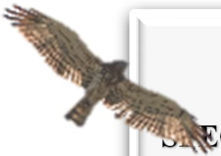
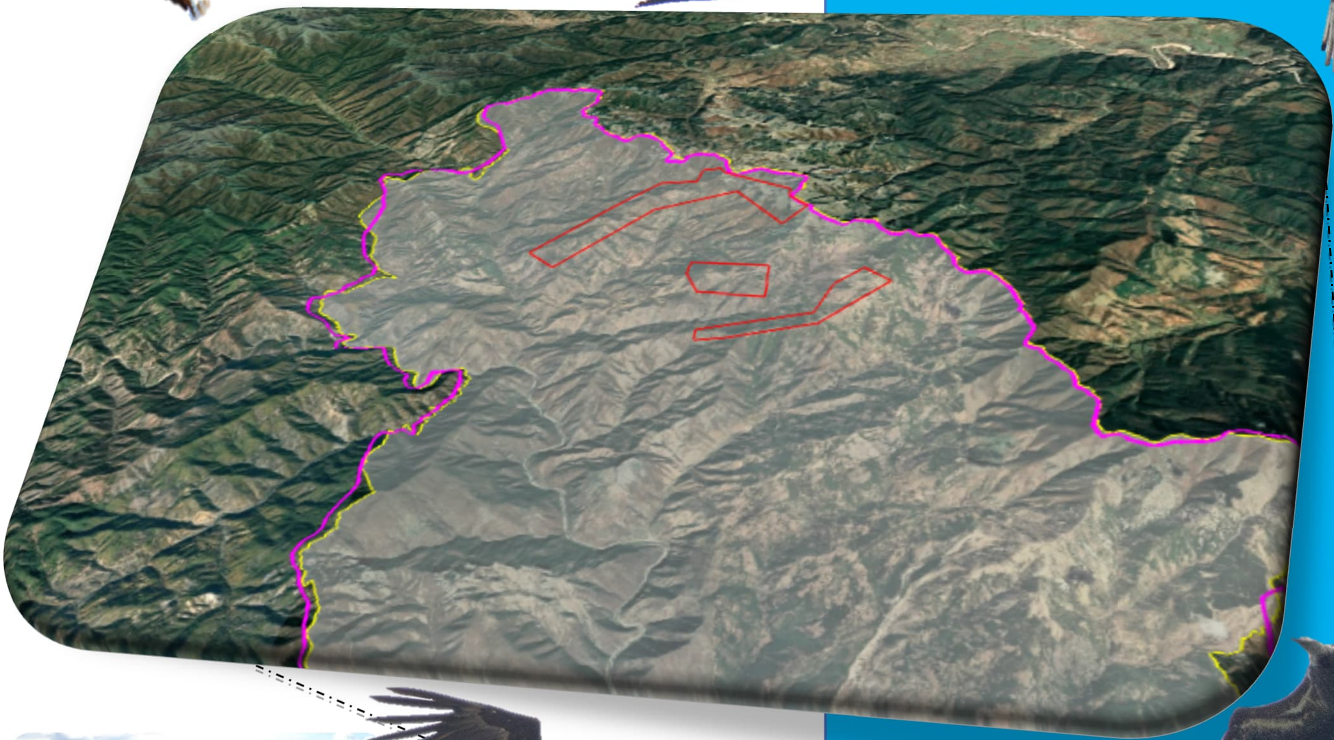
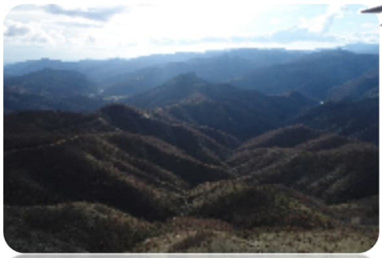
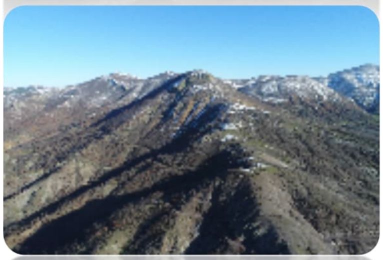


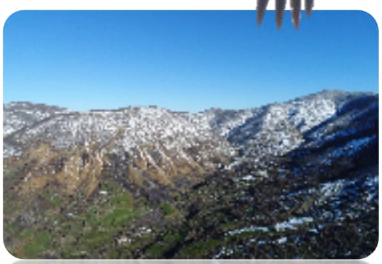
HELLENIC PETROLEUM RENEWABLE ENERGY SOURCES S.A.

SPECIAL ECOLOGICAL ASSESSMENT FOR THE PROTECTED ELEMENTS OF THE SPECIAL PROTECTION AREA WITH CODE GR1130012 AND NAME 'VALLEY OF KOMSATOU' AND THE IMPORTANT AREA FOR BIRDS OF GREECE WITH CODE GR009 AND NAME 'VALLEY OF KOMSATOU'









OCTOBER 2022

SPECIFIC ECOLOGICAL ASSESSMENT

SPECIAL ECOLOGICAL ASSESSMENT FOR THE PROTECTED ELEMENTS OF THE SPECIAL PROTECTION AREA WITH CODE GR1130012 AND NAME 'VALLEY OF KOMSATOU' AND THE IMPORTANT AREA FOR BIRDS OF GREECE WITH CODE GR009 AND NAME 'VALLEY OF KOMSATOU'

PROJECT PROMOTER

HELLENIC PETROLEUM RENEWABLE ENERGY SOURCES S.A.

PROJECT STUDY GROUP

Name	Specialty	Object
Psarikidis Athanasios	Forester - Environmental Scientist, M.Sc., Sustainable Management of the Environment and Natural Resources	Development of the survey methodology, coordination of fieldwork, field surveys, evaluation and synthesis of results and drafting of the final study
Fotopoulos Georgios	Forester - Environmental Scientist, M.Sc. Applied Geoinformatics in Environmental and Risk Management	Development of the survey methodology, coordination of fieldwork, field surveys, evaluation and synthesis of results and drafting of the final study
Apostolos Tsiobanoudis	Forester	Conducting field recordings and photography
Emrah Haji	Forester	Conducting field recordings
Valsamidis Evangelos	Forester, M.Sc. Urban Green Planning and Management	Conducting field recordings

Environmental Designer of the project

Psarikidis Athanasios	Forester - Environmental Scientist, M.Sc., Sustainable Management of the Environment and Natural Resources

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-Listing of the species of avifauna listed in Annex I 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

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1. INTRODUCTION

This Special Ecological Assessment (SEA) is prepared for the protected elements of the Special Protection Zone (SPA) code GR1130008 and name "Komsatou Valley" and the Important Bird Area of Greece (S.P.P.E.) with the code GR009 and the name 'Komsatou Valley', in the context of the EIA for the development project of a wind farm of the company HELLENIC PETROLEUM ANNEWABLE ENERGY SOURCES ANONYMIH ETAIRIE. The wind power plant is of nominal power of 148,8 MW, in the location "Xefoto", in the Municipality of Mykes, in the Regional Unit of Xanthi and is classified in Category A1 of the 10ης Group with *aa* 1, and type of project: Electricity generation from wind energy, based on the contract No. YPEN/DIPA/17185/1069 Modification and codification of the Directive under DIPA/oik. 37674/27-7-2016 ministerial decision "*Amendment and codification of ministerial decision 1958/2012 - Classification of public and private projects and activities in categories and subcategories according to paragraph 4 of article 1 of Law 4014/21.9.2011 (A' 209), as amended and in force*" (B' 2471) (Government Gazette 841/B/24-02-2022).

This study is prepared in accordance with the specifications resulting from the YA A.P. οικ. 170225. According to Article 13 of Law 4296/2014 (Government Gazette No. 205/B/27-01-2014), the need to prepare an EIA even for areas located outside special protection zones for avifauna but classified as SPAs arises, as based on the provisions of the Law: "*Article Thirteenth Article Obligation to prepare a special ornithological study for sites that are outside Special Protection Zones for avifauna 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 installations within the Special Protection Areas (SPAs) of avifauna and Important Bird Areas (IBAs) of Directive 79/409/EEC is permitted after the required under Article 10 of Law No. 4014/2011 Special Ecological Assessment (SEA) and based on the relevant provisions of 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 EIA for category B projects under the same law.*"

The entire project (boundaries of the power plant's production licence blocks, based on the special permit issued by P.A.E. No. P.A.E. AD - 08040 production licence) is located within the Special Protection Zone (SPA) with code GR1130012 and name 'Komsatou Valley' and within the Important Bird Area of Greece (IBA) with code GR009 and name 'Komsatou Valley'.

In this Special Ecological Assessment, the study team has chosen to examine and evaluate the potential impacts of the project on the protected elements of the following protected areas:

- The area with the code GR1130012, which is classified as a Special Protection Zone (SPA), covering an area of 16,600.86 ha (Government Gazette 4432/B/15-12-2017).
- The area with code GR009, which is classified as an Important Bird Area of Greece (S.I.P.P.E.), covering an area of 26.041 ha (https://www.ornithologiki.gr/el/oi-draseis-mas/diatirisi-erevna/simantikes-perioxes-gia-ta-poulia-tis-elladas/xartis-perioxon/GR009).

In addition, selected by the study team of this EOA, to examine and assess the potential impacts of the project on the protected elements of the closest Natura 2000 network area with code GR1130010 and name "Lakes Vistonis - Ismaris - Lagoons Porto Lagos, Salt Ptelea, Xirolimni, Karatza", which is classified as a Special Protection Zone (Z.E.P.), covering an area of 18,217.14 ha (Government Gazette 4432/B/15-12-2017), which is located at an average distance (in a straight line) of 18,500 meters, south of the boundaries of the production permit polygons of the project under study. In addition to supporting important predator - scavenger species, which according to their ecology are active in a large radius capable of covering the distance to the study area of the project, the above SPA also supports significant populations of waterfowl and wading birds, as it is one of the most important wetland complexes, both at national and European level. Many of the important waterfowl and wading bird species that this Natura 2000 protected area supports are breeding, wintering, either in concentration or using the area as a migration stopover, and therefore this SEA will consider whether the project (despite being located more than 18 km away) will affect their movements, particularly during the migration season.

Also, in this EOA, it was chosen by the study team to examine and assess the potential impacts of the project on the protected elements of the neighbouring Natura 2000 site BG0001032 "Rodopi - Iztochni", which is classified as a Special Area of Conservation (SAC).), with emphasis on those species of other fauna which, due to the distances they can travel during their daily movements (and the very short distance between the area of the project site and the boundaries of the above mentioned SPA), may be affected by the project. Those species of other fauna in the above mentioned EEZ.D, which were selected for examination, consist of 12 species of arthropods (*Barbastellus barbastellus barbastellus, Mioniopterus schreibersii, Myotis Bechsteinii, Myotis blythii, Myotis capaccinii, Myotis emarginatus, Myotis myotis, Rhinolophus blasii, Rhinolophus Euryale, Rhinolophus ferrumequinum, Rhinolophus hipposideros, Rhinolophus mehelyi*), because of the distances they can travel to meet their daily needs, five species of mammals (other than carnivores) (*Canis lupus, Ursus arctos, Myomimus roachi, Spermophilus citellus, Vormela peregusna*) and three species of reptiles (*Testudo graeca, Testudo hermanni, Elaphe sauromates*), which are either species with a large area of endemism (e.g.e.g. *Canis lupus*, *Ursus arctos*), or which may be affected by the project under consideration due to the proximity of the site of the project to the boundaries of the SPA.

The W/F under study at the location "XEFOTO" is proposed to be installed in the Municipality of Mykis, of the Regional Unit of Xanthi, by the company HELLENIC PETROLEUM RENEWABLE ENERGY SOURCES S.A., at an average distance (in a straight line) of more than 26 km northeast of the city of Xanthi . The project has received a production license and includes 24 wind turbines with a total installed capacity of 148.8 MW , (individual power of each wind turbine 6.2 MW), type SG 6.2 - 170, with a rotor diameter of 170 meters and a pylon height of 135 meters.

The coordinates of the project's polygons, as they were located by the project promoter, in a geodetic reference system ΕΓΣΑ'87 are shown in Table 1 below.

Table 1. Coordinates of vertices of polygons of the production license of the W/F at the XEFOTO site, based on the location of the project promoter.

Coordinates in ΕΓΣΑ'87					
AA	X	Y	AA	**X**	**Y**
	SECTION A			SECTION B	
1	598498,73	4572980,28	1	597011,58	4570892,12
2	598482,04	4572732,40	2	598352,36	4570684,18
3	598839,86	4572382,92	3	598370,45	4569856,00
4	598456,01	4571989,61	4	597226,96	4569944,48
5	597520,02	4573097,14	5	596976,50	4570406,50
6	596062,88	4572483,07	6	597011,58	4570892,12
7	594630,38	4570457,62		SECTION C	
8	594102,27	4570870,20	1	597360,83	4568909,08
9	595314,59	4572556,61	2	599176,59	4569377,54
10	596023,30	4573478,55	3	599463,28	4570237,62
11	596705,28	4573478,20	4	599929,76	4570627,51
12	596764,81	4573911,80	5	600373,23	4570253,62
13	597087,04	4573915,92	6	599251,42	4569042,14
14	597216,03	4573672,70	7	597862,49	4568666,37
15	598164,49	4573254,54	8	597377,06	4568651,78
16	598498,73	4572980,28	9	597360,83	4568909,08

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 category A projects and activities shall be included as an annex to the EIA, as an integral part of it, presenting, in addition to the information provided for in Article 10 of this Law: a) a detailed record of the natural environment 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) an appropriate impact assessment, in accordance with paragraph 10 of this Article.*

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

a) the habitat types of Annex I of the Regulation. H.P.14849/853/E103/4.4.2008 (B΄ 645), in particular as regards their representativeness, relative area and conservation status,

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

c) the species of avifauna listed in Annex I to the Regulation. 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,

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

Where significant adverse effects are assessed as likely, the necessary measures 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 compensatory measures shall be set out, with appropriate documentation and in accordance with the provisions of Article 10 of this Regulation."

In the present study, the relevant bird fauna (with emphasis on chironomids) of the areas in the ZEPs GR1130012 and GR1130010, in the SPA BG0001032, as well as in the SPA GR009 were studied. The compilation of the present 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 EIAs based on the M.O.P. οικ. 170225 (Government Gazette 135/B/27-01-2014), taking into account the provisions of Article 6 of Directive 92/43 and the provisions of Article 5 of the Directive 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 Category A1 of the 10ης Group with *aa* 1, and project type: Electricity generation from wind energy, on the basis of the Order No. YPEN/DIPA/17185/1069 Amendment and codification of the Directive under Ref. 37674/27-7-2016 ministerial decision "*Amendment and codification of the ministerial decision 1958/2012 - Classification of public and private projects and activities in categories and subcategories according to paragraph 4 of article 1 of Law 4014/21.9.2011 (A' 209), as amended and in force*" (B' 2471) (Government Gazette 841/B/24-02-2022), and according to Annex 3.2: Specifications of the Special Ecological Assessment Study (SEA) of YA A.P. οικ. 170225 (Government Gazette 135/B/27-01-2014) "*the fieldwork/field study shall include at least the following:*

- ***Fieldwork interval***

  Fieldwork covering the ecological requirements of an annual cycle time period 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 has been designated) unless it is *documented by the EEA designer that the time period of fieldwork can be limited.*

- ***Duration of fieldwork***

  Fieldwork that will have a total duration of 20 to 60 days, depending on the species or habitat types to be investigated, the area, the topography and the habitats of the area. 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 EOA, for projects and activities of Category A1, the study team carried out the fieldwork within the period November 2021 - October 2022, in order to include the ecological requirements of an annual cycle of avifauna (the breeding season of avifauna species, the spring and autumn migration and the wintering period).

A total of 56 field days were spent to achieve the above observation programme. More specifically, observation visits were made by three observers of the team for three days in the month of November 2021, six days in the month of December 2021, four days in the month of January 2022, five days in the month of February 2022, six days in the month of March 2022, six days in the month of April 2022, six days in the month of May 2022, five days in the month of June 2022, four days in the month of July 2022, four days in the month of August 2022, four days in the month of September 2022 and three days in the month of October 2022. On the above field days, all the field work was carried out, which involved recording work of avifauna (diurnal and nocturnal) and, in an ancillary capacity, other fauna (with emphasis on chironomids). The above field days also included hours spent observing behaviour and finding possible raptor nesting sites and critical habitats by the study team researchers.

This Special Ecological Assessment, taking into account the whole of the above mentioned legislative framework, includes:

- Introductory information concerning the planned project in the study area.
- Description of the design for the implementation of the study.

- Institutional framework concerning the relevant legislation on the necessity of RES, the protection of nature, and the environmental licensing of RES projects.
- Literature review in Greek and foreign language literature on the types of impacts of ESD on avifauna and other fauna (with emphasis on chironomids and other fauna species with a large endemic area).
- Preliminary impact assessment including the definition and description of the study area and the field survey area, the definition of species of interest from an analysis of existing information on the area (literature data) and the description of the protective scope of the study area, conservation objectives, etc., with a literature review and data collection for the area regarding avifauna - fauna (standard data forms, distribution maps, other literature sources), and finally
- Definition of the methodology for field surveys based on a combination of internationally accepted methods, by bird group and, alternatively, other fauna species and organisation of sampling sites by bird group and, alternatively, other fauna species according to ecological requirements and habitat suitability, definition of the timing of measurements, compilation of survey protocols by bird group and, alternatively, other fauna species and definition of the methodology for data analysis.
- Methodology and framework for impact assessment, with assessment - evaluation of the potential impacts of the proposed ESDP on the selected, due to its importance, species of avifauna and subsidiary species of other fauna (with emphasis on chironomids and species with a large endemic area), 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 patterns of presence, abundance and movements of the species in the field survey area such as: Field records - spatial distribution, height and movement patterns, 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 repeatability of the impact, etc.etc.) as well as an assessment of the synergistic effects both in the wider study area and in the vicinity of the studied ESU, especially for species with a large area of endemism such as birds of prey.

- Analysis and evaluation of the appropriate impact assessment with analysis of field records, analysis of records of important species (species of SPA designation and other important bird species), assessment of the significance of impacts, potential impacts from impacts, impacts from disturbance - containment barriers, impacts from direct habitat loss, synergistic-accumulative impacts at the study area level, but also, in a subsidiary manner, analysis and evaluation of the appropriate impact assessment of other fauna species. Analysis and evaluation of the appropriate impact assessment with analysis of field records, analysis of records of important cephalopod species (Annex II species of the Directive 92/43/EEC of the European Union) impact significance assessment, potential impacts from impacts, impacts from disturbance - containment barriers, impacts from direct habitat loss, synergistic-accumulative impacts at the level of the study area, but also analysis and evaluation of the appropriate impact assessment of other fauna species.
- Overall Assessment of the Current Assessment - Summary of Conclusions and proposed mitigation measures.
- Proposed monitoring of avifauna and, in an ancillary capacity, other fauna during the operational phase.

All of the above has been recorded in sections and subsections in such a way as to include all of the above information and to be consistent with the sections of the required EIA (to include all of the sections required in the EIA)

3. INSTITUTIONAL FRAMEWORK

This section summarises the framework of the institutional framework concerning the relevant legislation on the necessity of RES, as a necessary component for the implementation of an integrated rational climate change planning, the protection of nature and the environmental licensing of RES projects. This section first presents a brief literature review of the impacts of climate change on wildlife.

Impacts of climate change on wildlife

The global warming observed in recent decades has affected biological systems in several 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 over 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 most important 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 variation at different altitudes.
- Change in the phenology of migration.
- 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 the new climatic conditions are:

- ✓ Lack of phenotypic/genotypic adaptability, with species that cannot respond to adaptation being more vulnerable.
- ✓ Dispersal capacity, with species with low dispersal being unable to move to new suitable areas that will arise due to climate change, particularly where fragmented habitats arise.
- ✓ Ecological specialisation, with species that follow generalised dietary patterns and exhibit a greater range of flexibility in meeting their needs from the necessary natural resources (generalist) having a distinct advantage in adapting to new climatic conditions compared to species that exhibit specialisation in the above requirements (specialist).
- ✓ Species with small population sizes will be more vulnerable.
- ✓ Increasing the extremes of certain climate variables as a result of climate change will have additional negative impacts on 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 many 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.

Necessity of RES and protection of Nature

As the effects of climate change are increasingly being felt, European countries are already starting to design national strategies and implement their 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 March 2007 European Council 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 to combat climate change and increase the EU'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 in energy consumption at EU level, in order to contribute to reducing the EU's dependence on energy imports and to reducing greenhouse gas emissions. The target for the share of energy from renewable sources in gross final energy consumption in 2020, as set out 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 sources in gross final energy consumption is increased from 18% to 20%. In Greece, promoting 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_2 emissions 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% renewable energy consumption in 2030**
- ✓ Indicative EU-wide target for at least 27% improvement in energy efficiency in 2030
- ✓ Supporting the completion of the internal energy market by achieving the current electricity interconnection target of 10% as a matter of urgency and by 2020 at the latest, 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 great importance for sustainable development, saving energy resources, protecting the environment and addressing climate change (ypeka.gr/Default.aspx?tabid=287).

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 (from now on 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 transposed into national law and which concern the protection of sites belonging to the Natura 2000 network and the protection of species and their 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 (SPAs) or Sites of Community Importance (SCIs) which, according to Law 3937/2011 (Biodiversity Conservation and other provisions, Government Gazette 60/A/31.3.2011) are now designated as Special Conservation Areas (SCAs). In 2017, the inclusion of the new sites and the updating of the national list of Natura 2000 sites was established by means of the KYA 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, under the OP OPEPERA (NSRF 2007-2013) and implemented by the Biodiversity and Protected Areas Department of the Ministry of Environment and Natural Resources in 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 define 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 the species listed in Annex II occurring 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, either alone or in combination with other projects, shall be duly assessed as to its implications for the site, taking into account the objectives of its conservation. 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 they are satisfied that it will not harm the integrity of the site in question and, where appropriate, after public consultation.

4. If, despite the negative conclusions of the impact assessment and in the absence of alternatives, a plan 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 the location of 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 major public interest, may be raised."

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 define the necessary conservation measures and regulatory, administrative or contractual measures to protect protected objects (paragraph 1), to avoid habitat degradation and significant disturbance of species (paragraph 2), and to define the need to establish the necessary conservation measures and regulatory, administrative or contractual measures to protect protected objects (paragraph 3).

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 there are other provisions related to the environmental permitting of projects and/or the conservation of biodiversity, which contain relevant provisions on the application of paragraphs 3 and 4 of Article 6 of the 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 responsibility 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 RES-E, based on Directive 2009/28/EC (OJ L 140/2009), are set as follows by 2020: (a) 20% share of energy produced from RES in gross final energy consumption; (b) at least 40% share of electricity produced from RES 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 the final energy consumption for heating and cooling at a rate of at least 20%. d) Participation of energy produced from RES in the final energy consumption in transport at a rate of at least 10%."

Also, in accordance with Article 8 of the above law, which concerns the amendment of provisions to address climate change more effectively:

1. The title of Article 8 of Law 1650/1986, as in force, 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, renewable energy sources shall be promoted, as a priority, as a means of combating climate change, protecting the atmosphere, ensuring the sustainable energy supply of the country, achieving sustainable development and the sustainable use of the 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 are 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' shall be added:

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

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

"l. 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 the H.P. 37338/1807/E.103 of the Ministry of Agriculture and Forestry "*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.*" and in particular paragraphs 2, 3.1, 3.2 and 3.3 of Article 5 thereof, concerning measures for the protection and conservation of SPAs, it is stated that

2. Any project or programme falling within the provisions of Decree No 107017/2006 (B 1225), not directly related or necessary for the management of an SPA, but which is likely to have a significant impact on it, alone or in combination with other projects or programmes, shall be subject to an appropriate assessment of its effects, taking into account the conservation objectives of the SPA in question. On the basis of the conclusions of the assessment of the impact on the MPA, 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 MPA.

3.1 Any project or activity not directly related or necessary to the management of an SPA, but which may have a significant impact on it, alone or in combination with other projects or activities, shall be properly assessed for its effects, taking into account the conservation objectives of the SPA in question.

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 SPA 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 SPA, the competent authority shall agree to the project or activity only if it does not have significant negative effects on the ecological balance and integrity of the SPA.

3.3 If, despite the negative conclusions of the impact assessment and in the absence of alternatives, a project or activity has to 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 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 EEZs and SPAs, 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 the case, in order to ensure the overall coherence of the network of protected Within two months of the approval of these 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: "Modification 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 (WPPs)

Indicative of the above are the following in paragraphs 1, 3 and 4 of Article 5 B: "*1. The installation of RES-EEOs is not allowed within ZEPs 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 an EEZ exceed the boundaries of the Ramsar wetland concerned, then the installation of RES-E within a radius of three (3) kilometres (within the EEZ) from the boundaries of the wetland is not allowed.*

(...)

3. For the installation of ESUs within SPA areas, with one of the following spatial and/or colonial species designation: Vulture (Gyps fulvus), Egyptian vulture (Neophron percnopterus), black vulture (Aegypius monachus), vulture (Gypaetus barbatus), golden eagle (Aquila chrysaetos), sea eagle (Haliaeetus albicilla), spotted eagle (Hieraaetus fasciatus), black-necked gull (Falco eleonorae), black-necked stork (Ciconia nigra), black-headed gull (Falco naumanni), peregrine falcon (Falco peregrinus), black-headed gull (Circus aeruginosus), Common Stork (Circus pygargus), Kestrel (Hieraaetus pennatus), Eagle Falcon (Buteo rufinus), Golden Eagle (Falco biarmicus), Silverbird (Pelecanus crispus), rose-breasted pelican (Pelekanus onocrotalus), Egyptian gull (Larus audouinii), goldeneye (Calonectris diomedea) and myotis (Puffinus yelkouan), the number of hours of flight time 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 qualifying species 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. 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 RES-E within the ZEP areas, shall include 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 CASES OF ASPESVIRUS IN THE AVIAN POPULATION

Impact on avifauna

In order to draw firm conclusions that will allow the competent authorities to verify whether the project under consideration will adversely affect the integrity of the site, an appropriate and justified assessment based on the Directives on the conservation of rare and threatened species and habitats of European interest is required, based on reliable scientific field data and literature. An understanding of the negative impacts that wind power plants can have on avifauna and fauna is an essential tool for properly determining the appropriate assessment and evaluation of the impacts that wind power plants can have on the structure and function of the study area, in order to answer with the greatest possible certainty 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.

In accordance with Commission Decision No. H.P. 8353/276/E103: "Modification 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 impacts on the population of the qualifying species considered in defining the perimeter exclusion zone in each case are:

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

Also in accordance with No. οικ. 170225 (Government Gazette 135/B/27-01-2014):

- Causes delay or interrupt progress towards achieving the conservation objectives of the Natura 2000 site concerned as established.
- Reduce the area or fragment habitat types of the Natura 2000 site, threatening its integrity or affecting the representativeness and degree of conservation of its structure and ecological functions.
- Reduce the population size of species or affect the degree of habitat conservation or fragment it or affect the balance between species or affect the degree of isolation of species.
- Causing changes in vital parameters (e.g. nutrient balance, soil degradation from potential erosion dynamics of the relationship between biotic and abiotic parameters), which 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 RES 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 obstacles-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 the potential induced impacts (Strickland et al. 2011), with areas that are a concentration area 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 crossing zones appearing as per

Disturbance can be observed during construction and/or during the operation of wind turbines, and can be caused either by the presence of the 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 turbines 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 near these areas 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 raptor 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, Peace-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 wind turbines by 15-53%, while no changes in the flight height of raptors were observed in the vicinity of wind 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 decline in golden eagle activity in the area during the first period of operation of the LDF, with activity subsequently returning to its original levels. Significant evidence of displacement of the species was reported by Fielding and Haworth (2010) at three LPAs in Scotland. A study conducted in the USA estimated a 47% reduction in predator abundance following the construction of NPPs with most individuals remaining within a hundred metres of wind turbines, while mortality from impacts was estimated to be very low (Garvin et al. 2011). However, some studies have reported an increase in flight activity of some species in the vicinity of NPPs (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 predators in close proximity to 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 construction of a NPP (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 wintering gulls nesting in close proximity to a wind turbine NPP with twenty-eight turbines in Scotland found that the species continued to nest in very close proximity to them, flight density in the NPP 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 to be particularly sensitive at the population level to impacts from NPPs (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 NPP construction, possibly in response to the creation of new habitat (Bevanger et al. 2010, Pearce-Higgins et al. 2012). In most cases, disturbance effects on these species are limited to a short distance from the installed 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 A/G increased) and higher densities in the reference area compared to 80 m from A/G, confirming displacement, at least in this case, while similar patterns were reported by Pearce-Higgins et al. (2009) and Bevanger et al. (2010). Pearce-Higgins et al. (2009) report displacements of 100-200m from A/G for *Anthus pratensis* and *Oenanthe oenanthe*. Reduced densities (~12%) are also reported by Fernandez-Bellon (2018) in Ireland (in upland areas with wind compared to witness areas without wind) with most obvious/significant effects within 100m of A/G (~30% reduction). Hale et al. (2014), in grasslands in the USA, did not detect displacement within 500-750m of W/T for the 3 most abundant species. In contrast, Reichenbach & Steinborn (2011), report that (during a 7-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, in an ESU at an altitude of 800 - 1300 m) (Battisti et al. 2014) (Battisti et al. 2014) showed no difference in abundance (and number) of breeding species between the ESU site and the witness (control) site, while Bennett et al. (2014) studying bush-nesting stratiforms in the USA, generally report an absence of correlation of reproductive success of different species with distance from W/T. Another study in Italy (four years before and four years after construction) (Garcia et al. 2015) reports a slight decrease in the abundance of strathomorphs in the construction phase, and a gradual increase thereafter. In an extensive BACI survey in the USA (three AIS 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 of 9 breeding species (while attraction was observed for one species and no differentiation was observed for another). Displacement (and attraction) was generally observed within 100 m and often extended up to 300 m, with impacts observed one year after construction and for at least five years. In a year-round study of bird biocommunities in an ADF in Poland (Rosin et al. 2016), among the variables affecting species diversity and abundance was the distance to the nearest A/F (positive correlation). For wintering wetland species (wading birds and waterfowl), distances of disturbance (i.e. the distance from AWSs 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 full avoidance zone of 300m radius (from the A/Gs) 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, long-term investigation of the effects is required (to consider the reaction of new individuals in the population). In most cases, distances of up to 500m are reported (Hötker et al. 2006, Pearce-Higgins et al. 2009, Bevanger et al. 2010), while some species show a higher sensitivity (*Numenius arquata*, 800m). Fielding and Haworth (2015a, 2015b) studied the presence of 2 breeding species (*Calidris alpina*, *Pluvialis apricaria*, wetland/upland moorland and tundra species) in an AIS 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 400m from the W/T in the operational phase, Sansom et al. 2016). A BACI survey in Bulgaria (Zehtindjiev et al. 2017), reported that when comparing patterns in wintering populations of *Branta ruficollis* in an area with 200 W/T, no evidence of disturbance was detected (compared to the situation before the construction of the AACI).

Direct mortality of birds can be caused by impacts on the installations of the ESPO and mainly on the wind turbines (but also on the pylons, cables, wind masts, etc.). The likelihood of impact on the NPPs can be influenced by a multitude of factors related to the installation site, the characteristics of the NPP and the number and characteristics of species active in the NPP installation area (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 in SSCEOs near wetlands and in coastal areas and ridges, and generally lower in open farmland and other habitats. Higher risk on ridges, and especially in gaps and notches, is also reported by USFWS (2003). Katzner et al. (2012), studying the flight patterns of Golden Eagle individuals 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 windward slopes), 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 vulture 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 NPP, the size and layout of the wind turbines and the speed of the rotor can be critical variables affecting impact mortality. A more recent post-analysis for 15 ADFs (Marques et al. 2017b) found that the important parameters were orientation (higher mortality in NW facing locations), vegetation type (higher mortality in shrublands) and slope (higher in relatively flat areas). Particular topographical features likely to be used by categories of birds to gain height or the particular topography of the topography of the ESU site that may 'drive' large numbers of birds towards a particular ESU 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 there have been reported cases of high mortality in migratory oystercatchers attributed to disorientation due to lights (Gauthreaux and Belser 2006).

Impact 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 in 13 NSPs 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 risk 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 the use of the site depends to a considerable extent on the area, it is worth mentioning that in this study, the risk index was high for the stork (*Ciconia ciconia*), the two species of the genus *Milvus*, the vulture (*Gypaetus barbatus*), the Egyptian vulture (*Neophron percnopterus*), the hawk eagle and the spotted eagle (*Hieraaetus pennatus* and *H. fasciatus*) and the rock shrike (*Falco tinnunculus*). As regards oystercatchers (and other terrestrial species), the highest values of the index were for species such as mountain starling (*Tachymarptis melba*), tree starling (*Lullula arborea*), pale starling, tree starling (*Anthus campestris, A. trivialis*) and red-bellied starling (*Pyrrhocorax pyrrhocorax*). Finally, it should be noted that when monitoring mortality from impacts in the same study, the highest values were for the Vulture (Gyps fulvus), for which the risk index was relatively low (5.5%).

In a comprehensive analysis of findings for 44 LSEEs 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, Phlloscopus collybita, Circus pygargus.* These are mainly species that feed in the air in flocks (swallows/ ashtrays, they may also be attracted to the vicinity of W/Ts to feed on insects) and species of the family Alaudidae (starlings etc.) that also flock (outside the breeding season), fly display flights (at high altitude) during the breeding season and their habitat often coincides with areas of W/T development. 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 prey in the German ASPHS are *Buteo buteo, Milvus milvus, Haliaeetus albicilla* (De Lucas and Perrow 2017). In Spain, the most common prey are *Gyps fulvus, Falco tinnunculus, Circaetus gallicus*, while proportionally (relative to population) many prey are also reported 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 LSEs 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 ASPHE), 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 the Hawk and impact 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) and at Tarifa and Navara in Spain, Zeebrugge in Belgium (mainly gulls and terns), Everaert and Stienen 2008), while in recent years there has been a notable mortality (impacts, 39 individuals in 2006-2010) of the sea eagle (*Haliaetus albicilla*) in ESUs 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 vulture and golden eagle, which 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 Egyptian vulture (Carrete et al. 2009) and osprey (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 depends significantly on both species and site (Marques et al. 2014). Despite the given potential impact of wind turbines on avifauna, there is a plethora of published studies reporting that bird mortality in wind turbines 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 on bird turbines during migration do not appear to be very large, with the exception of migratory passes, as the flight height of birds is usually greater than the height of the 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 the direct loss or change in habitat structure and fragmentation from the installation of an ESU 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 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 to 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 for a large number of W/T in Canada (Zimmerling et al. 2013), direct habitat loss was estimated at 1.23 ha per W/T (including associated projects). Battisti et al. (2016) in a study of the installation of ASWE in a Mediterranean landscape with a mosaic of oak forests (Abruzzo, Italy), with A/W (and accompanying infrastructure) covering about 10% of the area (i.e. limited local perforation/dissection impacts), no differences were identified between the ESHEP 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 high area loss, e.g. >70% (Andren 1994 , Parker and Mac Nally 2002).

The effect of the operation of wind turbines as a containment barrier mainly relates to the fact that birds have to increase energy expenditure to avoid all wind 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 airspace of the APA. 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 the construction and operation of an AISP, changes in species passage behaviour were identified, with most species flying at higher altitudes than pre-AISP standards (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 behavior were detected. Thus, the movements of medium-sized raptors (spotted eagle, hawk eagle, wasp eagle) near the A/R decreased, while the passage patterns of other species (e.g., vulture, black vulture, snake eagle) were not affected. Also, most species passed at a higher altitude (compared to pre-ASU installation patterns). In a similar study in Portugal (Tome et al. 2017 , ADF with 25 A/Es) did not identify macro-avoidance patterns, but mid-avoidance (A/Es and line A/Es) patterns for herring gulls and wedge-tailed godwits (decrease in proximity crossings, increase in minimum distance from A/Es, increase in flight height), with wedge-tailed godwits appearing more sensitive (they changed course at greater distance and made "spiral" flights when within the ADF). Vulture reactions to the presence of W/T were much more limited. Similarly, in the case of a NPP in Sweden, a comparison of migratory bird passage patterns before and after construction showed clear avoidance of the NPP area by birds since during operation they passed through the adjacent areas with greater frequency (Bernhold et al. 2013) and Farfan et al. (2009) reported that most transits were parallel to the NPPs 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 AIS (~7.5 km long at the end of the study) on the crossing patterns of passing raptors (direction and "intersections" with the wind farm site, before and after construction) was investigated in 2009-2014, and fewer "intersections" were identified after construction (i.e. Macro-avoidance). Long-avoidance in terms of swan crossings in migration after construction of wind farms was also identified in a study in Japan (Moriguchi et al. 2017) and for raptors 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 marine NPPFs (Masden et al. 2009, Pettersson 2005, 2006). For example, in Swedish ASSPs, 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 impacts of the ASPEs on the avifauna in Greece and more specifically in the wider study area have been carried out by WWF Hellas and other scientists, with proposals for the proper siting of the ASPEs. 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 establishment of Exclusion Zones for the siting of ESUs (high use zones of Black-backed Owl and Vulture, high frequency zone of Black-backed Owl presence, areas of the National Forest Park of Dadia - Lefkimi - Soufli and Evros Delta, pine forest of Loutroi, vulture colony area in GR1110009, as well as circular areas with a radius of at least 1km. 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 placement of AISPs is allowed under certain conditions (the remaining areas within the ZEPs of the region, but also areas outside these where the Black-backed Vulture is active with moderate - low use and moderate frequency of data, as well as a radius of 5 km from raptor species with a large territory).

The paper by Ruiz et al. (2005) reports on the impact and flight behaviour of raptors in the Thrace region of existing ESUs, where few cases of impact are recorded, and not on birds of prey, with mortality occurrences concentrated at the beginning of the migration period. Few of the birds of prey with territories in the area flew in the danger zone of the parks, with a small proportion of these flights taking place 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 turbines in Thrace, four dead vultures and one falcon eagle, as well as individuals of eleven other non-predatory bird species were found within a 50 m radius of the turbines. More than half of the recorded flights were of vultures, black vultures and buzzards. According to the work of Kret et al. (2011) and Doutau et al. (2011), again, dead individuals of one black vulture, two snake eagles, three buzzards, one reed bunting and two osprey were detected in existing wind turbines in the above area, 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 Black-winged Teal 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 very 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 use of models to predict black grouse mortality in scenarios of simultaneous operation of all the LWRs 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 handrails 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 take 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), making 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 injuries to bats (Baerwald et al. 2008).

Bats are present almost everywhere and their mortality in 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 forests, 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 originally proposed in inappropriate locations, where they would have affected bats, were not installed due to a proper environmental impact assessment. For example, wind turbine projects 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 chironomid 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 cut down 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. In addition, 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 m 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 of particular importance to bats, such as tree rows, hedgerow networks, wetlands, water bodies and streams (Limpens et al. 1989, Limpens & Kapteyn 1991, De Jong 1995, Verboom & Kapteyn 1991, De Jong 1995, Verboom & Huitema 1997, Walsh & Harris 1996a, b, Kelm et al. 2014). The same applies to 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 impact on 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 for bats. Supporting infrastructure includes wind turbine bases, crane treads, temporary or permanent access roads, cables for connection to the grid and buildings. Construction should take place at an appropriate time to minimise the impact 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 turbines on cephalopods during the life cycle of onshore wind energy projects (Table 2) and the sensitivity of impact risk 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)

Τύποι επιπτώσεων	Φάση του έργου				
	Πριν από την κατασκευή	Κατασκευή	Λειτουργία	Παροπλισμός	Αναβάθμιση
Απώλεια και υποβάθμιση οικοτόπων	X	X	X	X	X
Όχληση και εκτοπισμός στους τόπους καταφυγίων	X	X	X	X	X
Κατάτμηση των οικοτόπων		X	X	X	
Πρόσκρουση			X	X	
Επίπτωση φραγμού			X	X	
Βαροτραύμα			X	X	
Απώλεια ή μετατόπιση διαδρόμων πτήσης και τόπων καταφυγίων		X	X	X	
Αυξημένη διαθεσιμότητα ασπόνδυλων θηραμάτων και, επομένως, αυξημένος κίνδυνος πρόσκρουσης, λόγω του νυχτερινού φωτισμού			X	X	
Έμμεσες επιπτώσεις		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)

Υψηλός κίνδυνος	Μέτριος κίνδυνος	Χαμηλός κίνδυνος
Είδη του γένους *Nyctalus*	Είδη του γένους *Eptesicus*	Είδη του γένους *Myotis*
Είδη του γένους *Pipistrellus*	Είδη του γένους *Barbastella*	Είδη του γένους *Plecotus*
Vespertilio murinus	*Myotis dasycneme*[2]	Είδη του γένους *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 the 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 carnivores) 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 badgers (*Meles meles*) in the UK had increased 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 the cortisol levels of badgers living close to wind farms from 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 system, 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 European badgers (*Cricetus cricetus*) within wind farms in Poland.

Łopucki, R., & 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) documented displacement of wolf (*Canis lupus)* nest sites (refugia) 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 roe deer (*Capreolus capreolus*) and hares (*Lepus europaeus*) avoided the interior of the wind power project and that there was a decrease in the frequency of habitat use 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. Fox (*Vulpes vulpes*) was observed to visit the interior wind energy project less frequently, possibly as a result of both less prey availability (hare) and reduced ability to hear when hunting. Foxes 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 European Commission 2020 document):

- The disturbance during construction may be temporary.
- The significance of impacts is likely to depend on the availability of habitat and existing levels of disturbance within the wider landscape.
- Avoidance of large areas around relevant infrastructure, such as transport lines, may be observed.
- Displacement of nest sites for larger predators may be observed.
- New access routes can make it easier for people to move around (but also 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 familiarity cannot be taken for granted, as it depends on variation according to species, sex, age, individual, season of the year and type of disturbance, as well as the frequency and predictability of disturbance.
- The significance of the impacts is likely to be directly proportional to the size of the wind energy project.

- The accumulation of many small impacts can 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 behaviour, physiology and morphology in a wind energy project in India (Thaker et al. 2018).

There is little empirical data available on the effects 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 response and monitoring

In this section we will refer to the mitigation measures and the guidelines for the mitigation of the impacts of wind farms on biodiversity and the compensatory measures proposed on the basis of international practices that have been implemented until today, taking into account the most recent proposals of international organizations and the 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 that emerged 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).

The above measures are divided into :

oAvoidance measures (avoidance measures)

oMinimization measures (minimization measures)

o Compensation measures

It is commonly accepted that proper siting of any project is the safest option to minimise 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). Sensitivity mapping is also an essential planning tool that allows the 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 mitigation techniques proposed in the international and domestic literature 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.

-Encourage the placement of wind turbines in groups to create communication corridors (flight paths) that will constitute safe zones through which birds can pass. It is suggested that a hill range with its branches be left clear, and a minimum flight path without a NPPF for crossing the hill ranges (WWF 2008). During the installation and operation of an ESU 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 paddling structures that allow birds to sit or congregate should be used in any facility.

-Warming of the runner: Birds are not able to perceive the cursor as something impenetrable once they are very close to it (motion smear). This phenomenon occurs at a distance of 20 m for small fins 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 at the wind farm: There is a general consensus that fixed lighting of wind turbines should be avoided to reduce the risk of collision. If this is unavoidable, the case of flashing white strobe 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.

-The size of the wind turbines: The literature review highlights the significant differences in the impacts of wind turbines on avifauna related to the density of turbine placement.

-Undergrounding of cables: structures such as power transmission cables should be placed 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, may be above ground, but it should be ensured that they are properly insulated and marked to minimise the risk of electrocution and birds striking them.

-Removal of dead animals: the obligation to immediately remove dead animals (dogs, sheep, goats, horses, cows, etc.) found within a 400 m radius of the base of the wind turbines should be provided for. 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 in the use of access roads only for the maintenance of the wind farm facilities, for research (monitoring programmes, etc.) or to serve the needs of the protection and management of the natural environment by the competent authorities and bodies to limit traffic to the minimum possible. After the installation of the wind turbines and the transport of the bulky components of the wind turbines, 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 wind turbines: In those cases where post-construction monitoring identifies some impacts (increased concentration or mobility of species on the site, incidents of collision 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 habitat management around wind farms: 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 wind farm should be required 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, as well as the other flora and fauna species in the area.

-Restoration of the surrounding area: After construction is complete, it is proposed that all unnecessary roads and encroachments be restored to limit access to the area resulting in disturbance.

-Monitoring of potential impacts: there should be an explicit obligation to monitor the impacts of the park, especially 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 competent Ministry of Environment 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, 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.

-Capability of interruption or cessation of operation of wind turbines: provision should be made for the occasional or seasonal interruption or permanent cessation of operation of wind turbines which, based on monitoring data, cause mortality.

-The amendment and supplementation of the 37338/1807/2010 EIA No. 8353/276/2012, refers to the obligation for RES-EEOs within ZEPs that have been characterized as migratory passages-constrictors, to have an automated system for stopping wind turbines and activating deterrent means.

Use of new technologies to monitor or counter/prevent the effects of impacts

In recent years, the technology for monitoring and recording of avifauna and flying birds (including manatees) has evolved significantly, 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 (including manatees), as well as on the movements and use of airspace by flying birds (including manatees), and on the use of airspace by flying birds (including manatees).

New technologies in the field of monitoring and mitigation of the impacts of RES projects consist of three main categories, which are:

A) Ornithological radar, B) Optical systems and C) Bioacoustic 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 a project operation, as they record incidents at the AIS, and some of them also provide the ability to record the presence and use of the site by species found in the area. In combination with specific software, they can provide a real-time response capability contributing to mitigation (e.g. automated wind turbine shutdown system, etc.). The main categories of new monitoring and mitigation technologies are presented below:

Ornithological radar

The ornithological radar has the ability to scan the airspace around it in 3D to record (a) the birds passing through the area, (b) the altitude at which they move, (c) the routes 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 done by using the following:

- Automated ornithological radar system, which has software to make decisions based on whether or not birds are detected on a collision course, and is directly linked to the SCADA to provide a stopping order.

- Non-automated ornithological radar system, where recording and real-time decision making is carried out by field researchers. Communication for immobilisation order is carried out with the wind farm operator at the control centre

Optical systems

Optical systems are based on high-resolution image analysis and target recognition. These systems have the capability to provide visual coverage of the entire airspace of the wind turbine on which they are installed. The optical systems can be mounted on the wind turbine tower without any intervention in the tower and with high-resolution cameras can cover a 360^o surveillance area around the wind turbine. These systems have a range of a few dozen to a few hundred meters, 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 the use of an optical system is related to the repelling of birds and/or the immobilisation of one or more wind turbines in cases where birds have an impact path to them. This requires real-time recording of the movement of flying birds and immediate decision-making. This is done 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 variable 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 the 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.

Wind turbine blade painting with black paint

According to research conducted by the Norwegian Institute for Nature Research in 2020, the visibility of W/Ts by birds was studied when one wing 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 A/Vs (20 A/Vs with 2.1MW and 48 A/Vs with 2.3MW). In the first week of August 2013, one of the three A/V blades on 4 A/Vs with 2.1MW were painted black, as dead birds due to impact had been recorded on them in the past. Neighbouring A/Vs were designated as control A/Vs for mortality searches, even though dead birds had previously been recorded on them, in order for the scientists/researchers to compare results in similar spatial conditions.

As previously mentioned, the BACI method was used to properly assess the impacts. There was 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, including their feathers, was carried out at regular intervals with the help of trained dogs, within a 100 m radius around the W/Ts, as well as by staff and passers-by. Usually, the carcasses were located close to the W/T or on the maintenance roads. After the end of the experiment, it was observed that the number of recorded carcasses increased in the control W/Ts and decreased in those where handling 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 W/Ts. This was checked by comparing the annual mortality rates in the control W/Ts with the other W/Ts before and after the experiment.

Specifically, after dyeing, the annual mortality rate **was reduced by an average of 71.9% compared to the control W/Ts**. In addition, seasonal mortality rates decreased strongly in the dyed A/Ws 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.

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 potential 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 the data collected before the wind project construction and during operation are 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 costs, minimise interference with wind turbine operation, and optimise their performance in protecting 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 areas of the SPA GR1130012 and SPA GR009, as well as on the nearest SPA GR1130010 and the neighbouring Bulgarian SPA BG0001032, in order to establish the necessity of 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 RES-EPP "XEFOTO" is of nominal capacity in the order of 148.8 MW, is to be installed in the Regional Unit of Xanthi, at the location "XEFOTO", and is located within the ZEP GR1130012, as well as within the SPA GR009.

In more detail, the W/F under study is located outside areas of absolute protection of nature, natural parks: national or regional parks, outside Special Conservation Zones (SACs) and outside Protected Landscapes and Landscape Features or Protected Natural Formations. The proposed project is also located outside National Parks and wetlands of international importance under the Ramsar Convention and outside Conservation of Natural Monuments and Aesthetic Forests. The nearest National Park is the National Park of Eastern Macedonia and Thrace, whose closest boundary is more than 14 km (in a straight line) south 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 of Conservation Monuments of Nature and Aesthetic Forests. The project site is also located outside Landscapes of Outstanding Natural Beauty (SSSIs). Finally, the project site is located outside Wildlife Refuges, the nearest of which is the K.A.Z. Kehrou - Kerasias Community of Kehrou whose nearest boundary is located at an average distance (in a straight line) of more than 8 km (8.30 km) south-southeast of the area of the production license blocks of the proposed ASPHE.

In the documentation maps section below, all of the above information is presented in relation to the location of the project in relation to Natura 2000 sites, National Parks, SPAs, RPAs and the field investigation area, as defined by the relevant EIA specifications for projects and activities of Category A1. Also, a map showing the land cover patterns is presented, according to the Corine land cover 2018 mapping, which also shows the location of the polygons of the wind farm under study, as well as the field research area.

According to the Special Spatial Planning Framework for Renewable Energy Sources (SPF-RES) (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. 3 of Article 6, as replaced by Article 13 of Law 4296/2014 (Government Gazette 214 A/2-10-2014). 4014/2011 Special Ecological Assessment (SEA) and based on the relevant provisions of 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 EIA for category B projects under the same law'.

The Study Area is defined **as** the wider area of the installation of the ASPE XEFOTO with the description and the characteristics mentioned referring to all the protected characteristics of the SPA GR1130012 and SPA GR009, while the protected characteristics of the nearest SPA GR11300010 and the neighbouring Bulgarian SPA BG0001032 were also taken into account. It is evident that while the production licence polygons of the studied ESDP, covering an area of approximately 660.89 ha, are small in comparison to the 16,600.86 ha of the GR1130012 SPA, and also in comparison to the GR009 SPA, the area of which amounts to 26,041 ha, and it is not possible to affect their values and protection purpose in the slightest, nevertheless the treatment of the area as a study area is considered to contribute to a more complete drafting of this report, due to the nature of the proposed project. It is emphasized that within the above-mentioned area of 660.89 ha of the production license blocks of the ASPE under study, a much smaller intervention will be carried out, with the total area of occupation of the project amounting to **only 35.5 ha**, as detailed in the MPE of the project under study.

The Field Investigation Area was defined as an area with a radius of 2,000 meters (twice the radius defined in the EIA-170225/20.01.2014 EIA-FEK 135/B/27-01-2014 for Class A1 projects and activities) from the boundaries of the project's production permit polygons and in practice covers a very large part of the mountainous volume of the project site. However, observations and recordings were made over a much larger radius, since from the viewpoints the observation of raptors could be made at a distance of even more than 5,000 m (using a telescope).

EXISTING SITUATION OF THE NATURAL ENVIRONMENT

Recording and analysis of the elements of the natural environment

The study presents, analyses and evaluates the specific characteristics and the specific environmental conditions prevailing in the wider project area, based on the data collected from both literature sources and from field surveys 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 network sites ZEP GR1130012, within which the study project is located, the nearest ZEP GR1130010 and the neighbouring Bulgarian EEZ BG0001032, on the integrity of the sites, as well as on their protected objects (species designation), due to the presence of large raptor species, which, according to their ecology, are active over a large radius, sufficient to cover the distance to the study area of the project, and mammal species with a large endemic area, as well as species of carnivores and other important fauna species listed in Annex II to Directive 92/43/EEC, which may use the area of interest and which, in order to meet their daily needs, are also active over a large radius, sufficient to cover the distance to the site of the project. In addition, account will also be taken of the protected elements of SPA GR009, within which, as mentioned above, the project under study is located.

STUDY AREA (M.P.M.)

Summary description of the areas GR1130012, GR1130010, BG0001032 and SPA GR009

The following is a brief description and identification of the areas defined in the context of this study as Study Area (ZEP GR1130012 and GR1130010, EEZ BG0001032 and SPA GR009).

Identification of areas (type, registration code, name)

GR1130012

According to the standardised area data form (TED/SDF) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1130012&release=8&form=Clean)

Code: GR1130012

Place name: Valley of Komsatou

Place Category: Special Protection Zone

GR1130010

According to the standardised area data form (TED/SDF) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1130010&release=8&form=Clean)

Code: GR1130010

Place name: Lakes Vistonis - Ismaris - Lagoons Porto Lagos, Salt Ptelea, Xirolimni, Karatza

Place Category: Special Protection Zone

BG0001032

According to the standardised area data form (TED/SDF) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0001032)

Code: BG0001032

Place name: Rodopi - Itzochni

Place Category: Special Conservation Area

GR0009

According to the data of the Hellenic Ornithological Society, the following applies to this particular SPA area:

Code: GR009

Place name: Valley of Komsatou

Place Category: Important Area for the Birds of Greece (SPA)

<u>Geographical definition of the areas (coordinates, altitude, surface area)</u>

GR1130012

According to the standardised area data form (TED/SDF) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1130012&release=9&form=Clean)

Code: GR1130012

Longitude: 25.173889

Latitude: 41.238611

Total area (ha): 16.492,95 ha

Region: Eastern Macedonia and Thrace

GR1130010

According to the standardised area data form (TED/SDF) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1130010&release=9&form=Clean)

Code: GR01130010

Longitude: 25.100000

Latitude: 41.052222

Total area (ha): 17.697,92 ha

Region: Eastern Macedonia and Thrace

BG0001032

According to the standardised area data form (TED/SDF) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0001032)

Code: BG0002106

Longitude: 25.846000

Latitude: 41.505000

Total area (ha): 217.446,9973 ha

Region: Yuzhen tsentralen

GR009

Based on the data from the publication of the Hellenic Ornithological Society (https://www.ornithologiki.gr/el/oi-draseis-mas/diatirisi-erevna/simantikes-perioxes-gia-ta-poulia-tis-elladas/xartis-perioxon/GR009), the following applies:

Code: GR009

Longitude: 25º 9´ 31.052´´ E

Latitude: 41º 12´44.873´´S

Altitude range: 0 - 1.098 m.

Total area (ha): 26.041 ha

Region: Eastern Macedonia and Thrace

Regional Units: Xanthi, Rodopi

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

As mentioned in the previous sections, the project site (wind turbine sites and associated works) is located within the Natura 2000 network area ZEP GR1130012, but also within the SPA GR009. However, due to the nature of the proposed project and for the better drafting of this Special Ecological Assessment, the drafting team has chosen to assess the nearest SPA GR1130010 and the neighbouring Bulgarian SPA BG0001032.

According to the description of the SPA GR009 (Hellenic Ornithological Society, Portolou et al. 2009), the wider area of the W/F includes a deep valley with dense riparian forest, which in places is surrounded by hills covered with broad-leaved deciduous forest (which grows freely), scrub and grassland. This is one of the best preserved areas in Greece, where traditional agricultural management practices continue to take place, as a result of the different development path that this remote border area has taken in recent decades. The special landscape of the area designated as Thracian Meteora, in combination with the rich birdlife, mainly of birds of prey, has been a pole of attraction for mountaineers and nature lovers in recent years, while ecotourism infrastructure (paths, signposting, etc.) has been created. However, the biodiversity of the area remains in a fragile state, as tourism development has begun to have a negative impact, with the constant widening of roads and an increase in the number of visitors. The main human activity is livestock farming.

The area is very important for breeding raptors and forest species, as well as for migratory raptors. 28 species of diurnal raptors have been observed, 17 of which nest in the area, making it the second richest area in terms of raptor species in Greece after Dadia (GR004). The valley is particularly important for the conservation of three species of vultures. The large livestock population, the population of wild horses, the sparse unlogged oak forest with low grazing intensity and the geographical isolation of the area due to the limited road network provide suitable conditions for the feeding of vultures.

The main threats to the area are the opening of an increasingly dense network of forest roads, poaching and the placement of poisoned baits, both by livestock farmers to control "noxious" mammals and by hunters to combat partridge and hare predators, which directly affects the populations of scavenging predators and may cause their disappearance from the area. In addition, large-scale clear-cutting projects of mature oak woodland to replace it with coniferous trees constitute a large-scale alteration of raptor habitat and forest species and landscape. Finally, the installation of wind farms is another risk to large predators and the birdlife of the area in general.

According to the website of the Hellenic Ornithological Society (https://www.ornithologiki.gr/el/oi-draseis-mas/diatirisi-erevna/simantikes-perioxes-gia-ta-poulia-tis-elladas/xartis-perioxon/GR009) and Portolou and others (2009), the habitat types that make up the habitat mosaic of the area are:

- Artificial landscapes: 8.2%
- Forests: 17,3 %.
- Grassland/grasslands: 2,2 %.
- Shrublands: 69,7 %.
- Rocky areas: 1,9 %.
- Wetlands (inland): 0,1 %

SPA GR009, as mentioned above, is important for breeding raptors and forest species, as well as for migratory raptors. According to the official website of the Hellenic Ornithological Society, the following are defined as important species for the SPA GR009:

Table 4: Important bird species for the study area
(Source: https://www.ornithologiki.gr/el/oi-draseis-mas/diatirisi-erevna/simantikes-perioxes-gia-ta-poulia-tis-elladas/xartis-perioxon/GR009)

Latin name	**Common name**	**Latin name**	**Common name**
Ciconia nigra	Blackbird	*clanga pomarina*	Screamer
microcarbo pygmaeus	Lagos	*aquila heliaca*	Basil Eagle
Falco biarmicus	Goldilocks	*Aquila chrysaetos*	Golden Eagle
Haliaeetus albicilla	Sea Eagle	*Hieraetus pennatus*	Falcon Eagle

Neophron percnopterus	Egyptian vulture	*aquila fasciata*	Spiraeus
Gyps fulvus	Vulture	*Dendrocopos syriacus*	Balkan woodpecker
Aegypius monachus	Black vulture	*picus canus*	Ashy woodpecker
Circaetus gallicus	Snake Eagle	*Ficedula semitorquata*	Oak woodpecker
Circus macrouros	Stepocirko	*Emberiza hortulana*	Strawberry
Buteo rufinus	Aetogeracina		

With regard to the established SPA GR1130012, which is the main study area within which the project is located, according to the publication "*Identification of compatible activities in relation to the species classification of the Special Protection Areas of avifauna, Supplementary deliverable: National List of Species Designation of* Special *Protection Areas" with the contracting authority being the Ministry of Environment and Natural Resources - Environmental Planning Directorate, Department of Natural Environment Management (Demaleksis 2010)*", and in accordance with the decision no. H.P.8353/276/E103 (Government Gazette 415/B/23-02-2012), the species classified are *Dendrocopos syriacus, Ficedula semitorquata, Emberiza hortulana and Phalacrocorax pygmeus (Microcarbo pygmaeus).*

According to the information given in the Standard Data Forms of the SPA GR1130012, it consists of a deep valley surrounded by hills with deciduous forests (mainly mature oak forests with free grazing), scrub and meadows. The main human activity is livestock farming.

In terms of the quality and importance of the SPA, this is a very important area for breeding and passing raptors.

The main threats listed in the Standard Data Forms of the Natura 2000 network site ZEP GR1130012 are presented in Table 5 below.

Table 5. Pressures and threats as reported in the standard data forms of the GR1130012 region (End 2018_15/03/2019) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1130012)

Codes	Pressures and threats	Ranking	In/out ZEP
A4.01	Intensive grazing	High	Within
A4.03	Abandonment of extensive livestock farming, lack of grazing	High	In/ outside
A5.03	Lack of livestock breeding	High	Within
C03.03	Wind energy production	Medium	In/ outside
F03.02.03	Trapping, poisoning, poaching	Low	Within
I02	Problematic native species	Medium	Within

Codes	Pressures and threats	Ranking	In/out ZEP
K01.01	Corrosion	High	Within
K03.04	Captivity	High	Within

With regard to the established SPA GR1130010, which is located at a distance of more than 18 km, according to the publication "*Identification of compatible activities in relation to the species classification 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 Natural Resources - 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 types of classification are: *Anas penelope (Mareca penelope), Anser erythropus, Ardeola ralloides, Aythya ferina, Aythya nyroca, Burhinus oedicnemus, Calandrella brachydactyla, Casmerodius albus (Ardea alba), Chlidonias hybrida, Ciconia ciconia, Cygnus olor, Fulica atra, Ixobrychus minutus, Lanius minor, Larus melanocephalus, Larus minutus (Hydrocoloeus minutus), Numenius tenuirostris, Oxyura leucocephala, Pelecanus crispus, Phalacrocorax carbo, Phalacrocorax pygmeus (Microcarbo pygmaeus), Phoenicopterus roseus, Platalea leucorodia, Plegadis falcinellus, Podiceps nigricollis, Puffinus yelkouan, Recurvirostra avosetta, Sterna albifrons (Sternula albifrons), Tachybaptus ruficollis, Tadorna ferruginea, Tadorna tadorna* and *Vanellus spinosus.*

According to the data given in the Standard Data Forms of the GR1130010 SPA area, it includes a series of coastal lakes and the estuaries of the Kosynthos, Komsatos and Filiouri rivers. The largest lake, which is Vistonida, is half brackish and half freshwater, drained by the Kosyntos and Komsatos rivers. The water of the Filiuri River flows into Lake Ismarida. The lagoons of Valtos, Elos, Ptelea, Aliki, Karatza, Hirolimni, Lafri-Lafrouda and Porto Lagos are highly saline. Within the area there are various habitats, such as large reed beds, bushes (salt marshes), salt marshes, dunes, neighbouring hills with long vegetation and agricultural land around the wetlands. Estuaries also contain small wetlands.

In terms of the quality and importance of the SPA, it is very important for the breeding, passage and wintering of waterfowl and raptors, as well as for the breeding of wading species associated with the reedbed habitat. The wetlands of the area, either as a single ecological unit (large wetland complex) or individually, continue to be of great ecological value for Greece and Europe. The diversity of the area in terms of wildlife habitats is remarkable, as are the significant populations of birds present in the area, which are protected by international conventions, and for many of these birds the area is perhaps the only one nationally where they occur. In terms of fauna, the presence of the mammal *Vulpes vulpes* is important, while in terms of flora, the quality of the site is indicated by the occurrence of certain important taxonomic groups. Among these, four taxa which are included in the WCMC and/or IUCN red list, two taxa which are rare in Greece and/or reach their extreme limits of distribution in Northern Greece and one taxon (*Pancratium maritimum*) which is seriously endangered by human activities on the coast.

The main threats listed in the Standard Data Forms of the Natura 2000 network site ZEP GR1130010 are presented in Table 6 below.

Table 6. Pressures and threats as reported in the standard data forms of the GR1130010 region (End 2018_15/03/2019) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1130010)

Codes	Pressures and threats	Ranking	In/out ZEP
A01	Crops	Medium	Except
A01	Crops	Low	Within
A04	Grazing	Medium	Except
A04	Grazing	Medium	Within
A09	Irrigation	Medium	Within
C01.01	Sand and gravel extraction	Low	Within
C03.03	Wind energy	-	-
D01.02	Roads Motorways	Low	Within
D01.05	Bridges	Low	Within
D03.01	Ports	Medium	Within
E01	Human settlements and urbanisation of areas	Low	Within
E02	Industrial or commercial areas	Medium	Except
E03.01	Disposal of household waste and waste from recreational facilities	Medium	Within
E03.01	Disposal of household waste and waste from recreational facilities	Medium	Except
E03.02	Industrial waste disposal/disposal	Medium	Except
F03.01	Hunting	Medium	Within
F03.01	Hunting	Medium	Except

Codes	Pressures and threats	Ranking	In/out ZEP
G05	Other human activities	High	Within
H	Pollution	Medium	Except
J01	Fire and fire suppression	Medium	Except
J01	Fire and fire suppression	Medium	Within
J02.03	River and stream dredging / water diversion	Medium	Except
K02.03	Eutrophism (natural)	Medium	Within

Regarding the neighbouring Bulgarian Natura 2000 network site EZZD BG0001032, according to the data given in the TEDs of this site, the area includes most of Eastern Rhodope. The north-eastern part of the area includes the Gorata hill, which consists of mature oak forests. In the south is the valley of the Arda and Krumovitza rivers, with grassland and rocky habitats. The south-eastern boundary of the EEZ includes the Byala and Luda river valleys. Next to the Greek-Bulgarian border are the higher hills Gumurdjinski Snejnik and Muglenik with well-preserved and mature oak and beech forests.

In terms of quality and importance of the EEZ, this is one area (among many in Bulgaria) where naturally mature oak forests still exist. Wandering brown bears are rarely observed near the Greek-Bulgarian border. Populations of wolves persist in the area, despite their disappearance from most areas due to poisoning in the 1970s throughout the country. The lower altitude parts of the area, in particular the valleys with access to water, are very important for the conservation of *Elaphe sauromates* and *Mauremus capsica*. Finally, the area is very important at national level for the conservation of the turtle species *Testudo hermanni* and *Testudo graeca.*

The main threats listed in the Standard Data Forms of the neighbouring Bulgarian Natura EEZ BG0001032 are presented in Table 7 below.

Table 7. Pressures and threats as reported in the Standard Data Forms of the BG0001032 region (End 2021_07/02/2022) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0001032)

Codes	Pressures and threats	Ranking	In/out EZD
A02	Modification of farming practices	Low	Within
A04.03	Abandonment of extensive livestock farming/lack of grazing	High	Within
A07	Use of biocides, hormones and chemicals	Low	Within
B	Forestry	High	Within
B01.02	Artificial planting in open areas with non-native species	High	Within

Codes	Pressures and threats	Ranking	In/out EZD
B02.01	Reforestation	High	Within
B02.02	Use of biocides, hormones and chemicals	Medium	Within
B02.03	Removal of the basement	Medium	Within
B02.04	Removal of dead and old trees	Medium	Within
B03	Forest exploitation without subsequent afforestation or natural regeneration	Medium	Within
D01.02	Roads and motorways	Low	Within
D02.01	Power and telephone transmission lines	Low	Within
E01	Human settlements and urbanisation of areas	Medium	Within
E02	Industrial or commercial areas	Medium	Within
E03.01	Disposal of household waste and waste from recreational facilities	Medium	Within
E03.03	Disposal of aggregates	Medium	Within
F03.01	Hunting	High	Within
F03.02	Illegal capture and removal of terrestrial fauna	Low	Within
F03.02.01	Collecting animals (insects, reptiles, amphibians)	Medium	Within
F03.02.03	Trapping, poisoning, poaching	High	Within
F04	Illegal collection and taking of flora species	Low	Within
G01.03	Motor vehicles	Medium	Within
H07	Other forms of pollution	Low	Within
J01	Fire and fire suppression	Medium	Within
J02	Human changes to the hydraulic conditions of the area	High	Within
J02.03	Cave-in and water divergence	High	Within
J02.05	Modification of hydrographic operation	High	Within

Detailed description of the Study Area (S.A.)

The following sections describe the elements of the natural environment of the Study Area with emphasis on the protected objects of the areas, which 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 H.P.14849/853/E103/4.4.2008 (Government Gazette B΄ 645), in terms of the relevant area (if it is an EEZ, TKS or pTKS).

The study area is not an EEZ or a TKS and for this reason there is no mapping of the habitat types of Annex I of this EIA. The land uses of the wider area recorded in the wider project area are listed in the relevant subsection, in accordance with the 2018 Corine Land Use Cover 2018 Land Use Mapping.

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 they are in an EPZ, TKC or PAC).

The study area, as mentioned above, does not constitute an EEZ or a TKS. However, due to the nature of the project and the proximity of the project site to the neighbouring Bulgarian EEZ BG0001032, it was decided by the study team of this project, as mentioned in the above sections of this document, to take into account the neighbouring EEZ, as within it there is a significant presence of Annex II species of Annex II of Directive 92/43/EEC, which according to their ecology are active over a large radius, sufficient to cover the distance to the site of the project, a significant presence of species of the following speciese.g. *Canis lupus, Ursus arctos*), but also the general presence of important fauna species listed in Annex II of the Directive, which may be affected due to the proximity of the SPA to the project under study (e.g. reptile species such as *Testudo graeca* and *Testudo hermanni* turtles).

According to the Standard Data Formmes of the site, the fauna species of Annex II of Directive 92/43/EEC, with all the recorded information concerning their population data, conservation status, etc. are presented in Table 8 below.

Table 8. Species of Annex II to Directive 92/43/EEC listed in the standard data forms for site BG0001032 (End 2021_07/02/2022) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0001032)

Species					**Population in the site**						**site assessment**			
G	**Code**	**Scientific name**	**S**	**NP**	**T**	**Size**		**Unit**	**Cat.**	**D.qual.**	**A|B|C|D**	**A|B|C**		
						Min	**Max**				**Pop.**	**Con.**	**Big.**	**Glo.**
A	**1193**	*Bombina variegata*			p	129	129	localities	C	G	B	A	C	A
A	**1171**	*Triturus karelinii*			p	24	24	localities	C	G	B	A	C	A
F	**1130**	*Aspius aspius*			p	36351827	36351827	area	P	P	C	B	A	A
F	**5088**	*Barbus cyclolepis*			p				C	DD	B	A	C	A
F	**1149**	*cobitis taenia*			p	3255320	3255320	i	C	G	B	B	C	A
F	**5339**	*Rhodeus amarus*			p	28981541	28981541	i	C	G	C	B	C	B
F	**1146**	*sabanejewia aurata*			p	86478	86478	i	V	G	C	A	C	A
I	**1093**	*Austropotamobius torrentium*			p			i	R	M	C	A	B	A
I	**1088**	*Cerambyx cerdo*			p	719443	1061539	i	R	M	B	B	C	A
I	**4045**	*Coenagrion ornatum*			p	1	1	localities	R	G	C	A	C	A
I	**4032**	*dioseghyana schmidtii*			p	139300	204282	i	C	M	B	A	B	A
I	**1074**	*Eriogaster catax*			p	80	865	i	V	P	A	A	C	B
I	**1065**	*Euphydryas aurinia*			p	26551	52864	i	C	P	B	A	A	A

Species					Population in the site						site assessment			
G	Code	Scientific name	S	NP	T	Size		Unit	Cat.	D.qual.	A|B|C|D	A|B|C		
						Min	Max				Pop.	Con.	Big.	Glo.
I	6199	*Euplagia quadripunctaria*			p	326977	625794	i	C	P	B	A	C	A
I	1083	*Lucanus cervus*			p	733930	1443777	i	R	M	B	B	C	A
I	1060	*Lycaena dispar*			p				V	DD	C	A	B	A
I	1089	*Morimus funereus*			p	1023658	1189018	i	R	M	B	B	C	B
I	1084	*osmoderma eremita*			p	102651	201042	i	R	M	B	B	C	B
I	4053	*Paracaloptenus caloptenoides*			p	15	15	localities	C	M	B	A	C	A
I	4022	*probaticus subrugosus*			p				V	DD	B	B	C	A
I	1087	*Rosalia alpina*			p	141916	258451	i	R	M	B	B	C	B
I	1032	*unio crassus*			p	49425850	49425850	i	R	M	B	A	C	A
M	1308	*Barbastella barbastellus*			p	725	1146	i	V	M	B	B	C	B
M	1352	*canis lupus*			p	25	30	i		G	B	A	C	A
M	1355	*Lutra lutra*			p	43	86	i		G	B	A	C	A
M	1310	*Miniopterus schreibersii*			r	2000	3500	i	C	G	B	B	C	B
M	1310	*Miniopterus schreibersii*			w	250	500	i	R	G	C	B	C	C
M	2617	*Myomimus roachi*			p	0	2	localities	V	P	B	B	B	B
M	1323	*Myotis bechsteinii*			p	973	1947	i	R	M	B	B	C	B
M	1307	*Myotis blythii*			p	3000	4500	i	C	G	A	A	C	A
M	1316	*Myotis capaccinii*			w	11	50	i	V	G	C	B	C	C
M	1316	*Myotis capaccinii*			r	2000	3500	i	R	G	A	B	C	A
M	1321	*Myotis emarginatus*			r	6000	10000	i	R	G	A	B	C	A
M	1324	*Myotis myotis*			r	3500	5000	i	C	G	A	B	C	A
M	1324	*Myotis myotis*			w	51	100	i	C	G	C	B	C	C
M	1306	*Rhinolophus blasii*			w	1000	1500	i	R	G	A	B	C	A
M	1306	*Rhinolophus blasii*			r	800	1200	i	R	G	A	B	C	A
M	1305	*Rhinolophus euryale*			w	101	250	i	V	G	C	B	C	C
M	1305	*Rhinolophus euryale*			r	500	1000	i	C	G	B	B	C	B
M	1304	*Rhinolophus ferrumequinum*			p	2000	3000	i	C	G	A	B	C	A
M	1303	*Rhinolophus hipposideros*			p	250	500	i	C	G	B	B	C	B
M	1302	*Rhinolophus mehelyi*			p	250	500	i	R	G	B	B	C	B
M	1335	*Spermophilus citellus*			p	11	11	colonies	R	G	C	C	C	B
M	1354	*Ursus arctos*			p	1	2	i		G	C	B	B	B
M	2635	*Pre-melon peregusna*			p	2	2	localities	R	M	C	B	C	A
P	2327	*Himantoglossum caprinum*			p				R		C	B	C	B
R	5194	*Elaphe sauromates*			p	1	1	localities	V	P	B	A	B	A
R	1220	*Emys orbicularis*			p	22	22	localities	C	G	B	A	C	A
R	1222	*caspica*			p	16	16	Localities	C	G	A	A	B	A
R	1219	*Testudo graeca*			p	136	136	Localities	C	G	B	A	C	A
R	1217	*Testudo hermanni*			p	162	162	Localities	C	G	B	A	C	A

Other important species in the area based on the same source

Species					Population in the site				Motivation					
G	CODE	Scientific name	S	NP	Size		Unit	Cat.	Species Annex		Other categories			
					Min	Max		C|R|V|P	IV	V	A	B	C	D
A		*Bufo viridis*						C					X	

Species					Population in the site				Motivation					
G	**CODE**	**Scientific name**	**S**	**NP**	**Size**		**Unit**	**Cat.**	**Species Annex**		**Other categories**			
					Min	**Max**		**C|R|V|P**	**IV**	**V**	**A**	**B**	**C**	**D**
A		*Hyla arborea*						C					X	
A		*Pelobates syriacus*						V					X	
A		*Rana dalmatina*						C					X	
F		*alburnus alburnus*						C						X
F		*Anguilla anguilla*						P			X			
F		*chondrostoma vardarense*						C				X		
F		*Gobio gobio*						C						X
F		*Leuciscus cephalus*						C						X
F		*Perca fluviatilis*						C						X
F		*Perca fluviatilis*						C						X
F		*Phoxinus phoxinus*						R						X
F		*Rutilus rutilus*						R						X
F		*Salmo trutta*						V				X		
F		*Sander lucioperca*						C						X
F		*Silurus glanis*						C					X	
F		*Vimba melanops*						R				X		
I		*Apatura metis*						C					X	
I		*Balcanodiscus frivaldskyanus*						P				X		
I		*Balkanopetalum petrovi*						P				X		
I		*Brenthe's hecate*						C						X
I		*bureschiana drenskii*						P				X		
I		*Callimenus macrogaster*						R			X			
I		*Duroniella laticornis*						R			X			
I		*Duvalius petrovi*						R				X		
I		*Hipparchia senthes*						C				X		
I		*lycaena ottomanus*						C				X		
I		*Maculinea arion*						C					X	
I		*Melitaea trivia*						C						X
I		*Ottiorhynchus beroni*						P				X		
I		*Paranocarodes chopardi*						R			X			
I		*Parnassius mnemosyne*						C					X	
I		*pieris ergane*						C						X
I		*Pontia chloridice*						C						X
I		*Pyrgus cinarae*						C						X
I		*Thymelicus acteon*						C						X
I		*Trichoniscus rhodopiense*						P				X		
I		*Cerynthia polyxena*						R					X	
P		*Acer heldreichii*						R			X			
P		*Adiantum capillus-veneris*						V			X			
P		*alkanna primuliflora*						R				X		
P		*Alkanna stribrnyi*						R				X		
P		*alkanna tinctoria*						R						X

Species					Population in the site				Motivation					
G	CODE	Scientific name	S	NP	Size		Unit	Cat.	Species Annex		Other categories			
					Min	Max		C|R|V|P	IV	V	A	B	C	D
P		*Anacamptis pyramidalis*						C			X			
P		*Anemone pavonina*						C						X
P		*Anthemis rumelica*						R				X		
P		*Anthemis virescens*						R			X			
P		*arbutus andrachne*						V			X			
P		*arbutus unedo*						V			X			
P		*Aristolochia rotunda*						R			X			
P		*Astracantha thracica*						V			X			
P		*Atropa bella-donna*						R			X			
P		*betonica haussknechtii*						R				X		
P		*Bunium ferulaceum*						V			X			
P		*Bupleurum apiculatum*						R				X		
P		*Bupleurum flavum*						R			X			
P		*capsella thracica*						R				X		
P		*Carduus thracicus*						C			X			
P		*Cephalanthera damasonium*						C					X	
P		*Cephalanthera epipactoides*						V			X			
P		*Cephalanthera longifolia*						C					X	
P		*cephalanthera rubra*						C					X	
P		*Chamaecytisus jankae*						R				X		
P		*Convolvulus boissieri*						V			X			
P		*crucianella graeca*						R				X		
P		*Crucianella latifolia*						R			X			
P		*Dactylorhiza romana*						R					X	
P		*Dalium velenovskyi*						R				X		
P		*Epipactis helleborine*						R					X	
P		*Epipactis microphylla*						R					X	
P		*Eriolobus trilobata*						V			X			
P		*Fritillaria pontica*						C				X		
P		*Gagea chrysantha*						V						X
P		*Galanthus elwesii*						R			X			
P		*galium mirum*						R				X		
P		*Geranium macrostylum*						V			X			
P		*gymnadenia conopsea*						R					X	
P		*Haberlea rhodopensis*						R					X	
P		*Hippocrepis unisiliquosa*						R			X			
P		*Hippomarathrum cristatum*						V			X			
P		*hypericum thasium*						R				X		
P		*holly*						V			X			
P		*Iris suaveolens*						R				X		
P		*Jovibarba heuffelii*						R				X		
P		*Lathraea rhodopaea*						R				X		

Species					Population in the site				Motivation					
G	CODE	Scientific name	S	NP	Size		Unit	Cat.	Species Annex		Other categories			
					Min	Max		C|R|V|P	IV	V	A	B	C	D
P		*Legousia pentagonia*						R			X			
P		*Lilium rhodopeum*						V					X	
P		*Limodorum abortivum*						R			X			
P		*Lotononis genistoides*						V			X			
P		*lupinus albus*						R			X			
P		*Lupinus angustifolius*						R						X
P		*Lupinus graecus*						R						X
P		*Micromeria juliana*						V			X			
P		*muscari vandasii*						C				X		
P		*Nigella orientalis*						V			X			
P		*nonnea atra*						R				X		
P		*Oenanthe lachenalii*						V			X			
P		*oenanthe millefolia*						R				X		
P		*Onobrychis degenii*						C				X		
P		*onosma thracica*						R				X		
P		*Ophrys apifera*						R			X			
P		*Ophrys cornuta*						C					X	
P		*Ophrys mammosa*						R					X	
P		*orchis coriophora*						R					X	
P		*orchis elegans*						R					X	
P		*Orchis laxiflora*						R			X			
P		*morello orchis*						C					X	
P		*orchis papilionacea*						C			X			
P		*orchis pinetorum*						R					X	
P		*Orchis provincialis*						V			X			
P		*orchis purpurea*						C					X	
P		*orchis simia*						C					X	
P		*orchis tridentata*						C					X	
P		*Pallenis spinosa*						R			X			
P		*Platanthera bifolia*						C					X	
P		*Platanthera chlorantha*						C					X	
P		*Polygala monspeliaca*						C			X			
P		*polygala rhodopaea*						R				X		
P		*Potentilla regis-borisii*						C				X		
P		*Quercus coccifera*						R			X			
P		*Quercus thracica*						V				X		
P		*ruta graveolens*						V			X			
P		*Salix xanticola*						R				X		
P		*Saponaria stranjensis*						R				X		
P		*Satureja pilosa*						C				X		
P		*Sempervivum ciliosum*						R			X			
P		*serapias vomeraceae*						R			X			

Species					Population in the site				Motivation					
G	CODE	Scientific name	S	NP	Size		Unit	Cat.	Species Annex		Other categories			
					Min	Max		C|R|V|P	IV	V	A	B	C	D
P		*cretaceous silene*						R			X			
P		*Silene lydia*						R			X			
P		*Smirnium rotundifolium*						R			X			
P		*spiranthes spiralis*						V			X			
P		*Stachys leucoglossa*						C				X		
P		*Stachys serbica*						R				X		
P		*Stefanoffia daucoides*						C			X			
P		*yew*						V			X			
P		*Thumus bracteosus*						V				X		
P		*Thymus atticus*						C				X		
P		*Trachelium rumelianum*						V				X		
P		*trapa natans*						V					X	
P		*Tulipa australis*						R						X
P		*verbascum humile*						C				X		
P		*verbascum juruk*						V				X		
P		*verbascum rupestre*						V				X		
P		*Verbascum spathulisepalum*						V				X		
R		*Ablepharus kitaibelii*						R					X	
R		*Coluber caspius*						C					X	
R		*Coluber najadum*						R					X	
R		*coronella austriaca*						R					X	
R		*Elaphe longissima*						R					X	
R		*Lacerta trilineata*						R					X	
R		*Lacerta viridis*						C					X	
R		*Natrix tessellata*						C					X	
R		*Podarcis erhardii*						C					X	
R		*Podarcis muralis*						C					X	
R		*Podarcis taurica*						C					X	
R		*viper ammodytes*						C					X	

Legend table 8

- **Group**: A = amphibians, B = birds, F = fish, I = invertebrates, M = mammals, P = plants, R = reptiles
- **S:** in case the species data are sensitive and therefore should be blocked for any public access enter: yes
- **NP:** in case a species no longer exists in the site enter: x (optional)
- **Type**: p = permanent, r = reproduction, c = concentration, 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**: the degree of protection of the habitat that is important for the species and the potential for its 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 large 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 8 above, the conservation status of all species was assessed from good (B) to excellent (A), except for *Spermophilus citellus*, for which the conservation status was assessed as moderate or degraded (C). Population data are shown for the majority of species, except for *Barbus cyclolepis, Austropotamobius torrentium, Lycaena dispar, Probaticus subrugosus, Himantoglossum caprinum.* For the species *Eriogaster catax, Myotis blythii, Myotis capaccinii, Myotis emarginatus, Myotis myotis, Rhinolophus blasii, Rhinolophus blasii, Rhinolophus ferrumequinum, Mauremys caspica,* the area supported more than 15% of the Bulgarian national population, having a population criterion of A, for the species *Bombina variegata, Triturus karelinii, Barbus cyclolepis, Cobitis taenia, Cerambyx cerdo, Dioszeghyana schmidtii, Euphydryas aurinia, Euplagia quadripunctaria, Lucanus cervus, Morimus funereus, Osmoderma eremita, Paracaloptenus caloptenoides, Probaticus subrugosus, Rosalia alpina, Unio crassus, Barbastella barbastellus, Canis lupus, Lutra lutra, Miniopterus schreibersii, Myomimus roachi, Myotis bechsteinii, Rhinolophus Euryale, Rhinolophus hipposideros, Rhinolophus mehelyi, Elaphe sauromates, Emys orbicularis, Testudo graeca, Testudo hermanni,* the area supported 2- 15% of the national Bulgarian population, with a population criterion of B, while for the species *Aspius aspius, Rhodeus amarus, Sabanejewia aurata, Austropotamobius torrentium, Coenagrion ornatum, Lycaena dispar, Miniopterus schreibersii, Myotis capaccinii, Myotis myotis, Rhinolophus Euryale, Spermophilus citellus, Ursus arctos, Vormela peregusna, Himantoglossum caprinum,* the area supported less than 2% of the Bulgarian national population.

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 SPA).

Based on the data of the SPA GR009, according to the Hellenic Ornithological Society and Portolou and others (2009), the species of avifauna found in the area with significant presence, especially in terms of population size and density, conservation status and isolation, are presented in Table 9 below (*the species showing data in the criteria 2000 column are the species characterizing the area*).

Table 9. Species of avifauna of the area listed in the Ornithological Society's Data Sheet for the SPA GR009, population estimates and criteria (https://www.ornithologiki.gr/el/oi-draseis-mas/diatirisi-erevna/simantikes-perioxes-gia-ta-poulia-tis-elladas/xartis-perioxon/GR009)

Kind of	Year	Status of presence	Plenty	Minimum population	Maximum population	Measurement unit	Data accuracy	Criteria 2000
Ciconia nigra	1998-08	B		2	4	P	B	
microcarbo pygmaeus	1998-08	W	R				B	A1, C1
Falco biarmicus	1998-08	B		1	1	P	B	
Haliaeetus albicilla	1998-08	R		0	1	P	A	
Neophron percnopterus	1998-08	B		2	3	P	B	
Gyps fulvus	1998-08	R		0	3	P	A	
Aegypius monachus	1998-08	U		1	3	I	B	
Cicraetus gallicus	1995	B		2	5	P	A	
Circus macrourus	1998-08	P	R				B	
Buteo rufinus	1998-08	R		2	3	P	B	
aquila pomarina	1998-08	B		2	3	P	B	
aquila heliaca	1998-08	P	R				B	
Aquila chrysaetos	1998-08	R		1	2	P	A	
Hieraetus pennatus	1998-08	B		1	2	P	C	
Hieraetus fasciatus	1998-08	U	P				C	
Dendrocopos syriacus	1998-08	R	A				C	B3, C6
picus canus	1992	B	R				C	
Ficedula semitorquata	1990	B	R				C	B2, C6
Emberiza hortulata	1995	B	C				B	B2, C6
Gyps fulvus	2013-2018	B		1	2	P	A	
Neophron percnopterus	2012-2018	B		1	1	P	A	
Aquila chrysaetos	2010-2013	B		3	3	P	A	

**Criteria EXPLANATION* MODEL *(Table 9)*

CATEGORY	*CRITERION*
A. Areas of global importance	
A1. Globally threatened species	*The area regularly supports significant numbers of a globally threatened species, or another species in need of global protection*
A2. Species of limited distribution	*The site is known, or is considered, to support a significant proportion of a species of restricted distribution, the breeding distribution of which defines an EBA (Bird Endemic Area) or SA (Secondary Area)*
A3. A group of species whose distribution is restricted to one type of habitat (biome)	*The site is known to support, or is thought to support, a significant proportion of the group of species whose distributions are mainly or entirely restricted to a biome*
A4. Gatherings	*(i) The site is known to support, or is considered to support on a regular basis, more than 1% of a biogeographic population of an aquatic species* *(ii) The area is known or believed to support on a regular basis more than 1% of the world population of a seabird or terrestrial species* *(iii) The site is known or believed to support on a regular basis more than 20,000 waterfowl, or 10,000 pairs of seabirds of one or more species.* *(iv) The area is known to, or is considered to, exceed the population limits set for migratory species*
B. Areas of European importance	
B1. Gatherings	*(i) The site is known to support, or is believed to support, more than 1% of a flyway or other distinct population of an aquatic species* *(ii) The area is known to support, or is thought to support, more than 1% of a distinct population of a seabird.* *(iii) The area is known or believed to support more than 1% of a flyway or other distinct population of another wild species* *(iv) Area where more than 5000 Stork, or 3000 raptors or Cranes regularly pass during spring or autumn migration*
B2. Species with an unfavourable conservation status in Europe (SPEC 1, 2 and 3)	*The site is one of the "n" most important in the country for a species with an unfavourable conservation status in Europe (SPEC 1, 2 and 3), for which a site-based approach is considered appropriate*
B3. Species with favourable conservation status but concentrated in Europe (SPEC 4)	*The site is one of the "n" most important in the country for a species with a favourable conservation status in Europe (SPEC 4), for which a site-based approach is considered appropriate*
C. Areas of importance in the European Union	
For species or subspecies listed in Annex I of the Community Birds Directive	*C1. The site regularly supports significant numbers of a globally threatened species, or another species in need of global protection*
	C2. The site is known to support at least 1% of a flyway or population size in the EU of an endangered species *C3. The site is known to support at least 1% of a flyway of another migratory species* *C4. The area is known to support on a regular basis at least 20,000 migratory waterfowl, or 10,000 pairs of seabirds of one or more species.* *C5. Area where more than 5000 Stork, or 3000 migratory raptors or Cranes regularly pass during spring or fall migration* *C6. The site is one of the 5 most important in a European region for a species or subspecies considered threatened in the European Union.* *C7. The area designated as SPA, or selected as a candidate SPA on the basis of ornithological*

With regard to the established SPAs GR1130012 (within which the proposed ESDP is located) and GR1130010, which are protected areas of the Natura network, all 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 10 and 11, as listed in the Standard Data Forms of GR1130012 and GR1130010.

At this point it is worth noting that the most important species of hornbills of the GR1130012 SPA are presented, as described in the 2019 edition of the 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 TEDs consists both in the fact that the latter is included in full, without the slightest difference, in the 2019 version 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-scavengers (e.g. *Aquila chrysaetos, Clanga pomarina, Hieraaetus pennatus, Gyps fulvus, Neophron percnopterus*) for which the area, as mentioned in previous subsections of this ERA, is very important, are not included in the latest version of the TENs for the GR1130012 SPA area. Also, important species of Annex I of Directive 2009/147/EC, such as e.g. *Ciconia nigra, are* not mentioned. The same applies to the nearest SPA GR1130010, within the revised TAP of which no important waterbirds, wading birds and birds of prey are mentioned (e.g. *Ardeola ralloides*, *Ardea purpurea, Buteo rufinus, Circus aeruginosus, Circus pygargus*, *Gyps fulvus*, *Haliaeetus albicilla*, *Hieraaetus pennatus, Neophron percnopterus*, *Pelecanus crispus*, *Pelecanus onocrotalus*, *Platalea leucorodia*, *Recurvirostra avosetta*, *Tadorna ferruginea*, *Tadorna tadorna* etc.) for which the area is very important both at national and European level, while many of them are also species of characterization (e.g. *Platalea leucorodia*, *Recurvirostra avorsetta, Tadorna ferruginea, Ardeola ralloides, Tadorna tadorna, Pelecanus crispus*) Also, important species of Annex I of Directive 2009/147/EC are not mentioned, e.g. *Coracias garrulus, Ciconia nigra, Ciconia ciconia* (the latter is also a designation species of the area).

The most important species of avifauna of the SPA GR1130012, as described in the 2019 version of the Standard Data Form (SDF/SDF), are presented below:

Table 10. Standard data forms of the GR1130012 region (End 2018_15/03/2019) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1130012)

Species					**Population in the site**						**site assessment**			
G	**Code**	**Scientific name**	**S**	**NP**	**T**	**Size**		**Unit**	**Cat.**	**D.qual.**	**A|B|C|D**	**A|B|C**		
						Min	**Max**				**Pop.**	**Con.**	**Big.**	**Glo.**
B	A402	*Accipiter brevipes*			r				P		C	A	B	B
B	A223	*Aegolius funereus*			p				P		C	A	C	C
B	A247	*alauda arvensis*			r				C		C		C	B
B	A229	*Alcedo atthis*			r				P		C	B	C	B
B	A255	*Anthus campestris*			r				P		C	A	C	B
B	A228	*Apus (Tachymarptis) melba*			r				P		C	B	C	B
B	A226	*Apus apus*			r				P		C		C	B
B	A091	*Aquila chrysaetos*			p				P		C	B	C	B
B	A089	*aquila pomarina*			r				P		C	B	B	B
B	A215	*bubo bubo*			p				P		C	A	C	B
B	A087	*Buteo buteo*			r				P		C		C	B
B	A403	*Buteo rufinus*			p				P		C	B	B	B
B	A224	*Caprimulgus europaeus*			r				P		C	A	C	B
B	A030	*Ciconia nigra*			c				P		C	B	B	B
B	A030	*Ciconia nigra*			r	1	1	p			C	B	B	B
B	A080	*Circaetus gallicus*			r				P		C	A	C	A
B	A231	*Coracia garrulus*			r				R		C	B	C	B
B	A738	*Delichon urbicum (urbica)*			r				P		C	B	C	B
B	A238	*Dendrocopos medius*			p				P		C	B	C	B
B	A429	*Dendrocopos syriacus*			p				P		C	A	B	B
B	A379	*Emberiza hortulana*			r				P		C	B	B	B
B	A098	*Falco columbarius*			w				P		C	B	C	B
B	A095	*Brown Falco*			r	3	3	p				B		
B	A709	*Falco peregrinus brookei*			p				P		C	A	C	B
B	A442	*Ficedula semitorquata*			r				R		B	B	C	A
B	A078	*Gyps fulvus*			p	5	8	p			B	B	C	B
B	A075	*Haliaeetus albicilla*			p	1	1	p			A	B	B	B
B	A092	*Hieraaetus pennatus (Aquila pennata)*			r				P		C	B	C	B
B	A439	*Hippolais olivetorum*			r				P		C	B	C	B
B	A251	*common hirundo*			r				P		C	B	C	B
B	A233	*Jynx torquilla*			r				P		C		C	B
B	A338	*Lanius collurio*			r	10	10	i/sq.km			C	B	C	B
B	A339	*Lanius minor*			r				P		C	B	C	B
B	A433	*Lanius nubicus*			r				P		C	B	C	B
B	A179	*Larus (Chroicocephalus) ridibundus*			w				P		C		C	B
B	A246	*Lullula arborea*			p				P		C	A	C	B
B	A230	*Merops apiaster*			c				P		C	B	C	B
B	A230	*Merops apiaster*			r				P		C	B	C	B
B	A077	*Neophron percnopterus*			r	1	1	p			C	B	C	B
B	A610	*Nycticorax nycticorax nycticorax nycticorax*			c				R		C	B	C	B
B	A337	*Oriolus oriolus*			c				P		C	B	C	B
B	A771	*passer hispaniolensis*			r				P		C	B	C	B
B	A072	*Pernis apivorus*			r				P		C	A	C	B
B	A393	*Phalacrocorax pygmaeus*			w				C		B	B	C	A
B	A234	*picus canus*			p				P		C	B	B	B
B	A210	*Streptopelia turtur*			r				C		C	B	C	B

Species					Population in the site						site assessment			
G	Code	Scientific name	S	NP	T	Size		Unit	Cat.	D.qual.	A|B|C|D	A|B|C		
						Min	Max				Pop.	Con.	Big.	Glo.
B	A307	*Sylvia nisoria*			r				R		C	B	B	B
B	A104	*Tetrastes (Bonasia) bonasia*			p				R		C	B	B	B

Other important species in the area based on the same source

Species					Population in the site						site assessment			
G	Code	Scientific name	S	NP	T	Size		Unit	Cat.	D.qual.	A|B|C|D	A|B|C		
						Min	Max				Pop.	Con.	Big.	Glo.
B	A726	*Charadrius dubius curonicus*						P			X			
B	A726	*Charadrius dubius curonicus*						P					X	
B	A726	*Charadrius dubius curonicus*						P						X
B	A211	*Clamator glandarius*						P			X			
B	A211	*Clamator glandarius*						P					X	
B	A207	*columba oenas*						P			X			
B	A207	*columba oenas*						P					X	
B	A207	*columba oenas*						P						X
B	A687	*Columba palumbus palumbus*						P			X			
B	A687	*Columba palumbus palumbus*						C			X			
B	A687	*Columba palumbus palumbus*						P						X
B	A687	*Columba palumbus palumbus*						C						X

Memorandum to Tables 10 and 11

- **Group:** A = amphibians, B = birds, F = fish, I = invertebrates, M = mammals, P = plants, R = reptiles
- **S:** in case the species data are sensitive and therefore need to be blocked for any public access enter: yes
- **NP:** in case a species no longer exists in the site enter: x (optional)
- **Type:** p = permanent, r = reproduction, c = concentration, 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**: the 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 large 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 10 above, detailed population data are very limited and for the majority of species the information available is an estimate of their presence in the area (present, common, rare, very rare). Population data appear for only six species: *Ciconia nigra, Falco naumanni, Gyps fulvus, Haliaeetus albicilla, Lanius collurio* and *Neophron percnopterus which* are Annex I species of the avifauna of Directive 2009/147/EC, none of them being a designated species of the area.

During the designation period, the conservation status of the majority of the species was assessed from excellent (B) to very good (A), except for *Alauda arvensis, Apus apus, Buteo buteo, Jynx torquilla* and *Larus ridibundus*, for which the conservation status was not assessed. For the characterisation species *Phalacrocorax pygmaeus* (*Microcarbo pygmaeus*) and *Ficedula semitorquata* the area supported 2-15% of the Greek population (population criterion B), while for the characterisation species *Emberiza hortulana* and *Dendrocopos syriacus* the area supported 0-2% of the Greek population (population criterion C). For the majority of species, except for the above characterisation species, the area supported 0-2% of the Greek population (population criterion C), with *Gyps fulvus* occurring with population criterion B (the area supported 2-15% of the Greek population) and *Haliaeetus albicilla* occurring with population criterion A (the area supported more than 15% of the Greek population).

The most important bird species of the nearest SPA GR1130012 (the area of the project under study, as mentioned above, is located at a distance of more than 18 km from the boundaries of this SPA), as described in the 2019 edition of the Standard Data Form (TED/SDF), are presented below:

Table 11. Standard data forms of the GR1130010 region (End 2021_07/02/2022) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1130010)

Species					Population in the site						site assessment			
G	Code	Scientific name	S	NP	T	Size		Unit	Cat.	D.qual.	A|B|C|D	A|B|C		
						Min	Max				Pop.	Con.	Big.	Glo.
B	A402	*Accipiter brevipes*			r	10	15		P		C	B	B	B
B	A298	*Acrocephalus arundinaceus*			r				P		C	B	C	B
B	A293	*Acrocephalus melanopogon*			c				P		C	B	C	B
B	A296	*Acrocephalus palustris*			c				P		C	B	C	B
B	A295	*Acrocephalus schoenobaenus*			r				P		C	B	C	B
B	A297	*Acrocephalus scirpaceus*			r				P		C	B	C	B
B	A168	*hypoleucous actitis*			c				P		C	B	C	B
B	A247	*alauda arvensis*			p				P		C	B	C	B
B	A229	*Alcedo atthis*			r	2	2	p	P		C	B	C	B
B	A229	*Alcedo atthis*			w	1	3	i	P		C	B	C	B
B	A054	*anas acuta*			w	220	500	i	P		C	B	C	B
B	A056	*anas clypeata*			r	1	1	p						
B	A056	*anas clypeata*			w	950	2300	i	P		C	B	C	B
B	A704	*Anas crecca crecca*			r	1	2	p		G	B	B	C	B
B	A704	*Anas crecca crecca*			w	3010	5360	i		G	B	B	C	B
B	A050	*Anas penelope*			w	2000	8240	i		G	B	B	C	B
B	A705	*Anas platyrhynchos platyrhynchos*			r	1	58	p	P		C	B	C	B
B	A705	*Anas platyrhynchos platyrhynchos*			w	2340	4440	i	P		C	B	C	B
B	A055	*Anas querquedula*			c	100	200	i	P		B	B	C	B
B	A055	*Anas querquedula*			r	1	14	p	P		B	B	C	B
B	A703	*Anas strepera strepera*			r	1	26	p	P		B	B	C	B
B	A703	*Anas strepera strepera*			w	186	820	i	P		B	B	C	B
B	A394	*Anser albifrons albifrons*			w	1	870	i		G	B	B	C	B
B	A043	*Anser anser*			w	10	20	i		G	C	B	B	B
B	A042	*Anser erythropus*			w	0	1	i		G	A	B	B	B
B	A255	*Anthus campestris*			r				P		C	B	C	B
B	A258	*Anthus cervinus*			c				P		C	B	C	B
B	A257	*Anthus pratensis*			c				P		C	B	C	B
B	A259	*Anthus spinoletta*			w				P		C	B	C	B
B	A256	*anthus trivialis*			c				P		C	B	C	B
B	A226	*Apus apus*			r				P		C	B	C	B
B	A090	*aquila clanga*			w	1	3	i		G	C	B	B	B
B	A699	*Ardea cinerea cinerea*			r	150	210	p		G				
B	A699	*Ardea cinerea cinerea*			w	80	230	i		G	C	B	C	B
B	A634	*Ardea purpurea purpurea*			r	1	11	p		G	A	B	C	B
B	A635	*Ardeola ralloides ralloides*			r	2	2	i		G	C	B	C	B
B	A169	*Arenaria interpres*			w	1	5	i	P		C	B	C	B
B	A222	*Asio flammeus*			r	1	1	p						
B	A222	*Asio flammeus*			w				P		C	B	C	B
B	A221	*Asiatic creature*			p	1	1	i						
B	A221	*Asiatic creature*			r	1	15	p						
B	A059	*Aythya ferina*			r	2	21	p						
B	A059	*Aythya ferina*			w	960	3630	i		G	B	B	C	B
B	A061	*Aythya fuligula*			w	5	210	i		G	B	B	C	B
B	A060	*Aythya nyroca*			r	2	24	p	P		A	B	C	B
B	A060	*Aythya nyroca*			w	2	7	i	P		A	B	C	B
B	A688	*Botaurus stellaris stellaris*			r	15	15	p	P		B	B	B	B
B	A396	*Branta ruficollis*			w	1	1	i	P		A	B	B	B
B	A215	*bubo bubo*			w	1	1	i	P		C	B	C	B

Species					Population in the site						site assessment			
G	Code	Scientific name	S	NP	T	Size		Unit	Cat.	D.qual.	A|B|C|D	A|B|C		
						Min	Max				Pop.	Con.	Big.	Glo.
B	A133	*Burhinus oedicnemus*			r	1	10	p	P		C	B	C	B
B	A087	*Buteo buteo*			r	7	7	p	P		C	B	C	B
B	A087	*Buteo buteo*			w	20	90	i	P		C	B	C	B
B	A403	*Buteo rufinus*			c				P		C	B	B	B
B	A403	*Buteo rufinus*			w	1	3	i	P		C	B	B	B
B	A243	*Calandrella brachydactyla*			r				P		C	B	C	B
B	A144	*Calidris alba*			w	1	20	i	P		C	B	C	B
B	A672	*Calidris alpina alpina*			w	610	2680	i	P		C	B	C	B
B	A147	*Calidris ferruginea*			c				P		C	B	C	B
B	A145	*Calidris minuta*			c				P		C	B	C	B
B	A145	*Calidris minuta*			w	1	440	i	P		C	B	C	B
B	A146	*Calidris temminckii*			c				P		C	B	C	B
B	A224	*Caprimulgus europaeus*			r				P		C	B	C	B
B	A682	*Charadrius alexandrinus alexandrinus*			r	1	21	p	P		C	B	C	B
B	A682	*Charadrius alexandrinus alexandrinus*			w	1	20	i						
B	A137	*Charadrius hiaticula*			r	1	3	p	P		C	B	B	B
B	A137	*Charadrius hiaticula*			w	2	2	i	P		C	B	B	B
B	A734	*hybrid chlidonias*			r	200		p	P		C	B	C	B
B	A198	*Chlidonias leucopterus*			c				P		C	B	B	B
B	A197	*chlidonias niger*			c				P		C	B	C	B
B	A667	*Ciconia ciconia ciconia*			r	80	130	i		G	C	B	C	B
B	A030	*Ciconia nigra*			r	2	2	p		G	B	B	B	B
B	A080	*Circaetus gallicus*			r	3	3	p	P		C	B	C	B
B	A081	*Circus aeruginosus*			r	12	12	p	P		C	B	C	B
B	A081	*Circus aeruginosus*			w	31	75	i	P		C	B	C	B
B	A082	*Circus cyaneus*			w	5	14	i	P		C	B	C	B
B	A083	*Circus macrourus*			c	5	5	i		G	B	B	B	B
B	A084	*Circus pygargus*			w				P		C	B	C	B
B	A231	*Coracia garrulus*			r	1	10	p	P		C	B	C	B
B	A113	*Coturnix coturnix*			r				P		C	B	C	B
B	A212	*Cuculus canorus*			r				P		C	B	C	B
B	A037	*Cygnus columbianus bewickii*			w	1	6	i		G	A	B	B	B
B	A038	*Cygnus cygnus*			w	5	5	i		G	A	B	B	B
B	A036	*cygnus olor*			r	2	49	p						
B	A036	*cygnus olor*			w	50	690	i		G	B	B	C	B
B	A738	*Delichon urbicum (urbica)*			r				P		C	B	C	B
B	A238	*Dendrocopos medius*			p				P		C	B	C	B
B	A429	*Dendrocopos syriacus*			p	30	30	p	P		C	B	B	B
B	A236	*Dryocopus martius*			r	3	3	p						
B	A698	*Egretta alba (Casmerodius albus albus)*			w	90	240	i		G	A	B	B	B
B	A697	*Egretta garzetta garzetta*			c	400	400	i		G	A	B	C	B
B	A697	*Egretta garzetta garzetta*			r	170	470	p		G	A	B	C	B
B	A697	*Egretta garzetta garzetta*			w	20	40	i		G	A	B	C	B
B	A382	*Emberiza melanocephala*			r				P		C	B	C	B
B	A269	*Erithacus rubecula*			w				P		C	B	C	B
B	A101	*Falco biarmicus*			w	1	2	i	P		C	B	C	B
B	A098	*Falco columbarius*			w	1	4	i	P		C	B	C	B
B	A100	*Falco eleonorae*			c	20	20	i		G	C	B	B	B
B	A709	*Falco peregrinus brookei*			c				P		C	B	C	B
B	A709	*Falco peregrinus brookei*			w	2	3	i	P		C	B	C	B
B	A099	*Falco subbuteo*			r	2	2	p	P	G	C	B	C	B
B	A097	*Falco vespertinus*			c	40		i	P		C	B	C	B
B	A321	*Ficedula albicollis*			c				P		C	B	C	B
B	A322	*Ficedula hypoleuca*			c				P		C	B	C	B
B	A320	*Ficedula parva*			c				P		B	B	B	B
B	A442	*Ficedula semitorquata*			c				P		C	B	C	B
B	A657	*fringilla coelebs*			r				P		C	B	C	B

Species					Population in the site						site assessment			
G	**Code**	**Scientific name**	**S**	**NP**	**T**	**Size**		**Unit**	**Cat.**	**D.qual.**	**A|B|C|D**	**A|B|C**		
						Min	**Max**				**Pop.**	**Con.**	**Big.**	**Glo.**
B	**A723**	*Fulica atra atra*			r				P		B	B	C	B
B	**A723**	*Fulica atra atra*			w	1900	8260	i		G	B	B	C	B
B	**A153**	*Gallinago gallinago*			w	1	60	i	P		C	B	C	B
B	**A689**	*Gavia arctica arctica*			w	4	9	i		G	B	B	B	B
B	**A001**	*Gavia stellata*			w	1	7	i		G				
B	**A625**	*Glareola pratincola pratincola*			r	1	59	p	P		C	B	C	B
B	**A078**	*Gyps fulvus*			c				P		C	B	C	B
B	**A130**	*Haematopus ostralegus*			r	1	38	p	P		C	B	C	B
B	**A130**	*Haematopus ostralegus*			w	60	160	i			C	B	C	B
B	**A075**	*Haliaeetus albicilla*			c	1	4	i		G	A	B	B	B
B	**A075**	*Haliaeetus albicilla*			r	2	2	p		G	A	B	B	B
B	**A092**	*Hieraaetus pennatus (Aquila pennata)*			c				P		C	B	C	B
B	**A131**	*Himantopus himantopus*			r	2	113	p	P		C	B	C	B
B	**A740**	*Hippolais (iduna) pallida*			r				P		C	B	C	B
B	**A299**	*hippolais icterina*			c				P		C	B	C	B
B	**A439**	*Hippolais olivetorum*			r	2	5	p	P		C	B	C	B
B	**A252**	*Daurian idiot*			r				P		C	B	C	B
B	**A251**	*common hirundo*			r				P		C	B	C	B
B	**A617**	*Ixobrychus minutus minutus*			r	1	9	p		G	B	B	C	B
B	**A338**	*Lanius collurio*			r				P		C	B	C	B
B	**A339**	*Lanius minor*			r				P		C	B	C	B
B	**A433**	*Lanius nubicus*			r	10	10	p	P		C	B	B	B
B	**A341**	*Lanius senator*			r				P		C	B	C	B
B	**A179**	*Larus (Chroicocephalus) ridibundus*			r	30	30	p	P		C	B	C	B
B	**A179**	*Larus (Chroicocephalus) ridibundus*			w				P		C	B	C	B
B	**A182**	*Larus canus*			w	1	20	i	P		C	B	B	B
B	**A180**	*Larus genei*			w	1	20	i	P		C	B	C	B
B	**A176**	*Larus melanocephalus*			c					G	A	B	C	B
B	**A177**	*Larus minutus*			c	13	13	i	P		C	B	C	B
B	**A157**	*lapponica limpet*			w	2	10	i	P		C	B	B	B
B	**A614**	*Limosa limosa limosa*			c	1	15	i	P		C	B	C	B
B	**A292**	*Locustella luscinioides*			r				P		C	B	C	B
B	**A246**	*Lullula arborea*			w				P		C	B	C	B
B	**A271**	*Luscinia megarhynchos*			r				P		C	B	C	B
B	**A242**	*Melanocorypha calandra*			p	90	90	i		G				
B	**A242**	*Melanocorypha calandra*			r				P		C	B	C	B
B	**A767**	*Mergellus albellus*			w	1	6	i		G	A	B	B	B
B	**A069**	*Mergus serrator*			w	20	60	i	P		C	B	C	B
B	**A230**	*Merops apiaster*			r				P		C	B	C	B
B	**A073**	*Milvus migrans*			c	1	1	i	P		C	B	C	B
B	**A262**	*motacilla alba*			r				P		C	B	C	B
B	**A261**	*motacilla cinerea*			w				P		C	B	C	B
B	**A260**	*motacilla flava*			r				P		C	B	C	B
B	**A319**	*Muscicapa striata*			r				P		C	B	C	B
B	**A077**	*Neophron percnopterus*			c				P		C	B	C	B
B	**A159**	*Numenius tenuirostris*			c	1	1	i		G	A	B	B	B
B	**A610**	*Nycticorax nycticorax nycticorax nycticorax*			c	100	200	i		G	C	B	C	B
B	**A278**	*oenanthe hispanica*			r				P		C	B	C	B
B	**A337**	*Oriolus oriolus*			r				P		C	B	C	B
B	**A214**	*otus scops*			p				P		C	B	C	B
B	**A214**	*otus scops*			r	1	3	p						
B	**A071**	*Oxyura leucocephala*			w	1	103	i		G	A	B	B	B
B	**A094**	*Pandion haliaetus*			c					G	C	B	C	B
B	**A771**	*passer hispaniolensis*			r				P		C	B	C	B
B	**A020**	*Pelecanus crispus*			c	250	700	i		G	A	B	B	B
B	**A020**	*Pelecanus crispus*			w	300	1200	i		G	A	B	B	B

Species					Population in the site						site assessment			
G	**Code**	**Scientific name**	**S**	**NP**	**T**	**Size**		**Unit**	**Cat.**	**D.qual.**	**A|B|C|D**	**A|B|C**		
						Min	**Max**				**Pop.**	**Con.**	**Big.**	**Glo.**
B	**A019**	*Pelecanus onocrotalus*			c	100	150	i		G	A	B	B	B
B	**A019**	*Pelecanus onocrotalus*			w	2	10	i		G	A	B	B	B
B	**A072**	*Pernis apivorus*			r	1	1	p	P	G	C	B	C	B
B	**A392**	*Phalacrocorax aristotelis desmarestii*			r	12	12	p		G				
B	**A392**	*Phalacrocorax aristotelis desmarestii*			w	20	40	i	P	G	C	B	B	B
B	**A391**	*Phalacrocorax carbo sinensis*			w	1200	10500	i		G	B	B	C	B
B	**A393**	*Phalacrocorax pygmaeus*			w	10	1270	i		G	A	B	B	B
B	**A170**	*Phalaropus lobatus*			c				P		B	B	B	B
B	**A151**	*Philomachus pugnax*			c	1	1	i	P		C	B	C	B
B	**A663**	*Phoenicopterus roseus*			c	2000	5500	i		G	A	B	C	B
B	**A663**	*Phoenicopterus roseus*			w	1280	4100	i		G	A	B	C	B
B	**A273**	*Phoenicurus ochruros*			w				P		C	B	C	B
B	**A274**	*Phoenicurus phoenicurus*			c				P		C	B	C	B
B	**A315**	*Phylloscopus collybita*			w				P		C	B	C	B
B	**A314**	*Phylloscopus sibilatrix*			c				P		C	B	C	B
B	**A316**	*Phylloscopus trochilus*			w				P		C	B	C	B
B	**A234**	*picus canus*			r	1	3	p						
B	**A234**	*picus canus*			w				P		C	B	B	B
B	**A607**	*Platalea leucorodia leucorodia*			w	9	25	i		G	B	B	C	B
B	**A700**	*Plegadis falcinellus falcinellus falcinellus*			c	300	600	i		G	B	B	C	B
B	**A140**	*Pluvialis apricaria*			w	10	320	i	P		C	B	C	B
B	**A141**	*Pluvialis squatarola*			w	90	300	i		G	C	B	C	B
B	**A691**	*Podiceps cristatus cristatus*			r	1	57	p	P	G	C	B	C	B
B	**A691**	*Podiceps cristatus cristatus*			w	1	2145	i		G	C	B	C	B
B	**A692**	*Podiceps nigricollis nigricollis*			r	2	5	p		G				
B	**A692**	*Podiceps nigricollis nigricollis*			w	50	240	i		G	B	B	C	B
B	**A719**	*porzana parva*			c				P		C	B	B	B
B	**A119**	*Porzana porzana*			c				P		C	B	B	B
B	**A720**	*Porzana pusilla intermedia*			c				P		C	B	B	B
B	**A464**	*Puffinus yelkouan*			w	700	1000	i		G	B	B	B	B
B	**A132**	*Recurvirostra avosetta*			r	1	39	p	P		C	B	C	B
B	**A132**	*Recurvirostra avosetta*			w	200	1300	i	P		C	B	C	B
B	**A249**	*riparia riparia*			r				P		C	B	C	B
B	**A275**	*Saxicola rubetra*			c				P		C	B	C	B
B	**A731**	*Sterna (Gelochelidon) nilotica nilotica*			c	1	1	i	P	G	C	B	C	B
B	**A731**	*Sterna (Gelochelidon) nilotica nilotica*			r	1	1	p		G	C	B	C	B
B	**A191**	*Sterna (Thalasseus) sandvicensis*			w	20	60	i	P		C	B	C	B
B	**A193**	*Sterna hirundo*			r	3	70	p	P		C	B	C	B
B	**A210**	*Streptopelia turtur*			r				P		C	B	C	B
B	**A351**	*Sturnus vulgaris*			r				P		C	B	C	B
B	**A351**	*Sturnus vulgaris*			w				P		C	B	C	B
B	**A310**	*Sylvia borin*			c				P		C	B	C	B
B	**A770**	*Sylvia cantillans*			r				P		C	B	C	B
B	**A308**	*Sylvia curruca*			c				P		C	B	C	B
B	**A397**	*tadorna ferruginea*			w	30	30	i		G	B	B	B	B
B	**A048**	*Tadorna tadorna*			r	3	80	p	P		B	B	C	B
B	**A048**	*Tadorna tadorna*			w	860	2430	i		G	B	B	C	B
B	**A725**	*Tetrax tetrax tetrax*			w	1	1	i	P	G				
B	**A161**	*Tringa erythropus*			c	1	90	i	P		C	B	C	B

Species					Population in the site						site assessment			
G	**Code**	**Scientific name**	**S**	**NP**	**T**	**Size**		**Unit**	**Cat.**	**D.qual.**	**A|B|C|D**	**A|B|C**		
						Min	**Max**				**Pop.**	**Con.**	**Big.**	**Glo.**
B	**A166**	*Tringa glareola*			c	120	250	i	P		C	B	C	B
B	**A164**	*Tringa nebularia*			w	2	12	i	P		C	B	C	B
B	**A165**	*tringa ochropus*			w	1	3	i	P		C	B	C	B
B	**A163**	*Tringa stagnatilis*			c	2	2	i	P	G	C	B	C	B
B	**A162**	*Tringa totanus*			r	1	10	p	P		C	B	C	B
B	**A162**	*Tringa totanus*			w	110	460	i						
B	**A285**	*Common Turd*			c				P		C	B	C	B
B	**A232**	*Upupa epops*			r				P		C	B	C	B
B	**A142**	*Vanellus vanellus*			r	2	11	p						
B	**A142**	*Vanellus vanellus*			w	1	3040	i	P	G	C	B	C	B
B	**A167**	*Xenus cinereus*			c				P		A	B	B	B

Other important species in the area based on the same source

Species					**Population in the site**				**Motivation**					
G	**CODE**	**Scientific name**	**S**	**NP**	**Size**		**Unit**	**Cat.**	**Species Annex**		**Other categories**			
					Min	**Max**		**C|R|V|P**	**IV**	**V**	**A**	**B**	**C**	**D**
A	1193	*Bombina variegata*	-	-				P			X			
A	1193	*Bombina variegata*	-	-				P					X	
A	1193	*Bombina variegata*	-	-				P						X
A	1193	*Bombina variegata*	-	-				P	X					
A	2361	*Bufo bufo*	-	-				P			X			
A	2361	*Bufo bufo*	-	-				P					X	
A	1201	*Bufo viridis*	-	-				C			X			
A	1201	*Bufo viridis*	-	-				C					X	
A	1201	*Bufo viridis*	-	-				C	X					
A	1203	*Hyla arborea*	-	-				C			X			
A	1203	*Hyla arborea*	-	-				C					X	
A	1203	*Hyla arborea*	-	-				C	X					
A	1200	*Pelobates syriacus*	-	-				P			X			
A	1200	*Pelobates syriacus*	-	-				P					X	
A	1200	*Pelobates syriacus*	-	-				P	X					
A	1209	*Rana dalmatina*	-	-				P			X			
A	1209	*Rana dalmatina*	-	-				P					X	
A	1209	*Rana dalmatina*	-	-				P	X					
A	1212	*rana ridibunda*	-	-				P			X			
A	1212	*rana ridibunda*	-	-				P					X	
A	1212	*rana ridibunda*	-	-				P						
A	2351	*Salamandra salamandra*	-	-				P			X			
A	2351	*Salamandra salamandra*	-	-				P					X	
A	1171	*Triturus karelinii*	-	-				P			X			

Species					Population in the site				Motivation					
G	**CODE**	**Scientific name**	**S**	**NP**	**Size**		**Unit**	**Cat.**	**Species Annex**		**Other categories**			
					Min	**Max**		**C|R|V|P**	**IV**	**V**	**A**	**B**	**C**	**D**
A	1171	*Triturus karelinii*	-	-				P					X	
A	1171	*Triturus karelinii*	-	-				P						X
A	1171	*Triturus karelinii*	-	-				P	X					
A		*Triturus vulgaris*	-	-				P			X			
A		*Triturus vulgaris*	-	-				P					X	
B	A633	*Accipiter nisus*	-	-	1	6	i				X			
B	A633	*Accipiter nisus*	-	-	1	6	i						X	
B	A633	*Accipiter nisus*	-	-	1	6	i							X
B	A218	*athena noctua*	-	-	1	11	p				X			
B	A218	*athena noctua*	-	-	1	11	p						X	
B	A062	*Aythya marila*	-	-	13	13	i				X			
B	A062	*Aythya marila*	-	-	13	13	i						X	
B	A062	*Aythya marila*	-	-	13	13	i							X
B	A067	*Bucephala clangula*	-	-	1	60	i	P			X			
B	A067	*Bucephala clangula*	-	-	1	60	i	P					X	
B	A067	*Bucephala clangula*	-	-	1	60	i	P						X
B	A088	*Buteo lagopus*	-	-	1	2	i	P			X			
B	A088	*Buteo lagopus*	-	-	1	2	i	P					X	
B	A088	*Buteo lagopus*	-	-	1	2	i	P						X
B	A143	*Calidris canutus*	-	-	25	150	i	P			X			
B	A143	*Calidris canutus*	-	-	25	150	i	P					X	
B	A143	*Calidris canutus*	-	-	25	150	i	P						X
B	A365	*Carduelis spinus*	-	-				P			X			
B	A365	*Carduelis spinus*	-	-				P					X	
B	A726	*Charadrius dubius curonicus*	-	-	1	13	p	P			X			
B	A726	*Charadrius dubius curonicus*	-	-	1	13	p	P					X	
B	A726	*Charadrius dubius curonicus*	-	-	1	13	p	P						X
B	A289	*cisticola juncidis*	-	-				P			X			
B	A289	*cisticola juncidis*	-	-				P					X	
B	A211	*Clamator glandarius*	-	-				P			X			
B	A211	*Clamator glandarius*	-	-				P					X	
B	A064	*Clangula hyemalis*	-	-	1	3	i				X			
B	A064	*Clangula hyemalis*	-	-	1	3	i						X	
B	A064	*Clangula hyemalis*	-	-	1	3	i							X
B	A373	*Coccothraustes coccothraustes*	-	-				P			X			
B	A373	*Coccothraustes coccothraustes*	-	-				P					X	
B	A207	*columba oenas*	-	-				P			X			
B	A207	*columba oenas*	-	-				P					X	
B	A207	*columba oenas*	-	-				P						X
B	A350	*Corvus corax*	-	-							X			
B	A350	*Corvus corax*	-	-									X	

Species					Population in the site				Motivation					
G	**CODE**	**Scientific name**	**S**	**NP**	**Size**		**Unit**	**Cat.**	**Species Annex**		**Other categories**			
					Min	**Max**		**C|R|V|P**	**IV**	**V**	**A**	**B**	**C**	**D**
B	A348	*Corvus frugilegus*	-	-				P			X			
B	A348	*Corvus frugilegus*	-	-				P					X	
B	A376	*Emberiza citrinella*	-	-				P			X			
B	A376	*Emberiza citrinella*	-	-				P					X	
B	A381	*Emberiza schoeniclus*	-	-				P			X			
B	A381	*Emberiza schoeniclus*	-	-				P					X	
B	A096	*Falco tinnunculus*	-	-	1	18	i				X			
B	A096	*Falco tinnunculus*	-	-	1	18	i						X	
B	A096	*Falco tinnunculus*	-	-	1	18	i							X
B	A360	*Fringilla montifringilla*	-	-				P			X			
B	A360	*Fringilla montifringilla*	-	-				P					X	
B	A360	*Fringilla montifringilla*	-	-				P						X
B	A721	*Gallinula chloropus*	-	-			i				X			
B	A721	*Gallinula chloropus*	-	-			i						X	
B	A640	*Larus fuscus fuscus*	-	-	2	2	i	P			X			
B	A640	*Larus fuscus fuscus*	-	-	2	2	i	P					X	
B	A640	*Larus fuscus fuscus*	-	-	2	2	i	P						X
B	A187	*Larus marinus*	-	-				P			X			
B	A187	*Larus marinus*	-	-				P					X	
B	A604	*Larus michahellis*	-	-			i	P			X			
B	A604	*Larus michahellis*	-	-			i	P					X	
B	A604	*Larus michahellis*	-	-			i	P						X
B	A604	*Larus michahellis*	-	-			i				X			
B	A604	*Larus michahellis*	-	-			i						X	
B	A604	*Larus michahellis*	-	-			i							X
B	A150	*Limicola falcinellus*	-	-				P			X			
B	A150	*Limicola falcinellus*	-	-				P					X	
B	A290	*locustella naevia*	-	-				P			X			
B	A290	*locustella naevia*	-	-				P					X	
B	A290	*locustella naevia*	-	-				P						X
B	A270	*Luscinia luscinia*	-	-				P			X			
B	A270	*Luscinia luscinia*	-	-				P					X	
B	A152	*Lymnocryptes minimus*	-	-				P			X			
B	A152	*Lymnocryptes minimus*	-	-				P					X	
B	A152	*Lymnocryptes minimus*	-	-				P						X
B	A058	*Netta rufina*	-	-	4	4	i				X			
B	A058	*Netta rufina*	-	-	4	4	i						X	
B	A058	*Netta rufina*	-	-	4	4	i							X
B	A058	*Netta rufina*	-	-	1	1	p				X			
B	A058	*Netta rufina*	-	-	1	1	p						X	
B	A058	*Netta rufina*	-	-	1	1	p							X

Species					Population in the site				Motivation					
G	CODE	Scientific name	S	NP	Size		Unit	Cat.	Species Annex		Other categories			
					Min	Max		C|R|V|P	IV	V	A	B	C	D
B	A730	*Numenius arquata orientalis*	-	-	180	260	i				X			
B	A730	*Numenius arquata orientalis*	-	-	180	260	i						X	
B	A730	*Numenius arquata orientalis*	-	-	180	260	i							X
B	A158	*Numenius phaeopus*	-	-				P			X			
B	A158	*Numenius phaeopus*	-	-				P					X	
B	A158	*Numenius phaeopus*	-	-				P						X
B	A435	*oenanthe isabellina*	-	-	5		p	P			X			
B	A435	*oenanthe isabellina*	-	-	5		p	P					X	
B	A323	*Panurus biarmicus*	-	-				P			X			
B	A323	*Panurus biarmicus*	-	-				P					X	
B	A313	*Phylloscopus bonelli*	-	-				P			X			
B	A313	*Phylloscopus bonelli*	-	-				P					X	
B	A235	*picus viridis*	-	-	2	6	p				X			
B	A235	*picus viridis*	-	-	2	6	p						X	
B	A665	*Podiceps grisegena grisegena*	-	-	1	1	i				X			
B	A665	*Podiceps grisegena grisegena*	-	-	1	1	i						X	
B	A665	*Podiceps grisegena grisegena*	-	-	1	1	i							X
B	A266	*Prunella modularis*	-	-				P			X			
B	A266	*Prunella modularis*	-	-				P					X	
B	A718	*Rallus aquaticus aquaticus*	-	-	1	4	i				X			
B	A718	*Rallus aquaticus aquaticus*	-	-	1	4	i						X	
B	A718	*Rallus aquaticus aquaticus*	-	-	1	4	i							X
B	A155	*Scolopax rusticola*	-	-				P			X			
B	A155	*Scolopax rusticola*	-	-				P					X	
B	A063	*Somateria mollissima*	-	-							X			
B	A063	*Somateria mollissima*	-	-									X	
B	A063	*Somateria mollissima*	-	-										X
B	A173	*Stercorarius parasiticus*	-	-				P			X			
B	A173	*Stercorarius parasiticus*	-	-				P					X	
B	A173	*Stercorarius parasiticus*	-	-				P						X
B	A172	*Stercorarius pomarinus*	-	-				P			X			
B	A172	*Stercorarius pomarinus*	-	-				P						X
B	A195	*Sternula albifrons*	-	-	1	59	p	P			X			
B	A195	*Sternula albifrons*	-	-	1	59	p	P					X	
B	A195	*Sternula albifrons*	-	-	1	59	p	P						X
B	A209	*Streptopelia decaocto*	-	-							X			
B	A209	*Streptopelia decaocto*	-	-									X	
B	A353	*sturnus roseus*	-	-				P			X			
B	A353	*sturnus roseus*	-	-				P					X	
B	A690	*Tachybaptus ruficollis ruficollis*	-	-	3	6	p	P			X			
B	A690	*Tachybaptus ruficollis ruficollis*	-	-	3	6	p	P					X	

Species					Population in the site				Motivation					
G	CODE	Scientific name	S	NP	Size		Unit	Cat.	Species Annex		Other categories			
					Min	Max		C|R|V|P	IV	V	A	B	C	D
B	A690	*Tachybaptus ruficollis ruficollis*	-	-	3	6	p	P						X
B	A690	*Tachybaptus ruficollis ruficollis*	-	-	100	250	i				X			
B	A690	*Tachybaptus ruficollis ruficollis*	-	-	100	250	i						X	
B	A690	*Tachybaptus ruficollis ruficollis*	-	-	100	250	i							X
B	A286	*common turd*	-	-				P			X			
B	A286	*common turd*	-	-				P					X	
B	A284	*Turdus pilaris*	-	-				P			X			
B	A284	*Turdus pilaris*	-	-				P					X	
B	A284	*Turdus pilaris*	-	-				P						X
B	A213	*Tyto alba*	-	-	1	2	p				X			
B	A213	*Tyto alba*	-	-	1	2	p						X	
F	1103	*alosa fallax*	-	-				P			X			
F	1103	*alosa fallax*	-	-				P						X
F	1103	*alosa fallax*	-	-				P						
F	5048	*alosa vistonica*	-	-				P			X			
F	5048	*alosa vistonica*	-	-				P						X
F	5048	*alosa vistonica*	-	-				P						
F	1152	*Aphanius fasciatus*	-	-				C			X			
F	1152	*Aphanius fasciatus*	-	-				C					X	
F	1152	*Aphanius fasciatus*	-	-				C						X
F	1141	*Chalcalburnus chalcoides*	-	-				P			X			
F	1141	*Chalcalburnus chalcoides*	-	-				P					X	
F	1141	*Chalcalburnus chalcoides*	-	-				P						X
F	5339	*Rhodeus amarus*	-	-				C			X			
F	5339	*Rhodeus amarus*	-	-				C						X
F	5944	*Squalius cephalus*	-	-				P			X			
F	5944	*Squalius cephalus*	-	-				P						X
F		*Syngnathus abaster*	-	-				P			X			
F		*Syngnathus abaster*	-	-				P					X	
I	1083	*Lucanus cervus*	-	-				P					X	
I	1083	*Lucanus cervus*	-	-				P						X
M	1353	*Canis aureus*	-	-				P			X			
M	1353	*Canis aureus*	-	-				P						
M	1363	*Felis silvestris*	-	-				P			X			
M	1363	*Felis silvestris*	-	-				P					X	
M	1363	*Felis silvestris*	-	-				P	X					
M	1355	*Lutra lutra*	-	-	1	30					X			
M	1355	*Lutra lutra*	-	-	1	30							X	
M	1355	*Lutra lutra*	-	-	1	30								X
M	1355	*Lutra lutra*	-	-	1	30			X					
M		*Martes foina*	-	-				P			X			

Species					Population in the site				Motivation					
G	CODE	Scientific name	S	NP	Size		Unit	Cat.	Species Annex		Other categories			
					Min	Max		C|R|V|P	IV	V	A	B	C	D
M		*Martes foina*	-	-				P					X	
M		*Meles meles*	-	-				P			X			
M		*Meles meles*	-	-				P					X	
M		*Mustela nivalis*	-	-				P			X			
M		*Mustela nivalis*	-	-				P					X	
M	1328	*Nyctalus lasiopterus*	-	-				V			X			
M	1328	*Nyctalus lasiopterus*	-	-				V					X	
M	1328	*Nyctalus lasiopterus*	-	-				V	X					
M	1331	*Nyctalus leisleri*	-	-				P			X			
M	1331	*Nyctalus leisleri*	-	-				P					X	
M	1331	*Nyctalus leisleri*	-	-				P	X					
M	1332	*vespertilio murinus*	-	-				V			X			
M	1332	*vespertilio murinus*	-	-				V					X	
M	1332	*vespertilio murinus*	-	-				V	X					
M		*Pre-melon peregusna*	-	-				P			X			
M		*Pre-melon peregusna*	-	-				P					X	
M		*Pre-melon peregusna*	-	-				P						X
M		*Pre-melon peregusna*	-	-				P	X					
P		*Salvinia natans*	-	-				P					X	
P		*trapa natans*	-	-				V					X	
R	1278	*Coluber caspius*	-	-				P			X			
R	1278	*Coluber caspius*	-	-				P					X	
R	1278	*Coluber caspius*	-	-				P	X					
R	1283	*coronella austriaca*	-	-				P			X			
R	1283	*coronella austriaca*	-	-				P					X	
R	1283	*coronella austriaca*	-	-				P	X					
R	1228	*Cyrtopodion kotschyi*	-	-				P			X			
R	1228	*Cyrtopodion kotschyi*	-	-				P					X	
R	1228	*Cyrtopodion kotschyi*	-	-				P	X					
R	1281	*Elaphe longissima*	-	-				P			X			
R	1281	*Elaphe longissima*	-	-				P					X	
R	1281	*Elaphe longissima*	-	-				P	X					
R	1279	*Elaphe quatuorlineata*	-	-				P			X			
R	1279	*Elaphe quatuorlineata*	-	-				P					X	
R	1279	*Elaphe quatuorlineata*	-	-				P						X
R	1279	*Elaphe quatuorlineata*	-	-				P	X					
R	1293	*Elaphe situla*	-	-				P			X			
R	1293	*Elaphe situla*	-	-				P					X	
R	1293	*Elaphe situla*	-	-				P						X
R	1293	*Elaphe situla*	-	-				P	X					
R	1220	*Emys orbicularis*	-	-				C			X			

Species					Population in the site				Motivation					
G	**CODE**	**Scientific name**	**S**	**NP**	**Size**		**Unit**	**Cat.**	**Species Annex**		**Other categories**			
					Min	**Max**		**C|R|V|P**	**IV**	**V**	**A**	**B**	**C**	**D**
R	1220	*Emys orbicularis*	-	-				C					X	
R	1220	*Emys orbicularis*	-	-				C						X
R	1220	*Emys orbicularis*	-	-				C	X					
R	1251	*Lacerta trilineata*	-	-				P			X			
R	1251	*Lacerta trilineata*	-	-				P					X	
R	1251	*Lacerta trilineata*	-	-				P	X					
R	1263	*Lacerta viridis*	-	-				P			X			
R	1263	*Lacerta viridis*	-	-				P					X	
R	1263	*Lacerta viridis*	-	-				P	X					
R	1222	*caspica*	-	-				C			X			
R	1222	*caspica*	-	-				C						X
R	1222	*caspica*	-	-				C	X					
R		*Natrix natrix*	-	-				P			X			
R		*Natrix natrix*	-	-				P					X	
R	1292	*Natrix tessellata*	-	-				P			X			
R	1292	*Natrix tessellata*	-	-				P					X	
R	1292	*Natrix tessellata*	-	-				P	X					
R	1269	*Ophisaurus apodus*	-	-				P			X			
R	1269	*Ophisaurus apodus*	-	-				P					X	
R	1269	*Ophisaurus apodus*	-	-				P	X					
R	1248	*Podarcis taurica*	-	-				P			X			
R	1248	*Podarcis taurica*	-	-				P					X	
R	1248	*Podarcis taurica*	-	-				P	X					
R	1219	*Testudo graeca*	-	-				R			X			
R	1219	*Testudo graeca*	-	-				R					X	
R	1219	*Testudo graeca*	-	-				R						X
R	1219	*Testudo graeca*	-	-				R	X					
R	1217	*Testudo hermanni*	-	-				P			X			
R	1217	*Testudo hermanni*	-	-				P					X	
R	1217	*Testudo hermanni*	-	-				P						X
R	1217	*Testudo hermanni*	-	-				P	X					
R	1295	*viper ammodytes*	-	-				P			X			
R	1295	*viper ammodytes*	-	-				P					X	
R	1295	*viper ammodytes*	-	-				P	X					

As shown in Table 11 above, detailed population data for the specific area GR1130010 exist for 109 species, while for the remaining 72, for which no population data exist, the information available is an estimate of their presence in the area (present, common, rare, very rare). Of the species *for* which population data are available, *Accipiter brevipes, Alcedo atthis, Anser erythropus, Aquila clanga, Ardea purpurea, Ardeola ralloides, Asio flammeus, Aythya nyroca, Botaurus stellaris, Branta ruficollis, Bubo bubo, Burhinus oedicnemus, Buteo rufinus, Charadrius alexandrines, Chlidonias hybrida, Ciconia ciconia, Ciconia nigra, Circaetus gallicus, Circus aeruginosus, Circus cyaneus, Circus macrourus, Coracias garrulus, Cygnus columbianus bewickii, Cygnus cygnus, Dendrocopos syriacus, Dryocopus martius, Egretta alba (Casmerodius albus), Egretta garzetta, Falco biarmicus, Falco columbarius, Falco eleonorae, Falco peregrinus, Falco vespertinus, Gavia arctica, Gavia stellata, Glareola pratincole, Haliaeetus albicilla, Himantopus himantopus, Hippolais olivetorum, Ixobrychus minutus minutus, Lanius nubicus, Lanius nubicus, Larus genei, Larus minutus, Limosa lapponica, Melanocorypha calandra, Mergellus albellus, Milvus migrans, Numenius tenuirostris, Nycticorax nycticorax nycticorax, Oxyura leucocephala, Pelecanus crispus, Pelecanus onocrotalus, Pernis apivorus, Phalacrocorax aristotelis desmarestii, Phalacrocorax pygmaeus, Philomachus pugnax, Picus canus, Platalea leucorodia, Plegadis falcinellus, Pluvialis apricaria, Puffinus yelkouan, Recurvirostra avosetta, Sterna (Gelochelidon) nilotica, Sterna (Thalasseus) sandvicensis, Sterna hirundo, Tadorna ferruginea, Tetrax tetrax* and *Tringa glareola*, are species of the avifauna listed in Annex I to Directive 2009/147/EC (with *Limosa lapponica* also listed in Annex II to the Directive and Pluvialis apricaria listed in Annexes II and III to the Directive), the species *Anas acuta, Anas clypeata, Anas crecca crecca, Anas penelope, Anas platyrhynchos, Anas albifrons, Anser answer, Aythya ferina, Aythya fuligula, Fulica atra, Gallinago gallinago, Tringa totanus, Vanellus vanellus,* are species listed in Annex II and III to the above Directive, the species *Anas querquedula, Anas strepera, Cygnus olor, Haematopus ostralegus, Larus (Chroicocephalus) ridibundus, Larus canus, Limosa limosa, Mergus serrator, Pluvialis squatarola, Tringa erythropus, Tringa nebularia, Tringa tetanus, Vanellus vanellus,* are species listed only in Annex II to the above Directive, while the species *Ardea cinerea,* Arenaria *interpres, Asio otus, Buteo buteo, Calidris alba, Calidris alpina, Calidris minuta, Charadrius hiaticula, Falco subbuteo, Otus scops, Phalacrocorax carbo, Phoenicopterus roseus, Podiceps cristatus, Podiceps nigricollis, Tadorna tadorna, Tringa ochropus, Tringa stagnatilis,* do not belong to any of the Annexes to Directive 2009/147/EC.

During the reference period for the area, the conservation status was assessed for all species (for those for which a conservation status assessment was carried out) as good (B), while for species *Anas clypeata* (for species related to Natura - in breeding), *Ardea cinerea* (in breeding), *Asio flammeus* (in breeding), *Asio otus* (resident and in breeding), *Aythya ferina* (breeding), *Charadrius alexandrinus* (overwintering), *Cygnus olor* (breeding), *Dryocopus martius* (breeding), *Gavia stellata* (overwintering), *Melanocorypha calandra* (resident), *Otus scops* (breeding), *Phalacrocorax aristotelis* (breeding), *Picus canus* (breeding), *Podiceps nigricollis* (breeding), *Tetrax tetrax* (overwintering), *Tringa tetanus* (overwintering), *Vanellus vanellus* (breeding), no assessment of their conservation status was made.

For the majority of species (for which the population criterion was estimated) the area supported 0-2% of the Greek population (population criterion C), except for *Anser erythropus, Ardea purpurea, Aythya nyroca, Branta rufficolis, Cygnus columbianus, Cygnus cygnus, Egretta alba, Egretta garzetta, Haliaeetus albicilla, Larus melanocephalus, Mergellus, ablellus, Numenius tenuirostris, Oxyura leucocephala, Pelecanus crispus, Pelecanus onocrotalus, Phoenicopterus roseus, Xenus cinereus,* for which the area supported more than 15 % of the Greek population with population criterion A and the species *Anas crecca crecca, Anas penelope, Anas querquedula, Anas strepera, Anser albifrons, Aythya ferina, Aythya fuligula, Botaurus stellaris, Ciconia nigra, Circus macrourus, Cygnus olor, Ficedula parva, Fulica atra, Gavia arctica, Ixobrychus minutus, Phalacrocorax carbo, Phalaropus lobatus, Platalea leucorodia, Plegadis falcinellus, Podiceps nigricollis, Puffinus yelkouan, Tadorna ferruginea, Tadorna tadorna*, for which *the* area supported 2 - 15 % of the Greek population having population criterion B.

Inventory 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 SPAs, SCIs or RACs) and/or species of avifauna of Annex I of Directive 2009/147/EC and regularly migratory species (in case of SPAs) and the main characteristics of endemic, threatened and protected species.

The production license blocks of the studied W/F are located outside the protected areas of the Natura 2000 network, EEZ, TKS and therefore there is no recording and mapping of the habitat types of Annex I of Directive 92/43/EEC, nor is there a relevant reason.

According to the database and land cover mapping (Corine land cover 2018) reflected on the documentation maps, the area of the W/F XEFOTO production license blocks is almost entirely within hardwood vegetation and transitional woodland and shrubland, with a small portion of broadleaf forest completing the habitat mosaic of the northernmost production license block of the project under study. (see map documentation section, Map 7). The above habitat types also cover most of the study project field survey area, along with smaller areas of coniferous forest, mixed forest, natural grasslands, and land used primarily for agriculture along with significant portions of natural vegetation. In general, the above habitat types predominate in the area.

From all the above data presented in previous sections of this Special Ecological Assessment, in the most detailed way, those species listed as designation species of the GR1130012 SPA and the designation species of the GR009 SPA were selected for further analysis (the four designation species of the GR009 SPA coincide with the four designation species of the GR1130012 SPA), within which the project under study is located. In addition, all the large and non-predatory species (as well as black-tailed godwit and goat) listed in Annex I of Directive 2009/147/EC, included in the TAPs of the main SPA under study GR1130012, were selected.

Regarding the nearest Natura 2000 network area under study, GR1130010, the species mentioned as its characterization species were selected for further analysis.

Finally, regarding the neighbouring Bulgarian Natura 2000 network site BG0001032, 12 species of cephalopods (*Barbastellus barbastellus*, *Mioniopterus schreibersii*, *Myotis Bechsteinii*, *Myotis blythii*, *Myotis capaccinii*, *Myotis emarginatus*, *Myotis myotis*, *Rhinolophus blasii*, *Rhinolophus Euryale*, *Rhinolophus ferrumequinum*, *Rhinolophus hipposideros*, *Rhinolophus mehelyi*), because of the distances they can travel in order to meet their daily needs, five species of mammals (excluding cephalopods) (*Canis lupus*, *Ursus arctos*, *Myomimus roachi*, *Spermophilus citellus*, *Vormela peregusna*) and three species of reptiles (*Testudo graeca*, *Testudo hermanni*, *Elaphe sauromates*), which are either species with a large area of endemism (e.g.e.g. *Canis lupus*, *Ursus arctos*), or which may be affected by the project under consideration due to the proximity of the installation site to the boundaries of the EEZ.

Therefore, the total of 71 species analysed below, and henceforth referred to as species of interest, consists of (listed by their new IUCN Latin names): *Dendrocopos syriacus, Emberiza hortulana, Ficedula semitorquata, Microcarbo pygmaeus, Lanius minor, Mareca penelope, Anser erythropus, Ardeola ralloides, Aythya ferina, Aythya nyroca, Burhinus oedicnemus, Calandrella brachydactylla, Ardea alba, Chlidonias* *hybrida, Ciconia ciconia, Cygnus olor, Fulica atra, Ixobrychus minutus, Larus melanocephalus, Hydrocoloeus minutus, Numenius tenuirostris, Oxyura leucocephala, Pelecanus crispus, Phalacrocorax carbo, Phoenicopterus roseus, Platalea leucorodia, Plecadis falcinellus, Podiceps nigricollis, Puffinus yelkouan, Sternula albifrons, Tachybaptus ruficollis, Tadorna ferruginea, Tadorna tadorna, Vanellus spinosus, Recurvirostra avosetta, Accipiter brevipes, Buteo rufinus, Clanga pomarina, Ciconia nigra, Circaetus gallicus, Hieraaetus pennatus, Neophron percnopterus, Pernis apivorus, Aquila chrysaetos, Haliaeetus albicilla, Aegolius funereus, Bubo bubo, Falco naumanni, Falco peregrinus, Falco columbarius, Gyps fulvus, Barbastellus barbastellus, Miniopterus schreibersii, Myotis bechsteinii, Myotis blythii, Myotis capaccinii, Myotis emarginatus, Myotis myotis, Rhinolophus Euryale, Rhinolophus ferrumequinum, Rhinolophus hipposideros, Rhinolophus mehelyi, Rhinolophus blasii, Canis lupus, Ursus arctos, Myomimus roachi, Spermophylus citellus, Vormela peregusna, Testuda graeca, Testudo hermanni, Elaphe sauromates.*

From all the above data, presented in previous sections of this Special Ecological Assessment, in the most detailed way, 71 species of interest were selected for further analysis, the main characteristics of which are analysed below by synthesising information from reliable literature 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. *Wildlife Biology. Yakhoudi Publications, Thessaloniki , p 413, IUCN Red List of Threatened Species,* *www.iucnredlist.org available on 15/10/202* 2, etc, *Deliverable 3 List of threats to the species of designation of the Identification of compatible activities in relation to the species of designation 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).

Balkan woodpecker (*Dendrocopos syriacus*)

The species is epidemic. The European population of the species is estimated at 322,000 - 767,000 individuals (645,000 - 1,540,000 mature individuals), while in the EU28 the population is estimated at 86,400 - 193,000 pairs (172,000 - 386,000 mature individuals). The Greek population of the species is estimated to number 10,000-25,000 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 has not been assessed and therefore does not have a threatened status (NE), 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 conservation by Birdlife International (BirdLife International 2017).

The species is observed at higher altitudes in Northern and Central (Eastern Thessaly) Greece. Quite common near villages and gardens or parks (Handrinos and Akriotis 1997).

The species is found in wooded areas adjacent to open areas, such as forest gaps, meadows, crops with scattered old trees, river and stream banks (willows and poplars). It is also commonly found in plantations of all species such as olive and avocado in the south, vineyards in central Europe, where it is found in trees near human-affected ecosystems, as well as in forest plots, parks and gardens. Selection of suitable nesting sites is related to the availability of mature trees near areas rich in food resources (Tucker and Heath 1994). It builds its nest in oak (*Quercus sp.)* trees in southeastern Europe, and has been observed breeding in coniferous forests at lower elevations in Turkey. Nesting occurs from mid-April to May, rarely until June. The nest is excavated by both sexes, but mainly by the male, on a log or large tree branch. Old nests are sometimes reused. The species lays three to seven eggs (Winkler et al. 2014). The species is omnivorous, feeding on various insects, snails, earthworms, fruits, berries, nuts and seeds (Gorman 2004). It is a resident species in our country and is mainly found in northern Greece.

According to the threats recorded in the list of threats to the species of designation (Dimalexis 2009) (*species of designation of the SPA GR1130012 and the SPA GR009*) the reported threats for the species are:

- Intensification of perennial crops (vines, orchards, olive groves, etc.)
- Reforestation
- Improper forest management
- Abandonment of traditional agricultural practices and land use, including the abandonment of extensive farming and livestock farming
- Reforestation
- Destruction of riparian ecosystems

Threats listed on the IUCN red list are hybridization with *Dendrocopos major*, however when sufficient females of the species can colonize an area and the extent of hybridization becomes insignificant (Hagemeijer and Blair 1997).

No conservation measures are currently required for the species.

Langonia (*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 European wintering 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 in Evros. 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 in open water, along 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 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 threats recorded in the list of threats to the species (Dimalexis 2009) (*species of designation of the GR1130012 and GR1130010 SPAs, as well as the GR009 SPA*), the reported threats to the species are:

- Extensive aquaculture
- Intensive aquaculture
- Incidental killing by hunting or poaching
- Accidental entanglement in fishing gear
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Noisy leisure 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

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

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

Corydalis *(Emberiza hortulana)*

The European population of the species is estimated at 3,610,000-5,630,000 pairs (7,220,000-11,300,000 adults), while in the EU28 the population is estimated at 1,030,000-1,750,000 pairs (2,060,000-3,500,000 adults). The Greek population of the species is estimated to number 20,000-50,000 pairs, which corresponds to about 1% of the European population (BirdLife International 2021). The population is estimated to be in decline due to ongoing habitat destruction. Between 1980 and 2013, the European population experienced a sharp decline (EBCC 2015) and the population trend is described as decreasing.

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). In Greece, the bachstelze is a summer visitor.

The species has a wide distribution throughout mainland Greece, while on the June and Aegean islands it breeds only in Crete and possibly in Samothrace (Handrinos and Akriotis 1997).

This species uses a variety of breeding habitats, preferably found in areas with a continental climate (long hours of sunshine and low rainfall). In the northern part of its breeding range it occurs mainly in cultivated fields, preferring low-intensity, mixed agricultural fields on light soils, with sparse vegetation and scattered trees or rows of trees or shrubs. In its southern breeding range it occurs in open mountainous areas with sparse shrubs up to 2,400 m (Hagemeijer and Blair 1997; Madge and Sharpe 2016). The species arrives in breeding areas from Africa, where it winters, in April. The nest is built by the female, usually on the ground, and she lays 4-5 eggs. Autumn migration usually takes place from mid-August to mid-September (Madge and Sharpe 2016). The species' diet consists of seeds (mainly cereals or grasses), and during the breeding season the species feeds on invertebrates such as ants, beetles, and grasshoppers, both on the ground. It collects its food primarily on the ground and often in close proximity to shrubs or trees that provide cover (Cramp 1998).

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of ZEP GR1130012 and SPA GR009*), the reported threats to the species are:

- Extension - intensification of annual crops
- Reforestation
- Residential development, urban or extra-urban, legal or arbitrary
- Abandonment of traditional agricultural practices and land use, including the abandonment of extensive farming and livestock farming.

The threats listed in the IUCN red list are the expansion - intensification of agriculture. The replacement of mixed, low-intensity and small-scale crops with large-scale crops, combined with the use of pesticides, results in a lack of suitable invertebrate-rich habitat (Menz and Arlettaz 2012). Other threats to the species include lack of nesting sites, accidental killing by hunting or poaching, and trapping of species during migration (Hagemeijer and Blair 1997).

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

- Draw up an international action plan for the species, including protection during migration and wintering areas.
- Establish a ban on hunting and trapping of the species.
- Evaluating the effectiveness of conservation measures (Bernardy 2009).

Oak woodpecker (*Ficedula semitorquata*)

The European population of the species is estimated at 30,100 - 149,000 pairs (60,300 - 297,000 mature individuals), while in the EU28 the population is estimated at 3,900 - 11,500 pairs (7,800 - 23,000 mature individuals). The Greek population is estimated to number 1,000 - 3,000, 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) and the Bonn Convention (Annex II).According to the Greek Red Data Book in Greece there are insufficient data for the assessment of 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 2 species of European interest in terms of conservation by BirdLife International (BirdLife International 2017).

In Greece, the oak leaf miner is a summer visitor. Both the distribution and the population status of the species are poorly known. The species is mainly observed in northern Greece from Epirus, Thessaly and further north (Handrinos and Akriotis 1997). Nests of the oak warbler have so far been found only in Holomontas, Preveza and the northern border in deciduous and coniferous forests.

The species prefers forested areas, mainly mountain slopes of about 2,000 metres in height. It is found in mature deciduous trees, mainly oak (*Quercus* spp.) and anchor (*Carpinus* spp.), in riverine and swampy forests of Frax (*Fraxinus oxycarpa*) and in places with plane trees (*Platanus orientalis*) (Handrinos and Akriotis 1997). Occasionally, species breed in old or abandoned orchards, olive groves and tree plantations, urban parks and large gardens or forested peripheral parts of cities, villages and industrial areas (Iankov 2007). It breeds in tree hollows created by woodpeckers, but also in technical nests. However, technical nests cannot replace the loss of suitable breeding habitat. Breeding takes place from mid-April to mid-July. The female builds the nest and usually lays 5-6 eggs. The diet of the species consists mainly of insects, as well as spiders and snails. The species is migratory and winters in southern and central Africa (Hagemeijer and Blair 1997).

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of ZEP GR1130012 and SPA GR009*), the reported threats to the species are:

- White crops
- Construction of all categories of roads and railways
- Improper forest management
- Deforestation logging
- Destruction of riparian ecosystems

The threats listed on the IUCN red list are the destruction of its habitat in some areas. The oak (*Quercus* spp.) forests of Bulgaria (the preferred habitat of the species in this country) have been overexploited for timber and coastal forests have been logged for riverbed corrections. In eastern Turkey, coastal forest habitat is threatened by ongoing dam building projects and rapid loss of oak forest may also have a negative impact on this species.

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

- Develop a programme to monitor population trends of the species.
- Assess threats to the species and develop appropriate actions.
- Forest management practices within the species' range should take into account the habitat requirements of the species.
- Ensure that Natura 2000 sites and other protected areas are adequately protected from threats and have management plans in place.

Whistling duck (*Mareca penelope*)

The European population of the species is estimated to number 225,000 - 367,000 pairs (451,000 - 733,000 mature individuals), with the European wintering population estimated at 2,020,000 - 2,730.The EU28 population is estimated at 41,600 - 70,100 (83,300 - 141,000 mature individuals), with the EU28 wintering population estimated at 1,780,000 - 2,090,000 individuals (BirdLife International 2021). According to the same source, 78% of the European breeding population is found in Russia (175,000 - 275,000 pairs), while in Greece the wintering population is estimated at 55,000 - 148,000 pairs, corresponding to 4% of the European wintering population.

The distribution range of the species extends from Iceland and Northern Britain eastwards across Northern Europe. The species winters in central and southern Europe (Billerman et al. 2020), and breeds in subarctic, arctic tundra and temperate strait zones (Hagemeijer and Blair 1997).

In Greece the species is found in coastal and inland wetlands of almost all of the mainland and on some of the large islands. The bulk of the wintering population is concentrated mainly in northern and central Greece (Thrace, Macedonia, Thessaly, Epirus and Central Greece) (Handrinos and Akriotis 1997).

The species is protected by Directive 2009/147/EC (Annex II and III) and the Bern (Annex III) 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 the IUCN at European level it is listed as a species of reduced interest (BirdLife International 2021). It is also not classified as a species of European interest for protection by BirdLife International.

The species prefers salt water and occurs in muddy or sandy estuaries and brackish lakes in coastal areas, and occurs inland in salt or brackish lakes in semi-arid areas (Madge and Burn 1988). The breeding season begins in April and May, forming pairs or small groups. The nest is usually placed in a tree cavity (Carboneras and Kirwan 2014) up to 8 m above the ground (Kear 2005) or uses burrows of terrestrial mammals. On rare occasions, the species nests in open country or within dense vegetation up to 1 km from water (Kear 2005; Madge and Burn 1988). The species also nests in artificial nests. The species' diet consists primarily of seawater mollusks (e.g., *Hydrobia ssp.), as well as* other aquatic invertebrates (e.g., insects, crustaceans, and worms), small fish, fish eggs, and plant material. Most populations of the species are migratory.

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats to the species are:

- Overgrazing of livestock in mountain, semi-mountainous and island pastures
- Expanding crops in wetlands
- Residential development, urban or extra-urban, legal or arbitrary
- Hunting-poaching-trapping-collecting eggs or chicks - destroying nests
- Lead shot molybdenum
- Wetland drainage and other land reclamation works
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters
- Solid waste and waste

The threats listed on the IUCN red list are habitat loss as a result of tidal flow control through the construction of tidal barrage systems in Europe (Kear 2005, Burton 2006). The species is also preyed upon by the American mink (*Neovision vison*) on some islands and is susceptible to avian influenza (Melville and Shortridge 2006). Finally, eggs of the species were formerly (and probably still are) collected in Iceland (Gudmundsson 1979).

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

- Control of predators at nesting sites and construction of artificial nesting sites.
- Protection of important areas for the species.
- Environmental impact assessment of tidal flow control with the construction of tidal barrage systems for electricity generation.

Dwarf goose (*Anser erythropus*)

Endangered and very rare species in Europe. The European population of the species is estimated at 170-270 pairs (340-530 adults), with the European wintering population estimated at 5,100-8,700 individuals, while in the EU28 the population is estimated at 15-30 pairs (30-60 adults), with the EU28 wintering population estimated at 80-530 individuals (BirdLife International 2021). According to the same source, 75% of the European breeding population is found in Russia (120 - 200 pairs), while in Greece the wintering population is estimated at 35 - 100, corresponding to 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 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 conservation by Birdlife International (BirdLife International 2017).

The species is a regular but rare and local winter visitor in Greece. It arrives in Greece around the end of October and winters until the end of March in a few large wetlands of Central and Eastern Macedonia and Thrace, especially in the Evros Delta and Lake Kerkini, and secondarily in Lake Ismarida, the lagoons of Thrace and the Nestos Delta (Handrinos and Akriotis 1997). Visiting nanohens belong to the Finnoscandian subpopulation, which nests in the sub-arctic zone of northern Scandinavia and the Kola Peninsula of north-western Russia. Evidence from ringing in northern Norway and satellite monitoring suggests that all (or almost all) of this population winters in Greece (Lorentsen et al. 1998; Vangeluwe 2004; Aarvak and Oien 2006). The Finnoscandian population has suffered a dramatic decline during the 20th century and in 2004 was estimated at only 20-30 pairs (excluding the unknown number nesting on the Kola Peninsula, Russia) (Tolvanen et al. 2004), although in recent years it appears to have stabilised. Similarly, data for Greece, where, after declining in the 1980s and 1990s, a relatively stable presence of 45-50 individuals, with some fluctuations, seems to be recorded today (Vangeluwe 2005).

The species is found both in inland and coastal wetlands. It breeds in low peat bogs and scrubland, in the tundra zone, up to 700 m altitude. It can also be found on mountain foothills in marshy areas (Cramp and Simmons 1977, Johnsgard 1978). It often nests in snow-free sites available early in the breeding season (such as rock outcrops) hidden among vegetation or in marshy hollows (Madsen 1996, Kear 2005), usually in close proximity to water (Kear 2005). The nest is a shallow cavity in the ground lined with grass, moss and feathers and often the same nesting site is reused. It usually gives birth to four to six (Carboneras and Kirwan 2014). The species is herbivorous, and its diet consists of roots, stems, leaves, fruits, and the green parts of aquatic and terrestrial plants. During winter the species supplements its diet with agricultural seeds. This species is fully migratory (Kear 2005). The species leaves its breeding grounds in northern Scandinavia and Arctic Russia in late August to early September and travels to wintering grounds in southeastern Europe and the Middle East (Alerstam 1990; Snow and Perrins 1998). The return to breeding grounds begins in February, with the species arriving there from early May to late June (Snow and Perrins 1998, Madsen 1996). In Greece the species is found in both inland and coastal wetlands. It feeds exclusively in natural or semi-natural open areas (e.g., prairies, salt marshes, periodically flooded areas) and very rarely in cultivated areas and, as mentioned above, is quite faithful to its preferred locations. In contrast to other goose species, Nanohares visit Greece for a relatively stable period of time and rather independently of the weather conditions prevailing in more northerly regions. They usually form a single flock, but individuals are sometimes found mixed with flocks of White-fronted Geese (*Anser albifrons*) and Red-fronted Geese (*Branta ruficollis*).

The threats according to the Greek Red Book (Legakis and Maragou 2009) are poaching, due to the close resemblance of the nanny goose to the white-faced goose, whose hunting is allowed. Also, habitat loss and degradation is considered an important but secondary threat. Finally, disturbance caused by hunting appears to play an important role along the migration route.

According to the NRC, the conservation measures required are the following: Implementation of legislation and already established conservation measures in practice, intensive conservation and implementation of the National Action Plan for the species. Expansion of certain Wildlife Sanctuaries and possible bans/restrictions on hunting of the White-fronted Goose (as the Nanohenna is extremely similar to the White-fronted Goose, which is a common and huntable species in countries along the migration route of the Nanohenna and can lead to accidental killing and poaching), combined with strict controls on poaching. Continuation of monitoring and awareness-raising activities after the end of the programmes. Specialised research on food habits and habitat use.

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats to the species are:

- Incidental killing by hunting or poaching
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)

Threats listed on the IUCN red list include poaching during the spring season, and bird harvesting in breeding areas in Russia (Jones 2011). In the western Palearctic, at least 20-30% of the population is accidentally hunted during hunting of other species (Mooij 2010). Habitat degradation of the species as a result of land cultivation and rising water levels in the Caspian Sea is a further threat (Madsen 1996), as is habitat loss through the creation of reservoirs for hydroelectric power in Scandinavia (Madsen 1996). The species may also be threatened by predation on nesting sites by *Vulpes vulpes*, and in Sweden the species is preyed upon by the sea eagle (*Haliaetus albicilla*) and the golden eagle (*Aquila chrysaetos*) (Jones et. al. 2008). Disturbance of breeding areas, e.g. through tourism development, is another threat to breeding populations. Climate change and associated habitat shifts are expected to negatively affect the species (as well as other species) that depend on tundra habitat for breeding. Modeling indicates that 28% of this habitat is in danger of being lost by 2070 (Zöckler and Lysenko 2000). In addition to the breeding season, high mortality in autumn and winter is caused by poaching and accidental killing during hunting of other species (Madsen 1996, Aarvak et al. 1997, Lorentsen et al. 1998, Kear 2005 , Morozov 2006, Jones 2011). Disturbance of roosting sites and feeding of birds by hunters is a potentially important factor in reducing the reproductive success of the species (Ebbinge and Spaans 1995). In the Kaliningrad region of Russia, important stations during migration along the Baltic Sea coastline are being degraded by oil pollution, wetland drainage for agriculture, changes in wetland management leading to overgrowth of shrubs and reeds, peat extraction and reed burning (Grishanov 2006).

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

- Reduce poaching in key wintering areas, as well as at migration stations during the migration season.
- Continuation of satellite monitoring.

- Preventing the loss of habitat for the species and managing it appropriately, especially in wintering areas.
- Promoting international and national legal protection, and raising public awareness.
- Development of captive breeding programmes.

Gissari (*Aythya ferina*)

In Europe, this species breeds mainly in Russia, with significant populations also occurring in the Czech Republic, Ukraine and Romania. European migratory populations winter mainly in northwestern and western Europe, the eastern Mediterranean, the Black Sea and the Caspian Sea, as well as in Turkey, the Middle East and Africa (Hagemeijer and Blair 1997). Important wintering countries for this species are Azerbaijan, Turkey, Germany, France, France, Greece, Switzerland and the Netherlands.

In Greece the species breeds in Western - North-Western Greece (Amvrakikos Gulf, lakes of Western Macedonia etc.). It has a much wider distribution in winter when it is observed in almost all coastal and inland wetlands of northern and central Greece (Handrinos and Akriotis 1997). The distribution of the species and its population levels in winter depend on weather conditions (Kazatzidis and Noidou 2008).

The European population of the species is estimated at 89,700 - 151,000 pairs (179,000 - 302,000 mature individuals), with the European wintering population estimated at 560,000 - 1,020,000 individuals, while in the EU28 the population is estimated at 28,500 - 55,000 pairs (57,000 - 110,000 mature individuals), with the EU28 wintering population estimated at 317,000 - 446,000 individuals (BirdLife International 2021). The Greek population is estimated to number 30 - 80 pairs, corresponding to <1% of the European population. According to the same source, 55% of the European breeding population is found in Russia (50,000 - 80,000 pairs).

The species is protected by Directive 2009/147/EC (Annexes II and III) and the Bern (Annex III) and Bonn (Annex III) Conventions. According to the Greek Red Data Book in Greece the species is listed as a species of reduced concern (LC), while according to the 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 conservation by Birdlife International (BirdLife International 2017).

The species lives in eutrophic marshes with rich vegetation, in lakes, in low-flow rivers with abundant riparian vegetation. It also breeds in brackish lakes and occasionally in coastal protected bays (Kear 2005). The species reaches breeding areas from early March (in the south) to early May (in Siberia) (Scott and Rose 1996), with breeding beginning in April-May. The nest is a cavity made of a thick layer of vegetation and is placed on the ground, well protected by dense vegetation near the water (Carboneras and Kirwan 2014) or is placed above the water in riparian reeds or islands of other vegetation (Johnsgard 1978). It usually lays eight to ten eggs. The species is omnivorous and its diet consists of seeds, plant-based foods (aquatic plant roots, grasses, aquatic plants, etc.) (Carboneras and Kirwan 2014, Kear 2005), as well as aquatic insects and larvae, mollusks, shellfish, amphibians, and small fish (Carboneras and Kirwan 2014). Northern populations of this species are highly migratory compared to those breeding in milder climates in areas of western or southern Europe that are resident or only make short-distance dispersal movements (Snow and Perrins 1998), a consequence of harsh weather occurrence (Scott and Rose 1996).

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats to the species are:

- Expanding crops in wetlands
- Residential development, urban or extra-urban, legal or arbitrary
- Commercial-industrial development (ports, airports, industrial zones)
- Hunting-poaching; trapping; collecting eggs or chicks; destroying nests
- Lead shot molybdenum
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Noisy leisure activities
- Wetland drainage and other land reclamation works
- Erosion control works, cleaning of the bed of streams, embankments of the seashore and stream beds
- Pollution from urban waste water
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters

- Solid waste and waste
- Changes in the extent and distribution of habitats due to climate change

Threats listed on the IUCN red list include hunting (Evans and Day 2002, Kear 2005, Carboneras and Kirwan 2014), disturbance from tourism in the species' riparian habitats (Fox et al. 1994, Kear 2005) and noise from machinery used for residential development in its habitats (Marsden 2000). It is also threatened by habitat destruction (Carboneras and Kirwan 2014) in its wintering areas due to eutrophication of wetland ecosystems (as a result of surface runoff of nutrients from agricultural crops) (Kear 2005). The species is threatened by predation on nesting sites by the American mink (*Neovison vison*) in Poland (Bartoszewicz and Zalewski 2003). The species is also susceptible to avian influenza, so may be threatened by future epidemics of the disease (Melville and Shortridge 2006). Finally, the species is hunted in Northern Ireland (Evans and Day 2002), Spain (Mateo et al. 1998) and Italy (Sorrenti et al. 2006), and eggs of this species are collected (and probably still are) in Iceland (Gudmundsson 1979).

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

- Protection and conservation of wetlands.
- Implement accurate population monitoring of the species in countries where it is hunted.

Mallard (*Aythya nyroca*)

In Europe, the species breeds extensively in Romania, Croatia, Hungary, Serbia and Russia, and winters in Azerbaijan, Bosnia-Herzegovina, Greece and Italy.

In Greece the species had a larger distribution in the past. It is a local and unusual summer visitor, quite common during migration and very rare in winter. According to the Greek Red Data Book (Legakis and Marangou 2009) it used to nest in many wetlands but its populations have shown a serious decline, especially in the last 50 years (Chandrinos 1992, Handrinos and Akriotis 1997). Today it nests in at least 24 sites and its total population is estimated at 130-250 pairs. (Zogaris and Handrinos 2002, BirdLife International 2004). The most important area for the species is the Rodia marsh in the Amvrakikos Gulf (50-80 pairs), while other important breeding areas are the lakes of Chimaditida and Kastoria, the wetlands of Epirus (Kalodikiou Marsh, Ioannina Lake), and other wetlands in Macedonia and Thrace (Ismarida Lake, Evros Delta, etc.). The species rarely nests in southern Greece, but recently breeding has been confirmed in Attica (about 5-10 pairs in 2006) and in the Prokopos-Elos Lamia lagoon (Strofylia, Peloponnese). During migration, especially in autumn, populations of the species are more conspicuous and small groups or even flocks of hundreds of birds are often observed in many wetlands, both on the mainland and on several islands (Crete, Lesvos, etc.). In autumn, migration is prolonged (July-December) and a few individuals remain in Greece, where they winter, usually in small groups (Handrinos 1989; Handrinos and Akriotis 1997; Bonetti and Papakonstantinou 2000).

The European population of the species is estimated at 9,000 - 23,000 pairs (18,000 - 47,000 mature individuals), while in the EU28 the population is estimated at 4,900 - 15,200 pairs (9,900 - 30,300 mature individuals). The Greek population is estimated to number 130-250 pairs, which corresponds to 1 % of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex III) 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 1 species of European conservation concern by Birdlife International (BirdLife International 2017).

The species prefers mainly inland freshwater wetlands (Snow and Perrins 1998) or coastal wetlands with a mosaic of reedbeds or other emergent vegetation. During the breeding season it is common in shallow water with floating vegetation, such as water lilies (*Nymphaea alba*) in Amvrakikos Bay. It nests on the ground, in dense reeds or other aquatic vegetation, at the margins of the water surface (Johnsgard 1978, Kear 2005) or in dense emergent vegetation above the water. The breeding season begins from April to May in central Europe and Turkey, but can start as early as February in southern Europe and as late as late June in the northern parts of its range (Carboneras and Kirwan 2014). It breeds in single pairs or small groups. It usually lays 8-10 eggs. The species is primarily migratory (Carboneras and Kirwan 2014), although little is known about its migratory routes (Scott and Rose 1996). Departure from breeding areas begins in mid to late August, with return to breeding areas beginning in early March (Scott and Rose 1996). It is an omnivorous species but is reported to prefer plant-based foods, such as leaves and roots of aquatic plants (emergent and floating plants), and also feeds on animal species (mollusks, insects, worms, crustaceans, amphibians, and small fish), primarily during the breeding season (Callaghan 1997). It forages by foraging at the surface or by diving in shallow water (30 - 100 cm) near dense vegetation.

The threats mentioned in the Greek Red Data Book (Legakis and Marangou 2009) are wetland drainage and poaching Although it is not a huntable species, many mallards are hunted every year, mainly due to the difficulty for hunters to distinguish them from other ducks, which are allowed to be hunted. In some nesting areas, however, the problem of poaching is particularly acute, such as in the Amvrakikos Gulf, where the species is systematically persecuted immediately after the breeding season, and many birds are decimated during the pollen season or even during the long migration to Africa (July-December). Locally, the species faces other problems, but these have not been adequately assessed, such as water pollution, which can cause eutrophication and significant habitat changes. The species may also be sensitive to habitat alteration by invasive alien species such as the myocastor, grass carp, etc. (Callaghan 1997). Finally, in some lakes, such as Chimaditida and Zazari, several swamp ducks occasionally drown in fishermen's nets.

According to the NRC (Legakis and Marangou 2009), the conservation measures required are: water management plans in wetlands that can restore or help the recovery of breeding populations. Measures to protect the species from the extremely important problem of poaching, especially in some wetlands, such as the Rodia marsh, Amvrakikos Gulf, and during the autumn migration. Systematic recording and mapping of the breeding population and long-term monitoring of its trends are also needed.

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats to the species are:

- Renewable energy: Wind farms
- Hunting-poaching-trapping-collecting eggs or chicks-destroying nests
- Accidental entanglement in fishing gear
- Molybdenum from buckshot
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Wetland drainage and other land reclamation works
- Anti-erosion works, cleaning of the bed of streams, embankments of the seashore and stream beds
- 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 the degradation and destruction of wetland ecosystems with abundant riparian vegetation through wetland drainage (excessive water pumping for agricultural needs), construction of dams and other infrastructure in floodplains, pollution, encapsulation of rivers and streams, increased water turbidity (Vinicombe 2000; Kear 2005; Robinson and Hughes 2006; Carboneras and Kirwan 2014; Grishanov 2006). In addition, changing land management practices, such as cutting and burning of reeds especially during the breeding season, overgrazing of wet grasslands, and intensification of agriculture (resulting in the destruction of riparian vegetation) are also significant threats to the species (Petkov 2006, Robinson and Hughes 2006, Vinicombe 2000, Kear 2005). The introduction of invasive species has caused further habitat degradation of the species. For example, the accidental introduction of *Ctenopharyngodon idella* has resulted in declines in macrophyte biomass and corresponding declines in invertebrate biomass (Kear 2005, Robinson and Hughes 2006) and in Bulgaria the introduced *Amorpha fruticosa* has altered the ecological character of wetlands (Robinson and Hughes 2006). Increased drought due to global climate change may pose a threat to the species in areas of its distribution range (Vinicombe 2000, Robinson and Hughes 2006). Disturbance from fishing vessels and anglers alongside a reduction in riparian vegetation could cause abandonment of breeding sites or disrupt the breeding schedule. Hunting is another serious threat to the species (Vinicombe 2000, Robinson and Hughes 2006, Carboneras and Kirwan 2014). Large numbers of the species are hunted during the autumn migration (e.g. through the Volga Delta) (Kear 2005, Balmaki and Barati 2006). Poaching continues in most European countries. Other threats, of lesser importance, include lead poisoning, fires in areas of reedbeds, peat and forest (Grishanov 2006), drowning in fishing nets (Robinson and Hughes 2006) and hybridisation with native species (e.g. *Aythya fuligula*, *Aythya ferina*) in Switzerland (Leuzinger 2010).

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

- Promote full legal protection of the species and habitats, both nationally and internationally.
- Promote proper management of lakes in Eastern Europe, promote better protection and management of important habitats.
- Prevention of mortality and disturbance caused by illegal hunting.
- Development of techniques for population census of the species.

- Investigate the ecology of the species and limiting factors.
- Investigation of the impact on the species and its habitat by *Ctenopharyngodon idella*.
- Develop and implement educational programmes for the conservation of the species' habitats.

Crabapple (*Ardea alba*)

In Europe the species breeds largely in Russia, with significant breeding populations also in Belarus, Ukraine and Hungary.

The species is rare and a local 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, 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 adults), while in the EU28 the population is estimated at 7,900 - 11,400 pairs (15,900 - 22,800 adults). 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 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.

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 paddies, 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).

The threats listed in the Greek Red Book (Legakis and Marangou 2009) are water pollution and the destruction/degradation of wetlands, especially 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 Marangou 2009), the conservation measures required are: the protection of wetlands from pollution and degradation, the promotion of measures to limit the use of pesticides and fertilizers on cultivated land around wetlands and the management of reeds, so that the needs and ecological requirements of the species for nesting are taken into account.

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats to the species are:

- Expanding crops in wetlands
- Grazing of livestock in wet meadows
- Transmission lines (electricity, telephone), oil and gas pipelines
- Persecution of specific users as harmful
- Erroneous killing by hunting or poaching
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Noisy leisure 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 banks, 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 protecting colonies, controlling disturbance and managing riparian vegetation.
- Conservation of feeding habitats, which includes water management (pollution, salinity, level).

Mustelid (*Chlidonias hybrida*)

The species breeds mainly in Russia, Azerbaijan, Romania and Ukraine, with smaller numbers in Belarus, Spain, Turkey and France.

The species is a rare and local summer visitor and a common transient migrant in Greece. By the early 1990s the breeding population of the species was estimated at 300 pairs, distributed in three areas (Handrinos and Akriotis 1997). Since then the breeding population of the species has dramatically declined and today it nests in very small numbers (5-10 pairs) in the Amvrakikos Gulf (Louros Delta, 1-5 pairs) and occasionally probably in at least two other wetlands (Lakes Kerkini and Chimaditida). It should be noted, however, that there is no precise census of the breeding population. Species common during migration, especially in spring, is observed in inland wetlands (marshes and lakes such as Kerkini, Agras, Prespa, Kastoria, Petron, Ismarida and Vistonida) and deltas or estuaries (Axios, Aliakmon, Evros, Kalamas, Louros, etc.), but also on several islands (Handrinos and Akriotis 1997).

The European population of the species is estimated at 58,900 - 147,000 pairs (117,000 - 294,000 mature individuals), while in the EU28 it is estimated at 19,100 - 41,500 pairs (38,300 - 82,900 mature individuals). The Greek population is estimated to number 160 - 330 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 Convention (Annex II).According to the Greek Red Data Book in Greece the species is classified as endangered (EN), 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.

The species prefers freshwater wetlands with sparse vegetation (lakes, marshes, swamps, rice paddies, bogs, salt marshes) for breeding and foraging (Billerman et al. 2020, Higgins and Davies 1996). It nests by forming loose colonies, often on floating leaves of water lilies or other floating vegetation, in shallow water, usually with similar individuals but also with black-headed gulls. During migration it is observed along rivers, in inland wetlands and also in coastal wetlands (e.g. deltas, estuaries, etc.). The species breeds from May to early June (Richards 1990) in monospecific colonies of 10-100 pairs. The nest is a pile of aquatic vegetation, placed either in emergent vegetation above the water, 60-80 cm deep, or adjacent to the bottom of very shallow water. It lays 2 - 3 eggs. Prefers to forage (aquatic and terrestrial insects, frogs, tadpoles, crabs, shrimps and small fish) (Billerman et al. 2020, Higgins and Davies 1996) in shallow, freshwater habitats, in rice paddies when flooded, in drainage ditches, etc.

The threats mentioned in the Greek Red Book (Legakis and Marangou 2009) are water pollution, especially from agricultural drugs and fertilizers, and the gradual degradation and drainage of marshes and small wetlands. The ongoing reduction in the area of lesser lesser lesser lilies in some areas (e.g. in L. Kerkini) is probably one of the causes of the decline in the breeding population.

According to the NRC (Legakis and Marangou 2009) the conservation measures required are: Protecting wetlands from pollution and degradation, with emphasis on wetlands where the species breeds. Promote measures to limit the use of pesticides and fertilizers on crops around the periphery of wetlands. Systematic census and monitoring of the breeding population and research into its biology/ecology. Investigate the possibility of constructing artificial islands in wetlands where it used to breed and is expected to breed again.

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats to the species are:

- Grazing of livestock in wet meadows
- Disturbing activities (hunting, logging, fishing, gathering, plant and firewood collection)
- Construction of dams and flood protection interventions, irrigation networks
- Wetland drainage and other land reclamation works
- Erosion control works, cleaning of the bed of streams, embankments of the seashore and stream beds
- Pollution from industrial or military activities
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters

The threats listed in the IUCN red list are the degradation and destruction of wetlands through drainage of water for agricultural use (Hagemeijer and Blair 199), the encapsulation of rivers and streams (Tucker and Heath 1994), long periods of drought due to climate change. Also, disturbance near breeding colony sites due to increased tourism leads to loss of nesting sites (Tucker and Heath 1994), and adverse weather conditions contribute to this loss. Also, in Ukraine, fishermen collect eggs of the species (Billerman et. al. 2020). In addition, the species is affected by water quality, with insecticide pollution and water eutrophication being another threat (Marti and Moral

2004). Finally, intensification of fishing and drowning after accidental entanglement in fishermen's nets is a threat (Golemanski 2011).

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

- Maintain wetlands with well-developed emergent vegetation to provide nesting sites.
- Protection from disturbance near nesting sites.
- Providing artificial nesting sites in intensively managed aquatic ecosystems (Tucker and Heath 1994).

Swan (*Cygnus olor*)

In Europe, the largest breeding populations are found in Russia and Germany, with significant numbers also in the Netherlands, Sweden, France, Poland, the UK and Finland.

The European population is estimated at 84,600 - 118,000 pairs (169,000 - 236,000 mature individuals), with the European wintering population estimated at 209,000 - 299,000 individuals, while in the EU28 the population is estimated at 67,100 - 94,600 pairs (134,000 - 190,000 mature individuals), with the EU28 wintering population estimated at 182,000 - 225,000 individuals. The IUCN red list population trend for the species, both at European and EU28 level, is estimated to be increasing. The Greek population of the species is estimated to number 20 - 30 pairs, with the proportion corresponding to <1% of the European population, while the wintering Greek population is estimated to number 640 - 4,400 individuals (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex II) and the Bern (Annex III) 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.

The species breeds in western - north-western Greece (Amvrakikos, lakes of western Macedonia etc.). It has a wide distribution in winter, so that it is observed in almost all coastal and inland wetlands of northern and central Greece, although the bulk of the wintering population in Greece is mainly found in Thrace and Macedonia, especially in the Evros Delta (Handrinos and Akriotis 1997). The distribution of the species and its population levels in winter depend on weather conditions (Kazantzidis and Noidou 2008), and in cases of heavy winters, buffaloes are dispersed in many areas, even in the south (Crete, etc.).

The species inhabits a variety of lowland freshwater wetlands, including shallow lakes, lagoons, marshes, reedbeds, and low-flow rivers (showing a preference for clean water in smaller riverine ecosystems over larger rivers with polluted water) (Carboneras and Kirwan 2013; Madge and Burn 1988; Snow and Perrins 1998; Kear 2005; Johnsgard 1978). It is also a common species in artificial aquatic ecosystems (Snow and Perrins 1998), such as reservoirs, ditches and canals. In addition, adult and immature individuals can also be found in brackish or saline habitats, (Kear 2005, Johnsgard 1978) estuaries and protected coastal sites. (Madge and Burn 1988).

The species breeds mainly in spring as single pairs in well-protected areas. The nest consists of aquatic vegetation placed near or on shallow water or among reeds (Carboneras and Kirwan 2013). Pairs often reuse nesting sites from previous years if there has been breeding success (Johnsgard 1978). It usually lays 5-7 eggs over a two-day interval. The diet consists mainly of plant-based foods such as aquatic plants (Carboneras and Kirwan 2013) and algae (Johnsgard 1978), and occasionally feeds on small amphibians and aquatic invertebrates (molluscs and worms). The species is migratory (particularly in areas displaced by weather conditions) (Carboneras and Kirwan 2013), although European populations are essentially epidemic or only locally migratory (Scott and Rose 1996; Snow and Perrins 1998).

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats to the species are:

- Expanding crops in wetlands
- Residential development, urban or extra-urban, legal or arbitrary
- Commercial-industrial development (ports, airports, industrial zones)
- Molybdenum from buckshot
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Noisy leisure activities
- Wetland drainage and other land reclamation works
- Erosion control works, cleaning of the bed of streams, embankments of the seashore and stream beds
- Pollution from urban waste water

- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters
- Solid waste and waste
- Changes in the extent and distribution of habitats due to climate change

Threats listed on the IUCN red list are lead ingestion through ingestion of heavy fishing gear (Kelly and Kelly 2004), ingestion of lead sediment from mining activities (Day et al. 2003) and lead ingestion from boat wrecks (Spray and Milne 1988). Large losses have also been recorded from local incidents of copper poisoning (Kobayashi et al. 1992). Ingestion or entanglement in fishing lines and/or hooks can also cause fatal injuries (Kelly and Kelly 2004), as can collisions with overhead power and telephone transmission lines (Carboneras and Kirwan 2013), although European populations are usually epidemic or only locally migratory. The species may be threatened by future oil spills (Berglund et al. 1963) and is also susceptible to avian influenza (Melville and Shortridge 2006; Nagy et al. 2007), and may be threatened by future outbreaks of the virus. Finally, adverse weather conditions in winter pose a significant threat as they prevent the species from foraging (Carboneras and Kirwan 2013).

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

- Legislation to ban the use of lead weights in fisheries and measures to minimise mortality from line and gillnets.
- Protecting wetland ecosystems from mining waste.
- Transportation of power lines or marking them.

Salamander (*Fulica atra*)

In Europe the species breeds in almost all countries, with the most important breeding populations being found in Russia, the Netherlands, Ukraine, Germany, France, Germany and Romania.

The European population is estimated at 1.010.000 - 1.680.000 pairs (2.030.000 - 3.360.000 mature individuals), while in the EU28 the population is estimated at 542.000 - 860.000 pairs (1.080.000 - 1.720.000 mature individuals). The IUCN red list population trend at European level is estimated to have declined by 27% (best estimate) over the last 15 years, while in the EU28, the population trend is estimated to remain stable. The Greek population is estimated to number 2,500-5,000 pairs, corresponding to <1% of the European population, while the Greek wintering population is estimated to number 111,000-213,000 individuals, corresponding to 4% of the European wintering population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annexes II and III) and the Bern (Annex III) 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 threatened (NT) (BirdLife International 2021). It is also classified as a SPEC 3 species of European conservation concern by BirdLife International (BirdLife International 2017).

The species nests in several areas of mainland Greece (mainly in Northern and Central Greece) and on some large islands (Lemnos, Lesvos). The distribution of the species and its population levels in winter depend on weather conditions (Handrinos and Akriotis 1997, Kazantzidis and Noidou 2008).

The species inhabits large, low-flowing aquatic ecosystems (Snow and Perrins 1998) and shows a preference for shallow waters adjacent to deeper water for diving with muddy bottoms and sparse emergent vegetation. Habitats for this species include eutrophic ponds (Taylor and van Perlo 1998), reservoirs, lakes, canals, drainage ditches, low-flow rivers, creeks (Taylor 1996) and river deltas (Taylor and van Perlo 1998), as well as marshes, freshwater wet meadows, floodplains and salt marshes.

The species breeds from February to September. The nest consists of vegetation and is placed on the margins of shallow waters or on islands of emergent vegetation on shallow waters. The species also nests in artificial nesting sites, tree stumps or bushes up to 3 m above water (Taylor and van Perlo 1998). The species is omnivorous, although its diet consists mainly of plant matter, such as algae, aquatic plants, seeds, mosses and aquatic fungi (Taylor and van Perlo 1998) and cereals (Taylor 1996). Animal matter included in the diet includes molluscs, insects, worms, leeches, shrimp, spiders, and small mammals (Taylor 1996).

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats to the species are:

- Expanding crops in wetlands
- Grazing of livestock in wet meadows
- Residential development, urban or extra-urban, legal or arbitrary
- Commercial-industrial development (ports, airports, industrial zones)

- Hunting-poaching; trapping; collecting eggs or chicks; destroying nests
- Molybdenum from buckshot
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Noisy leisure activities
- Wetland drainage and other land reclamation works
- Erosion control works, cleaning of the bed of streams, embankments of the seashore and stream beds
- Pollution from urban waste water
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters
- Solid waste and waste
- Changes in the extent and distribution of habitats due to climate change

The threats listed in the IUCN red list are hunting (Taylor 1996) and poisoning from ingestion of lead weights in fishing gear (Mondain-Monval et al. 2002). It is also threatened by water pollution from oil and its derivatives (Taylor 1996, Grishanov 2006), wetland drainage, peat extraction, changing wetland management practices (reduced grazing leading to the development of wetland scrub). The species is threatened by predation on nesting sites by the American mink (*Neovison vison*) in Poland (Bartoszewicz and Zalewski 2003) and the UK (Ferreras and MacDonald 1999). It is also susceptible to avian influenza, so may be threatened by future outbreaks of the virus (Melville and Shortridge 2006).

No conservation measures are currently required for the species, although monitoring and research on the effects of hunting, water pollution and land use changes on the species' habitats would help inform any future conservation measures.

Cephalopod (*Oxyura leucocephala*)

In Europe the species breeds mainly in Spain (the species is epidemic in the country), Russia, but also in Turkey.

The European population of the species is estimated at 500-760 pairs (1,000-1,600 mature individuals), while in the EU28 the population is estimated at 250-310 pairs (510-620 mature individuals) (BirdLife International 2021). 48% of the European population of the species is estimated to occur in Spain.

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 endangered (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).

In the middle of the 19th century the head flower was a locally common species, and is also mentioned as epidemic in Epirus, although there is no evidence that it ever flourished in Greece. Today the species is a rare and very local winter visitor, occurring almost exclusively in L. Vistonida and occasionally in Lakes Kerkini, Volvi, Ismarida, while there are also few records from the Evros Delta and Lesvos (Handrinos 1995, Handrinos and Akriotis 1997). In L. Vistonida, populations in the last 10 years have ranged from a few dozen to 2.213 individuals (Greek Red Data Book; Legakis and Maragou 20009) The origin of the population found in Greece is not known, but it is probably part of the larger population wintering in Turkey (Handrinos and Akriotis 1997). The fact that cephalopod populations greater than 1,000 individuals have been counted several times in L. Vistonida makes it one of the most important wetlands in the world for wintering of the species, as 2-10% of the world population is found in this lake (Hughes et al. 2006).

During the breeding season, the headed bird prefers shallow, productive wetlands with brackish or salt water, with a preference for inland wetlands, mainly located in dry or semi-arid areas (Birdlife International 2008). In winter, the birds congregate in large shallow wetlands with brackish or salt water, characterised by significant areas of open water surface without vegetation. Breeding begins in April with chicks hatching primarily in June and July (Billerman et al. 2020). Nests are constructed of stems and leaves of reeds lined with down and are located within dense vegetation on the ground or above water, often in old nests of other waterfowl, and sometimes within colonies of gulls and terns. It lays 4-9 eggs. Head lice appear in L. Vistonida in late October or early November and remain until late February or early March. The L. Vistonida, where the bulk of the wintering population in Greece is found, is characterised by overfeeding, significant annual variation in salinity and increased inflow of sediment from the three main contributing rivers (Komsatos, Kosynthos and Trayos). Headed ducks feed in small, pure or mixed groups with other butterns within the lake. They have often been observed feeding at very short distances from shore, and their diet consists primarily of polychaetes, which are the most common benthic organism on the lake bottom, and Chironomidae larvae.

The threats mentioned in the Greek Red Data Book (Legakis and Marangou 2009) are accidental entrapment in fishing nets , disturbance from hunting and poaching, as well as pollution and degradation of wetlands (with impacts on the composition of the benthic fauna of L. Vistonida, which is the main feeding habitat of the species). In other countries the species is also threatened by hybridisation with the related *Oxyura jamaicensis*, but there are no records of such hybrids in Greece.

According to the NRC (Legakis and Marangou 2009), the conservation measures required are the following: Hydrological management and protection measures for the Vistonida River, control of disturbance from hunting and poaching, measures to deal with accidental capture in nets, public awareness of the species, more systematic census and monitoring of the species' populations, study of its biology/ecology and immediate recording of any occurrence of *Oxyura jamaicensis* in Greece.

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats to the species are:

- Hunting-poaching; trapping; collecting eggs or chicks; destroying nests
- Accidental entanglement in fishing gear
- Wetland drainage and other land reclamation works
- Erosion control works, cleaning of the bed of streams, embankments of the seashore and stream beds
- Pollution from urban waste water
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters
- Solid waste and waste

The threats listed in the IUCN red list are competition and endogenous hybridization with *Oxyura jamaicensis* (Green and Hughes 1996, Green and Hughes 2001, Muñoz-Fuentes et al. 2007). This threat is extremely serious in that if allowed to progress beyond a certain point, the spread of *Oxyura jamaicensis* throughout the Palearctic would be unstoppable, especially if *Oxyura jamaicensis is* allowed to encroach into significant areas of *Oxyura leucocephala*'s distribution range in countries such as Turkey and Russia, where the sheer size and extent of wetlands, as well as scarce monitoring, would make control impossible (Hughes et al. 2006). The species' habitats have also been degraded or destroyed through water drainage for agricultural purposes, pollution and disturbance. Additional threats to the species include drowning from accidental entanglement in fish nets, hunting, and lead barite poisoning of fishing gear (Green et al. 1996; Mateo et al. 2001). Finally, the species is illegally hunted in most areas of its range. Hunting and egg collection is the likely cause of extinction in some countries (Hughes et al. 2006).

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

- Conduct surveys at breeding and wintering areas, as well as at refuelling stations during migration.
- Conduct integrated winter monitoring studies to improve knowledge of migration routes and stations (Li and Mundkur 1993).
- Protection and management of key areas and their river basins, including monitoring of hydrology and water pollution.
- Reduction of disturbance from fishing and hunting.
- Ensure legislative protection in all countries within the species' range.
- Promote policies to control hybridisation of the species with *Oxyura jamaicensis*

Phoenicopterus *roseus* (*Phoenicopterus roseus*)

In Europe the species breeds mainly in Spain, Italy and Turkey, with small populations also in France. In Greece the species occurs as a winter visitor.

The European population is estimated at 35,900 - 133,000 pairs (71,800 - 265,000 mature individuals), with the European wintering population estimated at 234,000 - 420,000 individuals, while in the EU28 the population is estimated at about 49,200 pairs (98,300 individuals), with the EU28 wintering population estimated at 168,000 - 250,000 individuals. At both European and EU28 level, the trend in both the breeding and wintering population of the species is estimated to be increasing. The Greek wintering population is estimated to number 18,000-30,000 individuals, corresponding to 8% of the European wintering population (BirdLife International 2021).

In Greece, since the late 1980s, the wintering and migratory populations of the species and its distribution have been increasing and the species is found in all suitable saltwater wetlands of the mainland and the islands (Handrinos and Akriotis 1997).

The species is protected by the Bern (Appendix III) and Bonn (Appendix 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 as a species of European interest in terms of protection by Birdlife International (BirdLife International 2017).

The species is found in shallow (Snow and Perrins 1998) eutrophic water bodies (Hockey et al. 2005) such as saline lagoons, salt ponds and large saline or alkaline lakes (Brown et al. 1982) (up to pH 11) and estuaries with water depths of less than one metre. Rarely found in freshwater wetlands. Nests in sandy areas, mudflats, islands of large bodies of water (Brown et al. 1982) or marshy open shores, occasionally on bare rocky islets (Flint et al. 1984). Breeds from March to June in large dense colonies of up to 20,000 pairs (occasionally up to 200,000 pairs). For successful reproduction it needs optimal water depth conditions. The nest of the palm warbler is a mound of mud with a depression at the top, where the single egg of the litter is laid and incubated. In each group of adjacent nests or even in the entire colony, the eggs are laid almost simultaneously. Incubation lasts 28-31 days. The chicks are able to fledge at an age of usually 70-75 days. Juveniles (to a lesser extent adults) (Mateo et al. 1998), are prone to irregular nomadic migratory or partially migratory movements throughout the species distribution range in response to changes in water level (Snow and Perrins 1998, Hockey et al. 2005). The species' diet consists of crustaceans, mollusks, worms, aquatic insects, small fish, seeds, algae, diatoms, and amorphous organic matter. The beak of the palm snappers bears rows of fine horned plates, like a comb, which it uses to filter small suspended pieces of food from the water.

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats for the species are:

- Transmission lines (electricity, telephone), oil and gas pipelines
- Erroneous killing by hunting or poaching
- Lead shot molybdenum
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- 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 low reproductive success if exposed to disturbance at breeding colonies (e.g. tourism) (Ogilvie and Ogilvie 1986, Yosef 2000) or if water levels at nesting sites are low resulting in increased access and predation by terrestrial predators such as foxes and wild dogs (Miltiadou 2005). In addition, lead shot and impacts on power lines pose significant threats to the species (Mateo et al. 1998, Miltiadou 2005, Hockey et al. 2005). Finally, diseases (e.g. tuberculosis, septicaemia, etc.) pose a threat (Nasirwa 2000, van Heerden 1974).

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

- Maintain and monitor feeding and nursery wetlands to ensure continued appropriate management techniques (Tucker and Heath 1994).

Red grouse (*Plegadis falcinellus*)

In Europe, the species breeds mainly in Russia and Spain, and in 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 Data Book (Legakis and Marangou 2009), the steelhead in Greece is a rare and local summer visitor with a wider distribution during migration. It was first found nesting 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' range are fully migratory (Billerman et al. 2020). Also, northern and southern populations of the species' range breed in spring, while breeding in other areas of the species' 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 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 mentioned in the Greek Red 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 Marangou 2009), the conservation measures required are the following: 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 reduce the use of pesticides and fertilisers on farmland around wetlands. Investigate competition between the species and the cormorant in terms of nesting sites.

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats to the species are:

- Expanding crops in wetlands
- Grazing of livestock in wet meadows
- Incidental killing by hunting or poaching
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Construction of dams and flood protection interventions, 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 invasive 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:

- Sustainable management of river valleys and wetlands.
- Deforestation of farmland, drying of wetlands and wetlands in the interior in important breeding sites should be stopped.

Black-bellied sea otter (*Podiceps nigricollis*)

In Europe the main part of the breeding population is in Russia, with significant numbers also in Ukraine, Spain, Belarus, Belarus, France and Poland.

The European population of the species is estimated to number 35.500 - 57.900 pairs (71.100 - 116.000 adults), with the European wintering population estimated at 49.100 - 129.000 individuals, while in EU28 the population is estimated at 6.900 - 13.700 pairs (13.800 - 27.400 adults), with the EU28 wintering population estimated at 31.600 - 46.300 individuals. The European population trend, according to the IUCN red list, is estimated to be decreasing. The Greek population is estimated at 40-50 pairs, corresponding to <1% of the European population, while the wintering Greek population is estimated at 1,500-5,000 individuals, corresponding to 4% of the European wintering population (BirdLife International 2021). According to the same source, 55 % of the European breeding population is estimated to be found in Russia.

Few pairs of the species seem to nest in Northern Greece. The species is found in almost all of mainland Greece and on several large islands during the wintering period, when it is most widespread. Population levels during the wintering period in Greece depend on several factors, but mainly on the severity of the winter in northern and central Europe.

The species is protected by the Bern Convention (Annex II). According to the Greek Red Data Book in Greece the species has not been assessed and therefore is not classified as threatened (NE), while according to the IUCN at European level the species is classified as threatened (VU) (BirdLife International 2021). It is also not classified as a species of European interest in terms of conservation by Birdlife International (BirdLife International 2017).

During the breeding season the species frequents permanent or temporary (Snow and Perrins 1998), shallow, highly eutrophic waters with rich vegetation such as marshes and freshwater lakes (Billerman et al. 2020) with scattered emergent low vegetation and small scattered stands of reeds (Konter 2001, Fjeldsa 2004), flooded areas and calm river channels. In the southern Russian region the species shows a preference for reed swamps and alkaline lakes rich in emergent low vegetation (Fjeldsa 2004). Outside the breeding season the species moves to saline lakes (Billerman et al. 2020), salt ponds (Fjeldsa 2004) and estuaries, coastal shallow waters and channels (Snow and Perrins 1998). The breeding season lasts from April to August, with the spawning season limited to May and June (Billerman et al. 2020). Usually nests in colonies on emergent marsh vegetation, sometimes far from shore (Fjeldsa 2004). Usually 3 or 4 eggs (Billerman et al. 2020). The species is carnivorous and the diet consists of insects (midges and flies), molluscs, crustaceans, amphibians (Billerman et al. 2020), small fish (Fjeldsa 2004). The species is fully migratory (Snow and Perrins 1998), although the extent of migration varies between populations and some populations remain epidemic, as in Spain (Billerman et al. 2020).

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats for the species are:

- Expanding crops in wetlands
- Residential development, urban or extra-urban, legal or arbitrary
- Commercial-industrial development (ports, airports, industrial zones)
- Accidental entanglement in fishing gear
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Noisy leisure activities
- Wetland drainage and other land reclamation works
- Erosion control works, cleaning of the bed of streams, embankments of the seashore and stream beds
- Pollution from urban waste water
- Pollution from industrial or military activities
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters
- Solid waste and waste
- Changes in the extent and distribution of habitats due to climate change

The threats listed on the IUCN red list are oil pollution on shorelines, as it commonly overwinters on them (Ogilvie and Rose 2003, Billerman et al. 2020). It is also susceptible to diseases such as avian cholera and avian botulism, and is thus threatened by future outbreaks of these diseases (Ogilvie and Rose 2003, Friend 2006, van Heerden 1974). Local declines of this species are also attributed to human disturbance (especially recreational - sporting activities in lakes) (Billerman et al. 2020), and it is threatened by collisions on power transmission lines (Malcom 1982). Finally, it is threatened by predation on nesting sites by the American mink (*Neovison vison*) in western Poland (Bartoszewicz and Zalewski 2003).

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

- Identify and protect key sites and monitor population fluctuations of the species in these sites.
- Relocate, underground or tag power lines to reduce collisions, and control introduced predators of the species at important breeding sites.
- Implement strict legislation on oil transport to reduce the potential future risk of spills.

Myxos (*Puffinus yelkouan*)

In Europe the species breeds mainly in Italy, but also in Greece, France and Malta.

The species is epidemic with the European population estimated to number 23,500-40,900 pairs (47,100-81,800 mature individuals), while in the EU28, according to the IUCN red list, the population is estimated at 23,500-40,400 pairs (47,000-80,700 mature individuals). The Greek population is estimated at 6,800 - 13,200 pairs, corresponding to 31% 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 classified as threatened (NT 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).

The species is found in all Greek seas, with significant concentrations observed in the northern Aegean, the northern Sporades and the Cyclades. However, very little is known about the movements of the species and the dispersal of juveniles (Handrinos and Akriotis 1997).

The species lives and breeds in marine ecosystems such as rocky coastlines and offshore islands. It is found in colonies and uses cracks or ledges in caves and occasionally in old rabbit burrows lined with sparse plant material for nesting. It sometimes nests in cliffs. It lays an egg. Its diet consists mainly of fish and squid (Carboneras et al. 2020). The species dives and stalks its prey in the water. Outside the breeding season it is widely dispersed in the Mediterranean and Black Sea, often aggregating in large swarms (Snow and Perrins 1998).

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats for the species are:

- Tourism - recreation infrastructures (ski resorts, golf courses, golf courses, camps)
- Renewable energy: Wind farms
- Accidental entanglement in fishing gear
- Introduction of invasive species
- Increase in the population of native problematic - competing species
- Pollution from industrial or military activities
- Changes in the extent and distribution of habitats due to climate change

Threats listed on the IUCN red list are fishing, with direct killing of populations of the species by accidental entanglement in fishing gear such as longlines (Arcos et al. 2008, Louzao et al. 2011) and fishing nets. Predation by non-native species, especially in breeding sites (mainly rats but also to a lesser extent by feral cats) (Bourgeois et al. 2008, Bonnaud et al. 2009), is another important threat to the species. The decline of the species' population in Italy (where 51% of the European population is found- BirdLife International 2021) is largely attributed to predation by invasive species, mainly rats, which greatly reduce reproductive success by predation on eggs and chicks (Sultana and Borg 2006; Capizzi et al. 2010). In the Hyères Islands (French Mediterranean coast), bobcats have been identified as the main predator of the species, as hundreds of adults of the species are killed every year, especially during the pre-breeding period (Bourgeois and Vidal 2008). Increasing tourism and coastal urbanisation in the Mediterranean is creating disturbances to colonies and destroying sensitive breeding habitats (Bourgeois and Vidal 2008, Oppel et al. 2011). Breeding success may be affected by reduced abundance of food stocks (e.g. anchovy) due to competition from fisheries (Bourgeois and Vidal 2008). The species is particularly vulnerable to oil spills (the strong presence of oil tankers in the Mediterranean and Bosphorus increases the risk of oil spills). Less obvious threats include competition for oiling sites with other species, collisions with wind turbines, pollution and contaminants (e.g. plastic) and illegal hunting (Derhé 2012).

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

- Research on whether the species breeds in Turkey and search for colonies in Turkey and Greece.
- Census of populations of the species in breeding colonies for better and more reliable data, especially in colonies in Sicily, Sardinia and Greece. In addition, continue to measure populations of the species during the breeding season and outside the breeding season in the Bosphorus.
- Investigation of the ecological requirements of the species and extensive monitoring.
- Investigate the impact of non-native predators throughout the species' range, and investigate the impact of non-native predator control/eradication programs on the annual survival and reproductive success of the species at different locations within its range.
- Control, or if possible eradicate, rats and feral cats in breeding colonies, with priority analysis of sites with evidence of predation.
- Quantify the extent of mortality from accidental entanglement of the species in fishing gear and encourage the development of policy-driven measures to reduce mortality from accidental entanglement of the species, and other seabirds, in fishing gear in the Mediterranean and Black Sea.

Common Duck (*Tadorna ferruginea*)

The species is widespread throughout southeastern Europe. It is mainly found in the Black Sea region (mainly in Turkey and Russia, but also in Azerbaijan), with small populations in other countries of South-Eastern Europe. In winter it occurs mainly in Azerbaijan and Turkey, with smaller populations in other countries of south-western Europe.

The European population of the species is estimated at 17,700 - 32,100 pairs (35,500 - 64,100 individuals), while in the EU28 the population is estimated at 230 - 870 pairs (460 - 1,800 mature individuals). The Greek population is estimated at 60 - 80 pairs, corresponding to <1% of the European population, while the wintering Greek population is estimated at 80 - 1,700 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 (Annex II) Conventions. According to the Greek Red Data Book in Greece it is classified as a threatened species (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 chestnut duck is an epidemic species. It nests locally, mainly in coastal wetlands, in Thrace, less frequently in Macedonia, and on some large islands, such as Lemnos, Lesvos, Samos, Kos, etc. (Handrinos and Akriotis 1997). The total breeding population is estimated at 60-80 pairs and is fluctuating, with a slightly increasing trend. According to recent records, 33-49 pairs nest in Lemnos and 13-19 pairs in Lesvos (Greek Red Data Book - Legakis and Marangou 2009). The species is also found both in winter and during the migration period, in almost the same areas where it breeds. The average (1996-2005) wintering population is 22 individuals, with the most important area being the Evros Delta, where 98% of the population wintered during the last decade. The maximum concentrations of the species were 352 individuals on 11-1-2007 and 240 individuals on 18-1-2006. Maximum winter records on the islands were 69 individuals at Aliki/Hortarolimni on Lemnos (23-2-2008) and 57 individuals at Kalloni on Lesvos (25-2-2007).

The species is found on the banks of inland freshwaters, particularly those on open steppes and upland plateaus, salt and brackish lakes and rivers (Cramp and Simmons 1977; Johnsgard 1978; Brown et al. 1982; Carboneras and Kirwan 2014). However, it is less dependent on large aquatic ecosystems for roosting and foraging than other species in the family Anatidae, and often occurs at a significant distance from water during the breeding season (Scott and Rose 1996). Outside of the breeding season, the species prefers streams, low-flowing rivers, flooded meadows, marshes, and brackish or saline lakes (Cramp and Simmons 1977; Johnsgard, 1978; Brown et al. 1982; Carboneras and Kirwan 2014). It avoids coastal waters and tall, dense riparian and emergent vegetation (Madge and Burn 1988). It breeds solitarily or in small groups, and in Europe it lays its eggs from mid-March onwards. It usually lays eight or nine eggs (Carboneras and Kirwan 2014). The species is omnivorous and its diet consists of tender green shoots and seeds of terrestrial vegetation, crustaceans such as shrimps, aquatic and terrestrial insects (especially grasshoppers), molluscs, small fish and amphibian eggs (Cramp and Simmons 1977; Johnsgard, 1978; Brown et al. 1982, Carboneras and Kirwan 2014). In Europe the species is mainly epidemic or makes local movements linked to the availability of suitable water (movement from drought-affected areas to areas with temporary wetlands) (Tucker and Heath 1994, Carboneras and Kirwan 2014).

The threats mentioned in the Greek Red Book (Legakis and Marangou 2009) are poaching (the species is not huntable), especially on the islands, and disturbance during the hunting season. Locally it may face problems from human encroachment on its habitats, especially during the breeding season.

According to the NRC (Legakis and Marangou 2009) the conservation measures required are as follows : Strict control of poaching and compliance with hunting laws, management and habitat protection measures for the species, especially during the breeding season, study of its biology/ecology and long-term monitoring of its population.

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats to the species are:

- Expanding crops in wetlands
- Overgrazing of livestock in mountain, semi-mountainous and island pastures
- Residential development, urban or extra-urban, legal or arbitrary
- Hunting-poaching-trapping-collecting eggs or chicks-destroying nests
- Wetland drainage and other land reclamation works
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters
- Solid waste and waste

The threats listed on the IUCN red list are hunting, especially in southeastern Europe (e.g. Turkey) (Johnsgard 1978, Kear 2005, Popovkina 2006, Carboneras and Kirwan 2014, Scott and Rose 1996). Other threats to western populations of the species' range include loss and degradation of inland wetlands through exploitation of groundwater reserves for agricultural use (leading to a reduction in water supplies for seasonal wetlands) (Popovkina 2006), widespread drainage of shallow marshes and lakes (Scott and Rose 1996), urban development, pollution, introduction of non-native fish and overgrazing (Green et al. 2002; Popovkina 2006; Carboneras and Kirwan

2014). Also, at the Klingnau Dam in northern Switzerland, the species is known to hybridize with *Tadorna cana* from individuals that had escaped captivity, which could pose a threat to the integrity of both species (Owen et al. 2006). The species is also susceptible to avian influenza, and is therefore threatened by outbreaks of the virus (Melville and Shortridge 2006).

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

- Protection from hunting in southeastern Europe and further studies, through ringing of individuals of the species, to investigate the status of individual populations, as well as their migration patterns (Kear 2005, Popovkina 2006)
- Protecting important sites for the species from residential development
- Conduct research to evaluate the effects of hybridization with *Tadorna cana*.

Nano-butterfly (*Tachybaptus ruficollis*)

The species breeds in much of Europe, with the largest populations occurring in Germany, France and Turkey, and significant populations also in Ukraine, Romania and Croatia.

The European population of the species is estimated to number 104.000 - 195.000 pairs (209.000 - 390.000 mature individuals), with the European wintering population estimated at 68.000 - 118.000 individuals, while in the EU28 the population is estimated at 68.100 - 138.000 pairs (136.000 - 275.000 mature individuals), with the EU28 wintering population estimated at 44.900 - 68.600 individuals. The population trend of the species, according to the IUCN red list, both at European and EU28 level, is estimated to be stable. The Greek population is estimated to number 1,500-2,000 pairs, corresponding to 1% of the European population, while the wintering Greek population is estimated at 3,500-7,100 individuals, corresponding to 6% of the European wintering population (BirdLife International 2021).

The species is protected by the Bern Convention (Annex II). According to the Greek Red Data Book in Greece the species has not been assessed and therefore is not under threat (NE), 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 conservation by Birdlife International (BirdLife International 2017).

The nano-butterfly reproduces in almost all wetlands of mainland Greece and the large islands. Its population levels during the wintering period in Greece depend on several factors, but mainly on the severity of winter in Northern and Central Europe (Handrinos and Akriotis 1997). The species is epidemic in Greece.

The species inhabits a wide range of small and shallow wetlands (Llimona et al. 2014), usually less than one metre deep (Fjeldsa 2004), with rich emergent vegetation and high densities of aquatic invertebrates. Also, suitable habitats for the species include small lakes, sheltered bays and shores with freshwater vegetation, reservoirs, channels (Llimona et al. 2014), low-flow rivers (Konter 2001), coastal brackish lagoons, rice fields (Brown et al. 1982), seasonally flooded areas, marshes. Outside the breeding season the species is common in more open waters and occasionally seen along the shoreline in estuaries or protected creeks. Breeding timing varies geographically and depends on emergent vegetation growth and water levels (Llimona et al. 2014). In Europe, spawning begins in late February (Snow and Perrins 1998). The nest is constructed of aquatic vegetation and placed on emergent vegetation (Fjeldsa 2004) or shrubs near the margins of shallow wetlands (Brown et al. 1982). The diet consists primarily of insects, (especially flies, beetles, dragonflies), mollusks, amphibians, and occasional small fish (up to 11 cm) (Llimona et al. 2014) during the winter (Konter 2001).

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats for the species are:

- Expanding crops in wetlands
- Residential development, urban or extra-urban, legal or arbitrary
- Commercial-industrial development (ports, airports, industrial zones)
- Accidental entanglement in fishing gear
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Noisy leisure activities
- Wetland drainage and other land reclamation works
- Erosion control works, cleaning of the bed of streams, embankments of the seashore and stream beds
- Pollution from urban waste water
- Pollution from industrial or military activities
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters
- Solid waste and waste

- Changes in the extent and distribution of habitats due to climate change

Threats listed on the IUCN red list are the degradation and loss of wetlands as a consequence of pollution or tourism development, but this threat is offset by the construction of artificial lakes, reservoirs and dams, leading to habitat expansion in many areas (Llimona et al. 2014). The species is susceptible to avian influenza, so may be threatened by future epidemics of this virus (Melville and Shortridge 2006).

In Europe, populations of the species fluctuate as a result of winter conditions.

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

- Establish monitoring and protection to ensure that wetland destruction is mitigated and where possible prevented.

Spiny-tailed dolphin (*Vanellus spinosus*)

The species is mainly found in Africa, but its distribution range during the breeding season extends to the Eastern Mediterranean (Wiersma and Kirwan 2012), where it is mainly found in Turkey, with small populations also present in Cyprus and Greece.

The European population of the species is estimated at 1,000 - 1,700 pairs (2,100 - 3,300 mature individuals), while in the EU28 the population is estimated at 80 - 130 pairs (160 - 260 mature individuals). The Greek population is estimated to number 30 - 60 pairs, corresponding to 3% of the European population (BirdLife International 2021). According to the same source, 92% of the European population is found in Turkey.

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 it is classified as a threatened species (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).

Until the 1960s, the spiny-tailed deer appeared occasionally or accidentally in Greece. The first nesting case was recorded in 1959 (Porto Lagos) and since then the species has been a regular but rare and local summer visitor, breeding only in the coastal wetlands of Thrace and mainly in the Nestos and Evros deltas. During migration, most records of the species in Greece come from the islands of the eastern Aegean (Lesvos, Kos, Karpathos, Rhodes, eastern Crete, etc.) and very rarely from other areas (Cyclades, Messolonghi, etc.) (Handrinos and Akriotis 1997). The breeding population in Greece is variable, estimated at 20-50 pairs (BirdLife International 2004), the majority of which (20-33) in the Evros Delta (Makrigianni et al. 2008).

The spiny-tailed godwits usually arrive in Greece in early March and usually depart in mid/late August. They nest in coastal wetlands (deltas, lagoons, etc.) and mainly in bare, dry areas (Wiersma and Kirwan 2012) or in places with minimal algal vegetation, sand dunes (Wiersma and Kirwan 2012). It is also found in lakes, rivers, lagoons, marshes, salt marshes, mudflats. The species nests from March to September in the eastern Mediterranean region (Hayman et al. 1986), in solitary pairs or small colonies. In a recent population study, 30 pairs in the Evros Delta, the first individuals were observed to arrive in late February, the first nesting was recorded on 23 April, and reproductive success was estimated at 42% (Makrigianni et al. 2008). The nest is placed on rock outcrops or in shallow scrapes on dry bare ground. The diet consists mainly of insects (beetles, diptera, termites and ants) and is supplemented by spiders, molluscs, small lizards, tadpoles, fish and seeds. The species is migratory and overwinters in Africa (Wiersma and Kirwan 2012).

The threats listed in the Greek Red Book (Legakis and Marangou 2009) are uncontrolled cattle grazing, which often destroys nests, seasonal flooding, drought and disturbance from human activities (tourism etc.). During migration, especially on islands, it is likely to be poached.

According to the NRC (Legakis and Marangou 2009), the conservation measures required are the following: Strict protection from uncontrolled grazing, avoidance of disturbance during the breeding season, management/protection of the species' habitats, control of poaching during the migration period, continued study of its biology/ecology.

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats to the species are:

- Expanding crops in wetlands
- Grazing of livestock in wet meadows
- Construction of dams and flood protection interventions, irrigation networks
- Wetland drainage and other land reclamation works

- 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 of habitat for the species, which has resulted in a population decline (e.g. loss of natural and semi-natural salt marsh habitat). The species is also locally threatened by poaching (Wiersma and Kirwan 2012).

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

- Protection and expansion of steppe habitats
- Development and implementation of legislation on hunting
- Conduct studies to understand the ecology, threats and their impacts.

Cormorant (*Phalacrocorax carbo*)

In Europe, the species breeds mainly in Russia and Ukraine, with significant numbers also in Sweden, Denmark, Poland, Germany, Finland, the Netherlands, Estonia, Finland, the Netherlands and Norway.

The European population of the species is estimated to number 414.000 - 515.000 pairs (828.000 - 1.030.000 adults), with the European wintering population estimated at 832.000 - 1.080.000 individuals, while in the EU28 the population is estimated at 220.000 - 267.000 pairs (444.000 - 533.000 adults), with the EU28 wintering population estimated at 602.000 - 757.000 individuals. In Europe both the breeding and wintering population is estimated to be increasing. The Greek population is estimated to number 6,000 - 8,000 pairs, corresponding to 2 % of the European population, while the wintering Greek population is estimated at 23,800 - 55,400 individuals, corresponding to 4 % of the European wintering population (BirdLife International 2021).

The species breeds in a few wetlands mainly in Northern and Central Greece. In winter, its geographical distribution widens considerably. The cormorant is found in almost all of mainland Greece and on several islands (Handrinos and Akriotis 1997).

The species is protected by the Bern Convention (Annex III). According to the Greek Red Data Book in Greece the species has not been assessed and therefore is not 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 not classified as a species of European interest in terms of conservation by Birdlife International (BirdLife International 2017).

The species occurs in both coastal and inland habitats (Brown et al. 1982; Johnsgard 1993; Snow and Perrins 1998; Nelson 2005; Billerman et al. 2020). In terms of coastal marine habitats, the species occurs in protected coastal areas, estuaries (Billerman et al. 2020), salt marshes, coastal lagoons (Johnsgard 1993, Billerman et al. 2020), river deltas (Johnsgard 1993) and coastal bays (Brown et al. 1982) with rocky shores, cliffs. It generally avoids the open sea and rarely moves away from shorelines (Snow and Perrins 1998). It also inhabits fresh, brackish or saline inland wetlands (Nelson 2005) including lakes, reservoirs, large rivers, marshes and swamps with deep water (Johnsgard 1993) and presence of reeds. The diet consists primarily of fish (10-36 cm) captured by diving to a depth of 3-9 m from the water surface, as well as crustaceans, amphibians (Billerman et al. 2020), and mollusks. The breeding season begins in April-May. It lays 3-4 eggs (sometimes up to 6). Incubation occurs from both leaves and lasts 28-31 days (Liordos and Goutner 2003). The incubation rate is one egg per two days and egg hatching is asynchronous (Naziridis 2005). Chicks leave the nest at 50 days of age. They reach sexual maturity at the age of 4-5 years (Liordos 2004). Due to the fact that its diet consists mainly of fish, the species, when found in large populations, can cause great damage to fish farms, and generally to places where nets are placed for fishing. Its daily food requirements are as high as 425-700 g (Cramp and Simmons 1977). At roosting and nesting sites it produces large quantities of faeces, which due to high ammonia concentrations can kill adjacent vegetation.

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats to the species are:

- Extensive aquaculture
- Intensive aquaculture
- Persecution of specific users as harmful
- Accidental entanglement in fishing gear
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Noisy leisure 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 on the IUCN red list are the direct killing of the species in fish farms when it causes a problem for fish stocks. Also, disturbance and displacement for the species is caused by coastal wind farms. Tourism taking place in coastal areas can also cause displacement from critical habitat for the species. The species is sensitive to oil spills throughout its distribution range. In addition, the species is threatened by incidental killing on fishing gear (Oliveira et al. 2015, Žydelis et al. 2013) (e.g., longlines and fishing nets) (Bellebaum et al. 2009). Finally, it is susceptible to avian influenza, and therefore may be threatened by future outbreaks of the virus (Melville and Shortridge 2006).

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

- Continue to monitor population control measures.

White-throated stork *(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 a threatened species (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). The species often congregates 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 (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats to the species are:

- Crop extension
- Grazing of livestock in wet meadows
- Transmission lines (electricity, telephone), oil and gas pipelines
- Illegal use of poisoned baits to control "harmful" mammals
- Incidental killing by hunting or poaching
- Construction of dams and flood protection interventions (irrigation works)
- 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 alteration, including drainage of wet grasslands (Elliott et al. 2020) (from dams, embankments, pumping stations and canal systems) (Goriup and Schulz 1990), development, industrialisation and intensification of agriculture (Hancock et al. 1992) (e.g. ploughing of rough grazing land for crop sowing) (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 proposed 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 its body temperature in warm climates, it is not recommended to place tracking rings 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).
- Monitor breeding, migration, wintering numbers and ecological changes in key breeding habitat locations.
- Sustainable management of river valleys and wet meadows.
- The abandonment of pastures, afforestation of farmland and the draining of wet grasslands and inland wetlands in key breeding areas should be stopped.

Stone turtle (*Burhinus oedicnemus*)

In Europe, the species breeds mainly in Spain and France, with significant numbers in Italy and Turkey. The species is considered migratory, although populations in the Iberian Peninsula and the Canary Islands remain in the breeding grounds (they tend to be epidemic).

The European population of the species is estimated at 61,600 - 96,500 pairs (123,000 - 193,000 mature individuals), while in the EU28, according to the IUCN, the population is estimated at 56,200 - 86,000 pairs (112,000 - 172,000 mature individuals) (BirdLife International 2021). The Greek population is estimated to number around 650

- 700 pairs, which corresponds to 1 % of the European population (BirdLife International 2015).

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 interest in terms of protection by BirdLife International (BirdLife International 2017).

The species is found in Greece in the large coastal wetlands of Western Greece, Macedonia and Thrace, while it is observed in smaller populations in Thessaly and Central Greece. In island Greece it has been recorded in Lemnos, Lesvos and Crete (Handrinos and Akriotis 1997).

The species is found in lowlands, semi-natural dry grasslands, barren grasslands, steppes, desert areas and extensive sand dunes. In Europe it is mainly found in open grasslands with very low vegetation, dry and rocky areas, sandy and very sparse forests, coastal sand dunes and river banks (Tucker and Heath 1994). Occasionally the species occurs in agricultural areas and has also been observed in degraded ecosystems such as military training areas or abandoned aggregate mining sites. Its diet consists mainly of insects, worms, spiders, small lizards and snakes but also small birds and their eggs, and it will rarely feed on plant food (seeds). It breeds in open, bare ground or in areas with very low vegetation (Batten et al. 1990) and is readily adapted to arable habitats, but only when crops are small or open in structure such as corn, sugar beet, sunflowers and vegetables (carrots), and does not prefer cereal crops which are intensively grown and very tall and dense in spring (Tucker and Heath 1994). The species breeds in spring over most of its distribution, laying from early April to June or early July, and usually lays two eggs (Hume and Kirwan 2013; Snow and Perrins 1998). Northern and eastern European populations migrate in autumn to southern Europe, the Middle East and Africa (Hume and Kirwan 2013, Snow and Perrins 1998).

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats for the species are:

- Extension - intensification of annual crops
- Reforestation
- Residential development, urban or extra-urban, legal or arbitrary

- Construction of all categories of roads and railways
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Abandonment of traditional agricultural practices and land use, including the 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 mainly the loss and fragmentation of the species' habitats. Forestry, intensification of agriculture, reduction of sheep farming in some areas and human occupation of coastlines for recreational purposes are pressures that may affect the species. The species also suffers from poaching and trapping during migration in the Mediterranean region, but the impact such a threat may have on the species is uncertain. Finally, collisions with overhead cables and fox mortality cause high losses (Hume and Kirwan 2013).

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

- Management of important sites for the species.
- Conservation in Europe depends to a large extent on future modifications of land use policies and also on mutual understanding with farmers (Hume and Kirwan 2013).
- Implement international legislation on hunting, while the impacts of hunting should be assessed and appropriate responses developed.

Crypto chickadee (*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 to number 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 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 locally a common summer visitor and a common transient migrant 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, the Axios Delta and the Amvrakikos Gulf (Kazantzidis 2005), while other smaller colonies are found in the Petron and Mikri Prespa lakes, the mouth of the river Gallikos and the 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 threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats for the species are:

- Transmission lines (electricity, telephone), oil and gas pipelines
- Incidental killing by hunting or poaching
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Noisy recreational activities
- Wetland drainage and other land reclamation works
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters

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

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

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

Microgalliandra *(Calandrella brachydactyla)*

The species breeds mainly in Turkey, with significant breeding populations also in Spain and Romania.

The European population of the species is estimated at 4.650.000 - 8.700.000 pairs (9.300.000 - 17.400.000 mature individuals), while according to the IUCN red list in the EU28, the population is estimated at 1.470.000 - 2.340.000 pairs (2.950.000 - 4.680.000 mature individuals). The Greek population is estimated to number 20,000 - 40,000 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 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 3 species of European interest in terms of conservation by BirdLife International (BirdLife International 2017).

The species has a wide distribution in mainland Greece, usually at low altitudes. In the Ionian and Aegean islands it has been recorded on large islands such as Lesvos, Lemnos, Kos, Crete, Rhodes and Corfu (Handrinos and Akriotis 1997).

The species prefers open areas with bare, sandy or stony soil, in the presence of sparse vegetation (Handrinos and Akriotis 1997, Tucker and Heath 1994). In the Mediterranean basin it breeds mainly in fallow fields but also in dry meadows, tobacco fields, dirt roads and olive groves. In Russia it also uses denser grasslands but is absent from steppes and sometimes present in semi-arid areas. It breeds in Europe, leaving its wintering grounds in late January. Arrival at breeding sites in the northern part of its range takes place in April and May. In south-western Europe it arrives from May to July, while in south-eastern Europe it arrives at its breeding grounds from mid-April. The species lays between 2 and 5 eggs. It feeds mainly on invertebrates in spring, supplementing its diet with seeds and the green parts of plants in other seasons. The chicks feed exclusively on invertebrates. The species is migratory and departs en masse from mid-August to September and October (de Juana et al. 2012). European populations overwinter in Africa (Hagemeijer and Blair 1997).

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats for the species are:

- Extension - intensification of annual crops
- Reforestation
- Residential development (urban or extra-urban, legal or arbitrary)
- Abandonment of traditional agricultural practices and land use (including abandonment of extensive agriculture and livestock farming)
- Pollution from agrochemicals discharged to receiving waters Recipient siltation.

The threats listed in the IUCN red list are agricultural intensification, which leads to loss of fallow land, increased number of irrigation systems, increase in area covered by crops and deforestation (de Juana et al. 2012).

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

- Conduct research on the behavior and habitat of the species to inform future conservation measures (Tucker and Heath 1994; Serrano and Astrain 2005).
- Conservation and expansion of dry grasslands and low-intensity crops (Tucker and Heath 1994).

Microchicken *(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 in 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 freshwater 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), swamps, 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 threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats to the species are:

- Extending the intensification of annual crops
- Transmission lines (electricity, telephone) oil and gas pipelines
- Erroneous killing by hunting or poaching
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Noisy leisure activities
- Wetland drainage and other land reclamation works
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters

The threats listed on the IUCN red list are the degradation and destruction of the species' habitats 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 areas (e.g. reed cutting, fish farming). Also, river incrustation and eutrophication (Bauer et al. 2006). The species may also be affected by wildfires (San-Miguel-Ayanz et al. 2009).

The proposed conservation actions, according to the IUCN, are as follows (although conservation measures in European breeding areas are unlikely to reverse the decline in the species' population):

- Conservation of reedbeds on the margins of rivers and ditches
- Sustainable management of river valleys and reedbeds, including reducing water pollution and overexploitation of fish.
- Minimise disturbance to breeding sites due to tourism

Cinderella (*Lanius minor*)

The European population of the species is estimated at 376,000-803,000 pairs (376,000-803,000 mature individuals), while the EU28 population is estimated at 118,000-266,000 pairs (237,000-532,000 mature individuals). The Greek population is estimated at 6,000 - 8,000 pairs (BirdLife International 2021). The European population, according to the IUCN red list, is estimated to be decreasing (Decreasing).

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 (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 2 species of European conservation concern by Birdlife International (BirdLife International 2017).

The species has scattered and discontinuous populations in Thrace - Central and Eastern Macedonia, Western Macedonia, Epirus, Thessaly, while it has also been found in the Ionian Islands (Corfu), Central Greece (Lamia), northern Peloponnese and some islands of the North Aegean (Handrinos and Akriotis 1997). Quite common in autumn migration throughout the country.

The species is found in open areas, hills and steppes. Suitable breeding habitats in Europe include orchards, groves, parks, woodlands and even occur near settlements and crops (Tucker and Heath 1994). Tall trees are essential for nesting. The species is found up to 700 m altitude, rarely up to 900 m in Central Europe, and has been recorded in Russia up to 1,500 m. The species is migratory, European populations depart in autumn and overflow South Africa before beginning to return in early March (Hagemeijer and Blair 1997). Spawning takes place from May to early June. It feeds mainly on insects, although part of its diet has been recorded as consisting of spiders and rarely vertebrates. (Yosef et. al. 2008)

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats to the species are:

- Extension - intensification of annual crops
- Reforestation, residential development (urban or extra-urban, legal or arbitrary)
- Commercial - industrial development (ports, airports, industrial zones), tourism - leisure infrastructure (ski resorts, golf courses, golf courses, camps)
- Construction of all categories of roads and railways
- 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)

The threats listed on the IUCN red list are agricultural intensification and the increase in monoculture which have led to a decline in the population of Western and Central Europe (Tucker and Heah 1994). Heavy fertilizer use since the mid-20^{ου} century has led to an increase in vegetation cover causing wet and cooler microclimates close to the ground, resulting in negative impacts on the large arthropod fauna on which the species relies for food. The use of insecticides has in turn contributed to a reduction in its prey. Climate change is also considered a serious threat.

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

- Reducing the use of agricultural pesticides
- Preservation of traditional farming methods (Tucker and Heath 1994, Yosef and International Shrike Working Group 2008)
- Development of protected areas in habitats suitable for the species and favourable management of these habitats (Lefranc and Worfolk 1997).
- Conduct studies on the influence of predators on reproductive success and post-natal survival of chicks, and improve monitoring in eastern and south-eastern Europe (Tucker and Heath 1994).

Black-headed gull (*Larus melanocephalus*)

In Europe the species breeds largely in Ukraine, but also in Russia and France.

The European population of the species is estimated at 64.400 - 102.000 pairs (128.000 - 203.000 mature individuals), while in the EU28 the population is estimated at 16.800 - 25.200 pairs (33.600 - 50.400 mature individuals). The Greek population is estimated to number 650 - 2,000 pairs, which corresponds 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).

The Black-headed Gull is a locally widespread, epidemic species in Greece. Most numerous until the late 1980s, it suffered a clear population decline of 43-52% during the last 10 years (Greek Red Data Book - Legakis and Marangou 2009). Until 1999 it nested in Aliki of Citrus in Pieria, where the largest colony of the species in Greece was located, with a maximum recorded breeding population of about 7.Today the species breeds regularly on islands in the deltas of the Aliakmonas, Axios and Evros rivers and occasionally in the lagoons of Nestos, Lafri and Lafrouda, Porto Lagos, Ptelea and Elos. The total breeding population is estimated at 650-1 950 pairs. The Black-headed Gull is numerous and most widespread during migration, with concentrations of 10,000-14,000 individuals in several wetlands in Greece (Axios and Sperchio deltas, Karla reservoirs, Aigio Salt Lake, etc.). The species also winters in Greece, with an estimated population of 450-550 individuals (1996-2005), which is clearly reduced compared to the period 1997-1999, when wintering Black-headed Gulls numbered 1,200-1,700 individuals. The main wintering areas are the Amvrakikos Gulf, the Gulf of Gera, the Evros Delta and the Thermaikos Gulf (Zogaris et al. 2003). Of the 91 recaptures in Greece of black-headed gulls ringed abroad, 89 (97.8%) came from Ukraine. In addition, of the 47 reintroductions abroad of Black-headed Gulls ringed in Greece, most were found in Italy, followed by France, Albania, Spain and Hungary (Akriotis and Chandrinos 2004, Flamant et al. 2003).

Most populations are fully migratory and travel along the coast between breeding and wintering grounds. Preferred habitats include shorelines, estuaries, salt marshes, harbors, marshes, inland lakes, fields and meadows. In the Mediterranean, it breeds along coasts, in coastal lagoons, lakes and marshes, in open lowland areas, favouring habitats with sparse vegetation, but generally avoiding barren sandy areas. It appears to be a species capable of adapting more readily than many other species to new habitats, both for breeding and overwintering. In recent years it has successfully colonized areas that differ significantly from its original habitats (e.g., climate and vegetation) (Burger and Gochfeld 1996). It forms pure or mixed colonies with other gull and tern species, usually smaller than 1,000 pairs. Its diet consists mainly of fish but it often feeds on insects and even on cereals in fields and meadows. In winter the species is attached to the marine environment, common in the coastal zone and avoids wetlands. It feeds on the surface in the sea or in large shoals on the coast, and also follows trawls. Its diet consists of insects, marine molluscs, small fish, worms, seeds and occasionally garbage, usually in terrestrial areas with agricultural crops or grasslands. It is a migratory species, wintering mainly in the western Mediterranean and Atlantic but also in the Sea of Azov, the Crimean peninsula and Greece. It returns to breeding areas from late February to mid-April, with autumn migration starting from late June.

The threats listed in the Greek Red Data Book (Legakis and Marangou 2009) are disturbance from recreation or construction works on breeding colonies, degradation, erosion, alteration of coasts and islands resulting in the reduction of suitable nesting habitat, drought, which reduces the degree of isolation of the islands, predation of chicks, random events, such as adverse weather conditions, which affect the colonies. There has also been a wide variation in the numbers of black-headed gulls nesting from year to year, for reasons as yet unknown. In Aliki Kritous, the management of water for salt production and the continuous improvement and expansion of the salt marshes were the most likely causes of the abandonment of the largest colony in Greece and one of the most important in the Mediterranean.

According to the NRC (Legakis and Marangou 2009), the conservation measures required are the following: Protection from human disturbance during the breeding season. Management measures to protect islands from erosion and manage vegetation on islands where required and investigate the possibility of constructing artificial islands in selected wetland locations.

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats for the species are:

- Renewable energy: Wind farms

- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Wetland drainage and other land reclamation works
- Pollution from industrial or military activities
- Filling of soils, streams, coasts
- 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 disturbance to breeding areas mainly through tourism (James 1984, Burger and Gochfeld 1996). Habitat loss resulting from marine pollution and tourism development are also threats to the species.

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

- Identification of threats to breeding and wintering areas and management of protected areas.

Dwarf gull (*Hydrocoloeus minutus*)

In Europe the species breeds mainly in Russia, but also in Finland and Sweden and generally throughout northern Scandinavia. The distribution of the species expands in winter and includes most of the Mediterranean, Black Sea and Caspian Sea coasts, as well as the European Atlantic coast (Burger and Gochfeld 1996).

The European population of the species is estimated at 32,100 - 62,200 pairs (64,300 - 125,000 mature individuals), while in the EU28 the population is estimated at 11,700 - 16,000 pairs (23,500 - 31,900 mature individuals) (BirdLife International 2021). The population trend of the species according to the IUCN red list at European level is unknown, while at EU28 level it is estimated to be stable. The Greek wintering population is estimated at 100-300 individuals (BirdLife International 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, the species has not been assessed and therefore does not have a threatened status (NE), 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 interest in terms of conservation by BirdLife International (BirdLife International 2017).

In Greece it has a wide distribution during wintering and migration, recorded mainly in coastal wetlands, inland lakes and harbours. The species prefers the open sea, so the population estimate is probably only a fraction of the true size (Handrinos and Akriotis 1997).

The species' habitat includes coastal areas, lagoons, sandy beaches, estuaries and streams. It breeds mainly inland (in subarctic to temperate forest zones), in freshwater lakes, river valleys, marshes with abundant vegetation and locally in coastal lagoons. It nests in sandy areas, reedbeds and marshy vegetation. The diet of the species is varied but includes mainly invertebrates. The species is mainly insectivorous during the breeding season and during migration. During the wintering period it supplements its diet with small fish.

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats for the species are:

- Renewable energy: Wind farms
- Pollution from industrial or military activities

The threats listed in the IUCN red list are habitat degradation, including changes in hydrological conditions from land reclamation dams and irrigation projects (Rašomavičius 2007, Ellermaa and Linden 2011). It is also threatened by oil spills (Mendel et al. 2008) and other types of marine pollution, including pesticides used in agriculture through surface runoff. In addition, it is threatened by incidental killing in fishing gear. Finally, it is considered vulnerable to impacts on offshore wind farms (Bradbury et al. 2014) and to disturbance from ships.

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

- Identification of marine protected areas important for the species
- Monitoring programmes throughout its distribution range concerning incidental mortality of the species in fishing gear.

Leptomycete (*Numenius tenuirostris*)

The species has been confirmed to breed in Siberia between 1909 and 1925. It used to migrate west-southwest from its presumed breeding areas in Siberia via Central and Eastern Europe to Southern Europe and North Africa. In Europe the species was present only in winter, but no sightings of the species have been reported since the early 2000s.

According to the IUCN red list the species occurs only in winter in Europe and the EU28. The minimum European population of the species is estimated at 1-2 individuals. The entire population is found in Bulgaria, although there have been no sightings of the species in the country since at least 2000.

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) (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 by the CITES International Convention (Appendix I).

One of the rarest and least known wader species in the world. It is estimated that the global population of the leptoidea no longer exceeds 100 individuals. The last leptomyotis nests were discovered in central Siberia in the 1920s, but since then no one has been able to locate the exact breeding site again. From 1857 to 2001 the species has been observed in Greece 104 times (in some cases probably the same individual), with maximum records, both in the Evros Delta, of 250 individuals (4-4-1981) and 150 individuals (20-10-1978). In recent years, single individuals have almost always been recorded (Legakis and Marangou 2009). In fact, Greece has the highest number of records of the species worldwide (last record in Greece: 1 individual, Messolonghi, 3-5-1999). Most observations in Greece are from the migratory period of the species (mainly in spring), the two most important areas being the Evros Delta (48 observations) and Porto Lagos (22 observations) (Goutner and Handrinos 1990; Gretton 1991; Chandrinos 1992; Handrinos and Akriotis 1997; Vangeluwe et al. 1998; Chandrinos 1999).

A species little studied internationally due to its great rarity. Most records of this species in Greece come from coastal wetlands, mainly lagoons, salt marshes, salt marshes, salt marshes, shallow mudflats, sandy coasts, sandy agricultural land next to lagoons, etc. It is more rarely found in inland waters (freshwater lakes, wet meadows, etc.). Large coastal wetland complexes may be particularly characteristic habitat for the species and most records are from near the sea (Buchanan et al. 2010). Only one reliable nesting description has been recorded which was in peatland-forest transition zones. Very little is known about its breeding habits. The nest is made of dry grasses and leaves (Gretton 1991). It is possible that it nests in colonies and has been recorded to lay up to four eggs. The birds have been recorded feeding on insects, molluscs, snails and crustaceans (Van Gils and Wiersma 1996). This species migrates west-southwest (Van

Gils and Wiersma 1996). Migration peaks in September (fall) and March (spring) (Gretton 1991),

The threats mentioned in the Greek Red Book (Legakis and Marangou 2009) are the great rarity of the leptoidea, which makes it particularly vulnerable to poaching, because the (accidental) death of even one individual directly affects the global population. International literature, as well as observations from Greece, also emphasise the species' timidity and sensitivity to disturbance by human activities in wetlands, such as hunting, grazing, etc. The species may also be threatened by habitat alterations.

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats for the species are:

- Hunting-poaching-trapping-collecting eggs or chicks-destroying nests
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Wetland drainage and other land reclamation works

Threats listed on the IUCN red list are habitat destruction, which through the conversion of European wetlands and Central European steppes to farmland may have greatly affected the species by depriving it of important habitats during migration (Gretton 1991). Historically, hunting was high and may have been a major factor in the species' decline. Typically rare species or smaller groups of species or individuals may have difficulty locating suitable staging sites during migration (Gretton 1991). Individuals may join flocks of *N. arquata*, which are driven to unsuitable wintering habitat and become unlikely to find a mate (Gretton 1991).

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

- Continued monitoring of key former and potential wintering and transit sites
- Search for breeding sites.
- Linking satellite transmitters to captive birds.
- Provide training in species identification during migration.
- Protecting the species' habitats and raising public awareness.

Silver pelican *(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 at 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 that spreads only in S.E. Europe. It is found up to 850 metres 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 on 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 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 the species faces 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 the following: Better guarding of the colonies, especially the one in Amvrakikos Gulf, to ensure their protection from disturbance.

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats to the species are:

- Intensive aquaculture
- Renewable energy: Wind farms
- Persecution of specific users as harmful
- Disturbing activities (hunting, logging, fishing, gathering, plant and firewood collection)
- Erosion control works, cleaning of the bed of streams, embankments of the seashore and stream beds
- Increase in the population of native problematic competing species
- Pollution from urban waste water
- 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:

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

Chuliar myrtle *(Platalea leucorodia)*

In Europe, the species breeds mainly in the Netherlands and Russia, with significant numbers also in Spain, Germany, Romania, Hungary and Portugal.

The European population of the species is estimated to number 11.900 - 18.200 pairs (23.800 - 36.300 adults), with the European wintering population estimated at 6.200 - 9.300 individuals, while in 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, which corresponds 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 VU, 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 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 travel only short distances during the migratory season (Snow and Perrins 1998).

In Greece, according to the Greek Red Data Book (Legakis and Marangou 2009), the chouliar myrtle 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 winters 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 lives in 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 woodlands with tamarisk, willow, alder and dense reed beds, forming mixed colonies with other heron species, cormorants and steelhead. 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 molluscs, 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 sludge 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 in Kerkini L., this may cause problems for the species.

According to the NRC (Legakis and Marangou 2009), the conservation measures required are the following: Protection of 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 threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats for the species are:

- Extending the intensification of annual crops
- Grazing of livestock in wet meadows
- Erroneous killing by hunting or poaching
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- 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) and 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:

- Monitoring of 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.

Lesser rhinoceros *(Sternula albifrons)*

In Europe the species breeds mainly in Russia, with significant numbers also in Turkey, Ukraine and Italy, as well as in Spain, France and Greece.

The European population of the species is estimated at 33,400 - 50,300 pairs (66,800 - 101,000 mature individuals), while in the EU27 it is estimated at 12,800 - 18,700 pairs (25,700 - 37,400 mature individuals). The population trend of the species, according to the IUCN red list, both at European and EU28 level, is estimated to be decreasing. The Greek population is estimated to number 1,500 - 2,000 pairs, corresponding to 4% 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 (NT), 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 conservation concern by BirdLife International (BirdLife International 2017).

The species has a wide breeding distribution in Greece, with colonies in most coastal wetlands, from the Kotychi Lagoon to the Evros Delta and on several large islands. In the same areas it is also found during migration (Handrinos and Akriotis 1997).

The species is mainly coastal, but is also found inland along rivers. It breeds on barren or sparsely vegetated sandy soils and rocky islets, pebble beaches, estuaries and lagoons. Outside the breeding season it is common in coastal bays, coastal lagoons and salt marshes. It sometimes feeds far offshore (Gochfeld and Burger 1996). It feeds mainly on small fish and molluscs, as well as on insects. The main fish species that make up its diet are *Rutilus rutilus, Scardinius erythrophthalmus, Cyprinus carpio, Perca fluviatilis.* It specialises in prolonged hovering and diving in shallow water, often at the edge of the tide. Groups of birds may dive synchronously in search of food (Gochfeld and Burger 1996).

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats for the species are:

- Expanding crops in wetlands
- Grazing of livestock in wet meadows
- Renewable energy: Wind farms
- Construction of all categories of roads and railways
- Hunting-poaching-trapping-collecting eggs or chicks-destroying nests
- Erroneous killing by hunting or poaching
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Noisy leisure activities
- Other nuisance activities (military exercises, scientific research, vandalism)
- Construction of dams and flood protection interventions, irrigation networks
- Wetland drainage and other land reclamation works
- Anti-erosion works, stream bed cleaning, embankments of the seashore and stream beds
- Introduction of invasive species
- Filling of soils, streams, coasts
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters

Threats listed on the IUCN red list are habitat degradation and destruction through industrial development of coastal breeding habitat (e.g., development of new port facilities) (Barcena et al. 1984, Gochfeld and Burger 1996). It is also very vulnerable to human disturbance (including birdwatchers) at coastal and inland nesting sites that may lead to breeding failure (Barcena et al. 1984, Gochfeld and Burger 1996). Pollution from pesticides used on agricultural land peripheral to wetlands (Barcena et al. 1984, Thyen et al. 2000, Choi et al. 2001) and artificially induced water level fluctuations in salt marshes (Barcena et al. may pocket a 198) also pose a threat to the species' reproductive success (Barcena et al. 1984, Thyen et al. 2000, Choi et al. 2001). The species also suffers from local egg collection (Barcena et al. 1984) and 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:

- Management of existing Special Protection Areas (SPAs), including ongoing measures to reduce human disturbance to breeding sites.

Barbara (*Tadorna tadorna*)

In Europe the species breeds mainly in Russia, with significant numbers also in the UK, the Netherlands, Germany, Sweden, France, the Netherlands, Germany, Sweden, Ukraine and Norway.

The European population of the species is estimated to number 52.100 - 76.600 pairs (104.000 - 154.000 mature individuals), with the European wintering population estimated at 374.000 - 497.000 individuals, while in EU28 the population is estimated at 34.700 - 49.800 pairs (69.500 - 99.600 mature individuals), with the EU28 wintering population estimated at 361.000 - 443.000 individuals. The Greek population is estimated to number 400-6000 pairs, corresponding to <1% of the European population, while the wintering Greek population is estimated at 6,000-10,000 individuals, corresponding to 2% of the European wintering population (BirdLife International 2021).

The species is protected by the Bern (Appendix II) and Bonn (Appendix II) Conventions. 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) (BirdLife International 2021). It is also not classified as a species of European interest in terms of protection by Birdlife International (BirdLife International 2017).

In Greece the barbara is an unusual and local epidemic species, much more widespread and locally common in winter. The bulk of the breeding population in Greece nests in almost all coastal wetlands of Thrace, Macedonia, and (fewer pairs) in the large coastal wetlands of Epirus and Central Greece (Handrinos and Akriotis 1997). Interestingly, the largest local breeding population in Greece is found in Lemnos and amounts to 62-75 pairs (Greek Red Data Book; Legakis and Maragou 2009). Based on these recent data, the total breeding population in Greece is reestimated at 120-150 pairs and is fluctuating, but without increasing trends (Legakis and Maragou 2009). The barbary has a wider distribution and a larger population in winter, when it shows marginal growth trends. The average MECU (1996-2005) is 4,128 individuals, the maximum annual count is 10,500 individuals (1989) and the maximum local count is 4,660 individuals in the Rhodope Lagoons (1997). 88% of the wintering population in Greece is recorded in five wetlands (Evros Delta, Axios-Ludia-Aliakmon Delta, Rhodope Lagoons, Porto Lagos and L. Kerkini) (Handrinos 1987b). Seven barbets ringed in Kazakhstan (4), Ukraine (2) and France were found in northern Greece, mainly in the Evros Delta and Axios Delta (5) (A-Kriotis and Chandrinos 2004) . Shows a clear preference for coastal saltwater wetlands with lagoons, salt marshes, extensive mudflats, shallow sandy shores, salt marshes and enclosed marine bays (Carboneras and Kirwan 2014). Often found in inland freshwater wetlands, such as L. Kerkini. Breeding begins in April and May in single pairs or small groups. The nest is usually placed in a tree cavity (Carboneras and Kirwan 2014) up to 8 m above the ground (Kear 2005) or in a mammal burrow (Kear 2005, Carboneras and Kirwan 2014). Rarely, nests can also be placed in open countryside or in dense vegetation up to 1 km from water (Madge and Burn 1988, Kear 2005). The species also nests in artificial boxes (Kear 2005). Its diet consists primarily of saltwater molluscs and other aquatic invertebrates (e.g., crustacean insects and worms), small fish, fish eggs, and plant food.

The threats mentioned in the Greek Red Book (Legakis and Marangou 2009) are that the breeding population remains small and is considered vulnerable to human interference, disturbance, etc. Although not a huntable species, it is hunted in several areas (through ignorance or indiscriminately) or harassed during the hunting season.

According to the NRC (Legakis and Marangou 2009), the conservation measures required are the following: Strict control of poaching, more effective protection of breeding sites, study of the biology/ecology of the species and long-term monitoring of the population.

According to the threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats for the species are:

- Expanding crops in wetlands
- Livestock overgrazing in mountain, semi-mountain and island pastures
- Residential development, urban or extra-urban, legal or arbitrary

- Hunting - poaching - trapping - collecting eggs or chicks - destroying nests
- Lead shot molybdenum
- Wetland drainage and other land reclamation works
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters
- Solid waste and waste

Threats listed on the IUCN red list include habitat degradation and loss as a result of tidal flow control through the construction of tidal barrages for power generation (tidal barrage systems). It also suffers predation by the American mink (*Neovison vison)* on the islands (Nordstrom et al. 2002) and is susceptible to avian influenza, so it may be threatened by future outbreaks of the virus (Melville and Shortridge 2006). Its eggs were formerly (and probably still are) collected in Iceland (Gudmundsson 1979).

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

- Control of predators at breeding sites, construction of artificial nesting sites.
- Protection of important areas for the species.
- Carrying out an assessment of the environmental impact of tidal flow control with the construction of tidal barrage systems for electricity generation.

Avocet *(Recurvirostra avosetta)*

The 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 to number 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 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 VU, 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).

In Greece the avocet is a locally quite common species, but it 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 abundant 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 grounds 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, which cause the restriction of natural habitats 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, especially in northern Greece.

According to the NRC (Legakis and Marangou 2009), the conservation measures required are the following: 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 threats recorded in the list of threats to the species (Dimalexis 2009) (*species classification of the GR1130010 SPA*), the reported threats to the species are:

- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Wetland drainage and other land reclamation works
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters

The threats listed on the IUCN red list are wetland pollution from pesticides and insecticides that run-off into water bodies. 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, probably as a result of reduced
- vegetation that allows improved predator detection (Olsen and Schmidt 2004).
- Wetland pollution, infrastructure development and human disturbance of key breeding sites must stop.

Shark *(Accipiter brevipes)*

The European population of the 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 has been recorded in Central Greece, Peloponnese and some islands (Kefalonia, Lesvos, Samos) (Handrinos and Akriotis 1997).

According to Poirazidi (2017), the number of the species' territories in the National Park of Dadia - Lefkimi - Soufli in 2012 was 3.5.

The species breeds mainly in fragmented deciduous forest along river and stream catchments, but may also use broadleaf forests at the foothills and slopes of mountains, usually below 1,000 m elevation, but has been recorded up to 2,000 m (Hagemeijer and Blair 1997). It arrives at its breeding grounds 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). The 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 threats recorded in the list of threats to the species of conservation *concern* (Dimalexis 2009), the reported threats to the species are:

- Extension - intensification of annual crops
- Residential development, urban or extra-urban, legal or arbitrary
- Tourism-recreation infrastructures (ski resorts, golf courses, golf courses, camps)
- Improper forest management
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Noisy leisure activities
- Deforestation logging
- Changes in the frequency and intensity of forest fires (increase or decrease)

- Construction of dams and flood protection interventions, irrigation networks
- Wetland drainage and other land reclamation works
- Abandonment of traditional agricultural practices and land use, including the abandonment of extensive farming 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 effects 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 proposed conservation actions, according to the IUCN, are as follows:

- Identification and protection of important areas for the species, especially from the construction of wind farms.
- Awareness campaign to reduce poaching.
- Conduct studies on the ecology of the species and monitor its populations to inform conservation measures.

Crane eagle *(Clanga pomarina)*

The screamer is quite widespread, locally rather common summer visitor and migrant passing through Greece. A much more common species and with a wider distribution in the 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).

According to Poirazidi (2017), the number of the species' territories in the National Park of Dadia - Lefkimi - Soufli in 2012 was 17.5.

More widespread during the 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 quite specialized habitat, living in lowland and semi-field 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 freshwater wetlands, where it feeds, due to the intensification of agriculture (reforestation, clearing of plantations 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 areas of the SPA/Natura 2000 network.

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

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:

- Transmission lines (electricity, telephone), pipelines, oil, gas
- Improper forest management

- Noisy leisure activities
- Other nuisance activities (military exercises, scientific research, vandalism)
- Deforestation logging
- Wetland drainage and other land reclamation works
- Erosion control works, cleaning of the bed of streams, embankments of the seashore 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 the drainage of wet forests and grasslands and ongoing deforestation) and hunting (Ferguson-Lees and Christie 2001). The latter is particularly prevalent in migration, with potentially thousands of birds killed annually in southern Europe (Tucker and Heath 1994). It is also highly vulnerable to the impacts of potential wind energy development (Strix 2012).

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

- Conduct surveys focusing on monitoring population numbers during migration, identifying important migration areas, investigating the required habitats (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).

Eagle Heron (*Buteo rufinus*)

The species is epidemic 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 adults), while in the EU28, according to the IUCN red list, the population is estimated at 1,100 - 2,100 pairs (2,300 - 4,200 adults) 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 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).

According to Poirazidi (2017), the number of the species' territories in the National Park of Dadia - Lefkimi - Soufli in 2012 was 1.5.

The species lives mainly in open dry bushy areas with topsoil, sparse macchia, meadows, extensive crops, near suitable nesting sites in rocks, gorges and mountains up to 1,600 m altitude. The species builds its nests primarily 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 on small ones, but its (possible) nesting on Crete has not yet been proven. A part of the population, especially 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 threats recorded in the list of threats to the species of conservation *concern* (Dimalexis 2009), the reported threats to the species are:

- Intensification of perennial crops (vines, orchards, olive groves, etc.)
- Residential development (urban or extra-urban, legal or arbitrary)
- Tourism - recreation infrastructures (ski resorts, golf courses, golf courses, camps)
- Transmission lines (electricity, telephone), oil and gas pipelines
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Noisy leisure 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.
- Ensure the conservation of the species' habitats, as well as the conservation of the species' prey populations.

Black stork (*Ciconia nigra*)

The Black Stork is a rare and local visitor and a passing migrant in Greece. Although it was probably never a common species even in the past, it breeds today in northern Greece, mainly in Thrace (especially in Evros), Macedonia, Epirus, 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.

It is estimated that 35 pairs of the species breed in the forest of Dadia (Alexandrou 2011).

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 NE. Greece. The maximum count in Greece was about 400 individuals in the Evros Delta (15-9-2006), while in autumn small flocks or single 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).

It is 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 the misapplication of forest exploitation practices (reforestation, clear-cutting, opening of forest roads, etc.), but especially by the degradation and destruction of wetland habitats where it feeds (browsing, draining of swamps, stream alignments, etc.), the reduction of its prey due to pollution, disturbance, collision with power lines, etc. Protected species, most of the breeding population in Greece is found in areas of the SPA/Natura 2000 network. 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), the reported threats to the species are:

- Expanding crops in wetlands

- Grazing of livestock in wet meadows
- Extractive activities Quarries - mining
- Construction of all categories of roads and railways
- Transmission lines (electricity, telephone), oil and gas pipelines
- Illegal use of poisoned baits to control "harmful" mammals
- Incidental killing by hunting or poaching
- Improper forest management
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Construction of dams and flood protection interventions, 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:

- Maintaining large mature trees during forest management is important for providing nesting sites (Lohmus and Sellis 2003).
- Conservation measures aimed at increasing the reproductive success and population density of the species should cover large areas, mainly deciduous forest areas, should focus on river quality management up to 20 km from the 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).
- Monitor breeding, migration, wintering numbers and ecological changes in the species' key habitats.
- Undergrounding of power transmission cables or their marking.

- Prevent poaching and overfishing of fish.

Snake eagle *(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 adults), while in the EU28, according to the IUCN red list, the population is estimated at 6,800 - 10,400 pairs (13,700 - 20,700 adults). 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 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 species spreads mainly in mainland Greece and some islands, although it does not breed on them. 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).

According to Poirazidi (2017), the number of the species' territories in the National Park of Dadia - Lefkimi - Soufli in 2012 was 38.5.

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 also been observed at altitudes above 1,200 metres but prefer areas with partial cover. They feed exclusively on reptiles, mainly 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 be facing 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 list of threats to the species of conservation *concern* (Dimalexis 2009), the reported threats to the species are:

- Extension - intensification of annual crops
- Construction of all categories of roads and railways
- Stalking of specific users as harmful
- Improper forest management
- Noisy leisure activities
- Other nuisance activities (military exercises, scientific research, vandalism)
- Deforestation logging
- Changes in the frequency and intensity of forest fires (increase or decrease)
- Abandonment of traditional agricultural practices and land use, including the 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: 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 maintenance of low-scale crops, the conservation of plant barriers and the reduction of pesticide use.

- Proper management of forest areas, with the preservation of old trees, prevention of fires and limitation of forest road construction.
- Educational campaigns, targeting 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 species monitoring (Tucker and Heath 1994).

Common Eagle (*Hieraaetus pennatus*)

In Greece the kestrel is a summer visitor and a transient migrant, with a fairly wide distribution. It nests mainly in northern Thrace, northern Greece, northern Greece, northern Greece, northern Greece, northern Greece, northern Greece. 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).

According to Poirazidi (2017), the number of the species' territories in the National Park of Dadia - Lefkimi - Soufli in 2012 was 21.5.

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 primarily 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 on 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 interventions and degradation of lowland and semi-mountainous forests (poor implementation of forestry practices, opening of roads, etc.) where it nests, the reduction of its prey due to the ongoing intensification of agriculture (clearings, destruction of plant barriers, pesticides, etc.) and perhaps poaching during migration. A protected species, probably most of its population occurs in areas of the SPA/Natura 2000 network. 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), 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
- Improper forest management
- Deforestation logging
- Changes in the frequency and intensity of forest fires (increase or decrease)
- the 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 proposed conservation actions, according to the IUCN, are as follows:

- Conservation and protection of extensive areas of alternating open habitats and mature forests.
- 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 on the distribution, numbers, habitat, population dynamics and diet of the species, and the impact of pesticides on reproductive success (Tucker and Heath 1994).

Wasp *(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).

According to Poirazidi (2017), the number of the species' territories in the National Park of Dadia - Lefkimi - Soufli in 2012 was 15.5.

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

- Improper forest management,
- Noisy leisure activities,
- Other nuisance activities (military exercises, scientific research, vandalism),
- Deforestation 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 receiving waters (waterlogged receiving waters)

Threats listed on the IUCN red list are: 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 habits: they live in woodlands and feed mainly on wasps). It is also very vulnerable to the effects of potential wind energy development (Strix 2012).

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

- Prevention of poaching.
- Promote low-intensity agriculture and forestry.
- Minimise disturbance during the breeding season.

Egyptian vulture (*Neophron percnopterus*)

Until the first 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 largest 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 couples have dramatically decreased even more in recent years and now (2018) they amount to five in Greece (Saravia et al. 2019).

According to Poirazidi (2017), the number of the species' territories in the National Park of Dadia - Lefkimi - Soufli in 2012 was 5.

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 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 for 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 in the past in Meteora. Social vultures in feeding areas feed largely on carrion and any other residue of organic origin, even mammalian excrement, and 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. Land use changes and especially the reduction of extensive livestock farming, combined with recent strict veterinary hygiene regulations, also directly limit 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 deposition 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.

Protected species, almost the entire breeding population in Greece is found in areas of the Natura 2000 network. The population in Evros is supported by the feeding ground in the National Park of Dadia.

Strict control of the illegal use of poison baits and the systematic provision of supplementary food (feeders) where the species used to use open dumps in the past, as well as near any isolated territories, is an immediate priority. 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 threats recorded in the list of threats to the species of conservation *concern* (Dimalexis 2009), the reported threats to the species are:

- Intensive and stabled livestock farming

- Residential development (urban or extra-urban, legal or arbitrary)
- Extractive activities: quarries - 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 "harmful" mammals
- Persecution of specific users as harmful
- Noisy leisure 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 farming 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 proposed conservation actions, according to the IUCN, are as follows:

- Intensive cooperation with local authorities 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 electrical poles in areas where high mortality is recorded.
- Coordinate the monitoring of population trends of the species throughout its distribution range.
- Create additional feeding places where needed especially in locations where immature people congregate.
- Reduce the risks of poisoning by imposing a strict ban on poison baits to control "harmful" 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 programmes.

Golden eagle *(Aquila chrysaetos)*

Until the 1960s the golden eagle was widely distributed 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, in the Pindos mountain range up to the Sterea, and in 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 Poirazidi (2017), the number of the species' territories in the National Park of Dadia - Lefkimi - Soufli in 2012 was 4.

According to the IUCN red list, the European population of the species is estimated at 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 percentage of the population of the species in Greece is 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 1/3 of the pairs), the illegal use of poisoned baits and the degradation of its feeding habitats (mainly the abandonment of mountainous crops), as well as, at a local level, the overharvesting of certain basic food species, such as partridges, the hare, etc. Extensive reforestation and natural afforestation of abandoned land also cause problems for the species.

Protected species, with the majority of the breeding population in Greece occurring in areas of the SPA/Natura 2000 network.

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 agro-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 threats recorded in the list of threats to the species of conservation *concern* (Dimalexis 2009), the reported threats to the species are:

- Intact and stabled livestock farming
- Tourism - recreation infrastructures (skiing, golf, sports fields, camps)
- Extractive activities Quarries - mining
- Renewable energy: Wind farms
- Transmission lines (electricity, telephone), oil and gas pipelines
- Illegal use of poisoned baits to control "harmful" mammals
- Persecution of specific users as harmful
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Noisy 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 the abandonment of extensive farming and livestock farming
- Reforestation
- Changes in the extent and distribution of habitats due to climate change

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

- Enforced protection of the species in many countries from illegal poaching and egg collection.
- Implement educational programmes 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 NE Europe.
- Require more information on the numbers and stability of unmonitored populations (Tucker and Heath 1994).

Sea eagle (*Haliaeetus albicilla*)

The European population of the 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 account for 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 Koroneia, 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, perhaps even 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 is found in large wetlands (river deltas, lagoons, lakes) and nests in large trees, in 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 areas of the SPA/Natura 2000 network. Locally, as in the Dadia SPA, it also benefits from the vulture feeder. Strict protection of all pairs and nesting sites, as well as wintering and feeding areas of the species is needed, especially 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 threats recorded in the list of threats to the species of conservation *concern* (Dimalexis 2009), the reported threats to the species are:

- Extension - intensification of annual crops
- Residential development, urban or extra-urban, legal or arbitrary
- Commercial - industrial development (ports, airports, industrial zones)
- Tourism - recreation infrastructure (ski resorts, golf courses, camps)
- Construction of all categories of roads and railways

- Hunting - poaching - trapping - collecting eggs or chicks destroying nests
- Illegal use of poisoned baits to control "harmful" mammals
- Erroneous killing by hunting or poaching
- Improper forest management
- Lead shot molybdenum
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Noisy leisure 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 the bed of streams, embankments of the seashore and stream beds
- Abandonment of traditional agricultural practices and land use, including extensive farming 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 proposed conservation actions, according to the IUCN, are as follows:

- Preventing the loss of nesting and foraging habitat due to inappropriate forestry.
- Protection of nesting sites from human disturbance/destruction and egg collection.
- Take measures against poaching and the use of poisoned baits to combat "harmful" predators.
- Providing food at feeding stations (feeders) in some areas will help juvenile survival and increase reproductive success rates (Tucker and Heath 1994).

Bubo bubo (*Bubo bubo*)

The species is epidemic with an estimated European population of 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 mature individuals). 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 a threatened species 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 spreads throughout mainland Greece 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 is mainly found in rocky areas with cliffs and ravines, caves, parts of woodlands, scattered trees and groves. It also uses foraging river valleys with gorges, woodlands, and fields with suitable rocky areas or cliffs and abandoned quarries. The species prefers sheltered rocks or crevices on steep slopes, in the ground, or in cave entrances for nesting. It 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 also includes frogs, reptiles, fish and larger 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:

- Tourism - recreation infrastructures (ski resorts, golf courses, golf courses, camps)
- Extractive activities: quarries - mining
- Transmission 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
- Improper forest management
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Construction of dams and flood protection interventions, irrigation networks

- Abandonment of traditional agricultural practices and land use, including the abandonment of extensive farming and livestock farming
- Extension - intensification of annual crops
- Residential development, urban or extra-urban, legal or arbitrary

The threats listed on the IUCN red list are human activity. 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 proposed conservation actions, according to the IUCN, are as follows:

- Protect 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),
- Strengthening the protection of the species

Aegolius *funereus* (*Aegolius funereus*)

The European population of the species is estimated to number 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 for the assessment of its 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 spreads mainly 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.

Forest species. It breeds mainly in coniferous forests of spruce and fir, or mixed conifer and sycamore, 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). At one time the species often 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 proposed conservation actions, according to the IUCN, are:

- Careful forest management (selective logging) that allows the preservation of suitable habitat for the species.
- Provision of artificial boxes for nesting, 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).

Great Hornbill (*Falco columbarius*)

The species is migratory with the European population estimated at 20,000 - 41,700 pairs (40,100 - 83,400 adults), while in the EU28 the population is estimated at 6,700 - 14,400 pairs (13,400 - 28,700 adults) (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 floors 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 threats recorded in the list of threats to the species of conservation *concern* (Dimalexis 2009), the reported threats to the species are:

- Extension - intensification of annual crops
- Residential development, urban or extra-urban, legal or arbitrary
- Wetland drainage and other land reclamation works
- Erosion control works, cleaning of the bed of streams, embankments of the seashore and stream beds

The 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. Also, predation by *Vulpes vulpes* is another threat to the species. Finally, in the past (1960s and 1970s), the use of chlorinated hydrocarbons caused a reduction in breeding success, but with the banning of these pesticides, their impact was reduced, as evidenced by the subsequent breeding density and distribution of the species, as well as the numbers of migration and overwintering populations.

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

- Restoration and protection of the species' habitats.
- Minimise pesticide use (Hagemeijer and Blair 1997)

Peregrine *Falcon (Falco peregrinus*)

The European population of the species is estimated at 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 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 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).

According to Poirazidi (2017), the number of the species' territories in the National Park of Dadia - Lefkimi - Soufli in 2012 was 2.

In Central and Northern Europe the species is migratory and winters in Africa. In Greece the species is permanent. 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. Spawning 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 threats recorded in the list of threats to the species of conservation *concern* (Dimalexis 2009), the reported threats to the species are:

- Extension - intensification of annual crops
- Intensification of perennial crops (vines, orchards, olive groves, etc.)
- Residential development, urban or extra-urban, legal or arbitrary
- Tourism-recreation infrastructures (ski resorts, golf courses, golf courses, camps)
- Extractive activities: quarries-mining
- Persecution of specific users as harmful
- Activities causing disturbance (hunting, logging, fishing, gathering of plants and firewood
- Abandonment of traditional agricultural practices and land use, including the abandonment of extensive farming 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 fetal 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 impacts of this are uncertain (White et al. 2013).

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

- Banning the use of highly toxic pesticides and preventing 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).

Curcinesis (*Falco naumanni*)

The species is migratory and in Europe it 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 found mainly in Central and Western Greece (Epirus, Thessaly, Central Greece), usually in settlements near large lowland areas (Handrinos and Akriotis 1997). A much more common species and with a wider distribution in the past, up to the early 1960s, while afterwards it suffered a dramatic decrease 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, in natural and managed grasslands, open bushland (toadflax), low hills with little vegetation and in 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), particularly during the northward migration (Brown et al. 1982; Ferguson-Lees and Christie 2001).

It breeds colonially (usually 15-25 pairs) and nesting occurs mainly in May, mainly nesting 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 using natural areas, for example rock cavities, quarries and occasionally old nests. It also uses artificial boxes 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 it 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 Marangou 2009) the threats to the species are the possible loss of habitat in the 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 threats recorded in the list of threats to the species of conservation *concern* (Dimalexis 2009), the reported threats to the species are:

- Extension - intensification of annual crops,
- Residential development, urban or non-urban, legal or arbitrary,
- Abandonment of traditional agricultural practices and land use, including the 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 degradation and habitat loss mainly as a result of agricultural intensification but also deforestation and urbanisation. 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 proposed conservation actions, according to the IUCN, are as follows:

- Monitor the species and encourage research into limiting factors, and manage its habitat appropriately.

- Promotion of appropriate agricultural policies (extensive farming), control of pesticide use, construction of artificial nesting sites.
- Protection of colonies.

Vulture *(Gyps fulvus)*

According to the most recent data and the literature review resulting from Xirouhakis (2019) and the deliverable of the LIFE16 IPE/GR/000002 project [*Action Plan for three scavenging species of avifauna (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 Acheloos estuary 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 VU/CR, 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 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 calcareous substrates (Xirouchakis and Mylonas 2005b), where many pairs nest together in steep cliffs, gorges and steep rocks 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 poisoning with baits 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.

Protected species, all its colonies are found in areas of the SPA/Natura 2000 network. Its population is systematically monitored only in Crete, while some colonies in Macedonia and Thrace are systematically supported by artificial food supply (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 threats recorded in the list of threats to the species of conservation *concern* (Dimalexis 2009), the reported threats to the species are:

- Intensive and stabled livestock farming
- Residential development, urban or extra-urban, legal or arbitrary
- Commercial-industrial development (ports, airports, industrial zones)
- Extractive activities: quarries-mining
- Renewable energy: Wind farms
- Construction of all categories of roads and railways
- Transmission lines (electricity, telephone), oil and gas pipelines
- Illegal use of poisoned baits to control "harmful" mammals
- Persecution of specific users as harmful

- Noisy leisure 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 the abandonment of extensive farming 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 include poisoning from poison baits intended for "noxious" predators (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 proposed conservation actions, according to the IUCN, are as follows:

- Maintain and promote non-intensive livestock management systems (extensive livestock farming) to ensure the supply of food for the species.
- Establish and maintain feeding stations, especially 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.

Barbastelle *(Barbastella barbastellus)*

According to the Greek Red Book in Greece and the IUNC red list at European level, the species is classified as endangered (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 to 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). Considered nearly extinct 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 from five sites in Central Greece (Fthiotida and Fokida prefectures) (Volleth 1987, Helversen and Weid 1990), and has also been found in 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, in 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 the boundaries of forests and tree plantations.

Threats to the species according to the IUCN are habitat degradation and destruction, especially the loss of old mature forests with old trees with loose bark or crevices that it 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).

Bechstein's myotis (*Myotis bechsteinii*)

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 (Annexes II and IV) and the Bern (Annex II) and Bonn (Annex II) Conventions.

A rare species that occurs at low densities and has 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, as mentioned above, considered 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 is found 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).

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. 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).

Winged bat (*Miniopterus schreibersii*)

The winged bat is a relatively small hand-winged bat 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 Data Book in Greece and the IUNC red list at global level, the species is classified as endangered (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, the species *M. schreibersii* is quite common, as it has been found in numerous locations in all geographical areas of Greece. Apart from Evia and the Peloponnese, it has been found on 13 other islands, in the Ionian, North and South Aegean and the Cretan Sea. It may have been recorded on Naxos and it is possible that it is present on other islands of the Cyclades. It has been recorded in very many places in Crete (53), the Peloponnese (47) and western Greece (38), while it seems to be relatively rare in the Cyclades, Attica and Epirus. Its greatest abundance has been recorded in western Greece, eastern Macedonia and Thrace, and the Ionian Islands, where its most important colonies are located. Very important colonies (more than 2,000 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 hibernates in groups in spacious caves (groups amounting to 40.000 individuals have been observed in three caves in Serbia (Paunović 2004), in Romania (Bücs et al. 2018), and in European Turkey (Paksuz and 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 fertilisation occurs immediately (rather than in spring, as most chironomids do), but implantation of the zygote takes place 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 of the conservation status as Unknown (Unk) (EEA 2019). The total population size was estimated at 23,000 - 50,000 individuals with 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 Chironomids, 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 on 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 grilles) can lead to abandonment or declining numbers. 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 *blythii (Myotis blythii)*

The species is a medium-sized bat, with quite 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 and 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 threatened (NT). The species is protected by Directive 92/43/EEC (Annexes II and IV) and the Bern (Annex II) and Bonn (Annex II) Conventions.

It spreads to south-central and southern Europe (including Sicily, Cyprus, Crete and other smaller Mediterranean islands), southwest 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. 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 more than

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 of 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 winter it is found only in mountain caves (above 1,000 m), where it hibernates. 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 in underground spaces with 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 the availability of insects 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 orthoptera. 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 of the conservation status as Unknown (Unk) (EEA 2019). The total population size was estimated at approximately 10,000 - 50,000 individuals with 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 Chironomid Database, nearly 14,900 individuals have been counted in 50 refuges (Georgiakakis and Papamichael 2020), but the actual number is likely higher.

The threats listed on the IUCN red list are changes in land management, particularly agricultural pollution, and other agricultural activities that can affect the species' populations. Disturbance to cave and building roosts is also a threat to the species.

Footed myotis (*Myotis capaccinii*)

The species is a medium-sized bat, with a wingspan of 23-26 cm and a weight of 7-10 g. Its fur is grey with a brownish tinge on the back and a white-grey colour on the abdomen. It has characteristically large, strong feet (more than half the length of the shin) with long hair.

According to the Greek Red Data Book in Greece and the IUNC red list at European level, the species is classified as endangered (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.

In general, the population of the species is fragmented, but locally it is abundant. It is restricted to the Mediterranean and Balkan countries, from the eastern Iberian Peninsula to the coastal areas of Turkey, Israel, Lebanon and Jordan, as well as northwestern Africa. It is also found in Iraq and western Iran. In the western Mediterranean it has a fragmented distribution and is restricted to a few coastal areas, while in the Balkan Peninsula it spreads to continental areas. Declines have been reported in many areas of its distribution range. In Spain the population has decreased by 30-50 % in the last 10 years and is estimated to be less than 10 000 individuals. Only 30 colonies are known and include more than 20 individuals (Palomo and Gisbert 2002). At least six important colonies are threatened by the reconstruction of buildings in nearby areas and five colonies have disappeared completely in the last 10 years. In France the population has declined to very low numbers (about 3,800 individuals). Colonies have been lost in the western part of the species' range over the last 15 years. Colonies in central Romania, known since the 1960s, are disappearing and the species is restricted to the south. The Bulgarian population is estimated at about 20 000 individuals. In Croatia a few large colonies still exist, but these are threatened by pollution of karstic water bodies and the species is listed as endangered in the Red Book of Mammals of Croatia (Tvrtković 2006). In Turkey the population is declining and is considered vulnerable. It is usually found in small groups and very occasionally up to several hundred individuals.

In Greece it has been reported in several continental locations, in all geographical areas, except Attica and the South Aegean, while apart from the Peloponnese and Evia, it has been found in six islands of the Ionian Sea and the North Sea. Aegean and in Crete (Figure II-6). Its presence in the Cyclades and the Dodecanese has not yet been documented, as it is either absent due to the low availability of surface inland waters on which it depends, or it has simply not yet been detected there. It has been found in very many locations in Eastern Macedonia and Thrace, where it has been extensively studied by Papadatou (2006) and other researchers (Hanák et al. 2001), and is relatively common in Crete, Western Greece and the Peloponnese. The largest population concentrations, however, have been observed in Eastern Macedonia and

Thrace, Western Macedonia and Northern Greece. Aegean (Lesbos), where the largest colonies (some with more than 500 individuals) have been found.

The species usually hunts in wetlands, including artificial water bodies such as canals and reservoirs) and in shrublands near water. The species seems to prefer open water surfaces due to the ease of locating its prey (Almenar et al. 2009). It usually roosts in subterranean habitats (mainly caves); at altitudes up to 1200 m (in Greece it has been found up to 1120 m). The species occurs mainly in areas with Mediterranean and mild continental climates, rich in caves or mines. Apart from underground shelters (caves and mines), where it usually forms colonies of tens or hundreds to thousands of individuals, the species can rarely be found in other types of shelters such as buildings, bridges and rock crevices. Mother colonies of the species consist of 30-600 individuals and are formed in caves and mines, and are often mixed, with other species of chironomid, such as *Miniopterus schreibersii, which* adds great management value to its refugia. Births take place between May and June, while in eastern Greece they may start as early as the end of April. It gives birth to a young and young females nurse until about the end of July. Mating takes place in the autumn. Most females (about 70%) mature reproductively in the first year, while males mature in the second year. The species is not considered a long-distance migratory species and uses caves and mines as rest stops. Movements between summer and winter colonies are mainly within 50 km of each other (with a maximum distance of 140 km according to Hutterer et al. 2005). During the night, it can move over distances exceeding 20 km (in Greece over 26 km) when moving from its shelters to feeding sites. In our country, the species appears particularly mobile, as during the rotation of refuges during the summer season, they can be up to 39 km apart. It feeds mainly on arthropods (mainly insects), such as diptera (family Chironomidae), trichoptera, moths and hymenoptera. It can also capture small fish (e.g. cauliflower) from the surface of the water. It forages over calm water surfaces (river basins with significant riparian vegetation and near large lakes). It hunts by flying in large circles very close to the water surface (even at sea or in lagoons), and captures its prey with its uropath. It can also, using ultrasound, sense vibrations on the water surface and capture prey by dipping its feet below the water surface. Its dependence on water makes it vulnerable to wetland pollution. Occasionally, it forages in forests and shrublands (Davy et al. 2007).

The conservation status of *M. capaccinii*, 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 at approximately 7,000 - 10,000 individuals with 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 3,800 individuals have been counted in 20 refuges (Georgiakakis and Papamichael 2020), but the actual number is likely higher. Frequent movements of individuals between Evros (where six significant colonies are located) and neighbouring areas of Turkey and Bulgaria make it difficult to estimate the size of the population in the country (Papadatou 2006)

The threats listed on the IUCN red list are water pollution, dams, and the loss of water bodies and watercourses. In addition, disturbance to cranberry sites within caves may also pose a threat to the species.

***Myotis emarginatus* (*Myotis emarginatus*)**

The pyromyotid is a relatively small bat, weighing between 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 wing has scattered tuberculate growths.

According to the Greek Red Data Book in Greece the species is classified as endangered (NT), while according to the IUNC red list at European level it is listed as a species of reduced interest (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 occurs 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, as it has been reported in several locations throughout the mainland, as well as in Crete, Euboea, the 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 livestock droppings (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.

Maternity colonies consist of dense aggregations of mainly adult females and juveniles, sometimes or in mixture with other species (genera Rhinolophus, Myotis, and Miniopterus), which adds great management value to its refugia. Breeding colonies use a network of adjacent refugia and often number 20 to 500 females, sometimes up to several thousand, and include some adult males. She gives birth to one young, rarely two, from late May to mid-July. The lactation period lasts 25-35 days. A few females mate from the first autumn, with the majority of them mating in the following year. Maternal colonies are often abandoned in August. The maximum recorded age is 18 years. 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 winter and is not found again until spring. In search of food, the species moves up to 12.5 km from its shelters. Its 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 at approximately 5,000 - 10,000 individuals with 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 shelters (Georgiakakis and Papamichael 2020), but the actual number is likely higher.

The threats listed on the IUCN red list are agricultural activities, which can affect the species' populations, as the species is mainly associated with agricultural habitats. Also, disturbance to roosting sites (such as buildings and caves) is a threat.

Traveller's moth *(Myotis myotis*)

The Tranomyotis is one of the largest bats in Greece with a weight of 20-27 grams and a wingspan of 35-45 cm. It has large ears and a wide snout. Its fur is brown or reddish brown on the back and distinctly whitish on the belly. Morphologically it is similar to *Myotis blythii*, but slightly larger in size, with a longer upper jaw length (the key diagnostic character) and yellow tones on the neck, while at the tip of the trapezium many individuals show a small black spot. To the unaided eye or at a distance the two species cannot be distinguished, and have been found to hybridize in the Mediterranean (Berthier et al. 2006, Furman et al. 2013).

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

In Greece, trannomyotida has been reported in several continental areas of all geographical regions, Euboea and the Peloponnese, but also 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 known sites, the most important colonies (100-1,500 individuals) and, consequently, the highest abundance, have been recorded in Eastern Macedonia and Thrace, Central Macedonia and Central Greece.

The species is common throughout its distribution range with population numbers ranging 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 a threatened species (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, populations of the species increased, after 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.

The trannomyotida occurs in a variety of habitats from deciduous forests (mainly open forests and forest margins) to semi-open and open grasslands and pastures, agricultural land, orchards and olive groves, from sea level to 2,000 m altitude. In Greece it has been found up to 1,950 m, but only four sites are above 1,400 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, plus 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), which 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 to 8 weeks. Colonies disperse in mid to late August, when they begin to mate. Most females mature reproductively during their first and second year of life. Usually males attract females by "singing" from their shelters, where they form harems of up to 5 females. Maximum recorded age to date is 25 years. 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. When searching for its prey, the species flies very slowly, at a height of 30-70 cm above the ground surface, in order to increase the chances of locating its prey. In addition to echolocation, prey detection is based on hearing and smell. When it detects a prey by sound (rustling of insect wings, movement), it pounces, covering the prey first with its wings and then capturing it with its mouth. It consumes the small prey in flight, which it catches with its uropatagium or wing, while for the consumption of larger insects it hangs on to a neighbouring position. It is an occasional migrant. The longest recorded movement is 436 km (Simon et al. 2004). Movements between summer and winter refuges are in the range of 50-100 km. During the night they travel 5 to 26 km to reach feeding grounds.

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 at approximately 1000 - 5000 individuals with 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 Greek Chironomids, nearly 2700 individuals have been counted in 17 refuges (Georgiakakis and Papamichael 2020), but the actual number is probably higher.

The threats listed in 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) 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.

Mesrinophus *euryale (Rhinolophus euryale*)

The species is a medium sized chironomid, 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 grey or reddish brown and usually differs slightly from the greyish (sometimes whitish) fur of the ventral region. 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 Data Book in Greece and the IUNC red list at European level, the species is classified as endangered (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, northwestern 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, Central Greece, Central Greece, Peloponnese, North Aegean and Ionian Islands. The highest abundance of the species has been observed in these regions.

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

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 its food at the edge of forests 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 of the Conservation Status as Unknown (Unk) (EEA 2019). The total population size was estimated to be approximately 2,275 - 5,000 individuals with 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 30 refuges (Georgiakakis and Papamichael 2020), but the actual number is undoubtedly higher.

The 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 (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 greyish and acquire their adult colouration after about two years (Dietz et al. 2009).

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 threatened (NT).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 very 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 north-western Europe over the last 100 years (e.g. UK, Germany, Austria) and has become extinct 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, 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 to a lesser extent 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 tranquilophus 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 seasonal movements (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 frequently visits 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 at approximately 5,000 - 10,000 individuals with 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 Chironomids, nearly 2,300 individuals have been counted in 40 refuges (Georgiakakis and Papamichael 2020), but the actual number is undoubtedly higher.

The threats listed on the IUCN red list are 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 underground 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 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).

Microrhinolophus (*Rhinolophus hipposideros*)

The microrhinolophus 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 grams. 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.

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 threatened (NT). 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 in Central and Southern Europe (but is absent from the Netherlands and Scandinavia), NW Africa, West and Central Asia up to the Himalayas, while 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 building restoration, 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 microrinolophos is one of the most common chiroptor species in Greece, as it has been found 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 the 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 during the night it may visit up to seven different feeding sites. 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. Individuals of the species typically use linear landscape features such as shrub/woodland hedgerows, canals, forest edges, etc. for their movement.

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 at approximately 3,600 - 5,000 individuals with 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 on the IUCN red list are disturbance and loss of underground habitats, change in the management regime of agricultural areas (loss of scattered trees and hedgerows due to intensification of agriculture) and fragmentation and isolation of the species' habitats.

Blasius' rhinolophus (*Rhinolophus blasii*)

The species is a medium-sized bat with a wingspan of up to 28 cm and a weight of 7 to 15 g (Wilson and Mittermeier 2019). The dorsal fur is pale brown or yellowish with a whiteish base, while the ventral region is slightly lighter in colour. Both saddle projections are acuminate, and in some individuals of this species, the dermal fold under the lanceolus has a serration in the middle. On the fourth toe, the first phalanx is more than half the length of the second, in contrast to the similar species *Rhinolophus euryale* and *Rhinolophus meheyi*, where the second is more than twice as long as the first.

According to the Greek Red Book in Greece and the IUNC red list, 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.

The species has a wide range of distribution in Palaearctic. In Africa, it occurs from northeastern South Africa and the Democratic Republic of the Congo to Ethiopia and Somalia, and North Africa. In Asia, it has a patchy distribution extending from Turkey in the west to Pakistan in the east, and from the Caucasus in the north to Yemen in the south (Wilson and Reeder 2005). In Europe, it has disappeared from many areas and is mainly restricted to the Balkan Peninsula and some Mediterranean islands, including Crete and Cyprus. The species occurs from sea level to 2,215 m in Yemen.

In Greece, the Blasius rhinolophos is a fairly common species and is found throughout the mainland, while so far it has been found in 22 islands of the Ionian and

Aegean Sea, but also in Evia, the Peloponnese and Crete. Most of its presence has been recorded in Crete (60) and Eastern Macedonia and Thrace (23). In these regions, a comparatively high abundance has been recorded, but Thessaly is the leader, as many hundreds of individuals have been recorded in the Melissotrypa cave. The next smallest colonies (a few hundred individuals) have been found in Eastern Macedonia and Thrace, Western Macedonia, Central Greece and Crete.

R. blasii prefers karstic areas of low and medium altitude (rarely above 1,000 m in Greece) with low vegetation and sparse trees. It usually forms colonies, with dense aggregations of a few hundred individuals, in karst caves and mines. It often shares its refugia with other species of the genera Rhinolophus, Myotis and Miniopterus, which gives its refugia great management value. It inhabits caves with mild temperatures (13.8 - 17 degrees Celsius). It is a typical species of the Mediterranean landscape with a small-scale mosaic of open habitats and shrublands. It usually hunts in shrublands, oak woodlands and along habitats in fragmented landscapes. It hunts exclusively in flight and systematically forages for insects. It can and does move very flexibly and captures its food close to vegetation or ground. It is a species that is quite dependent on the presence of water and is associated with watercourses and other water surfaces. In the area of the Bulgarian and Greek Rhodopes, the species feeds almost exclusively on moths (moths), while studies in other areas of its range have found that it also feeds on cephalopods, diptera, trichoptera, hemiptera, neuroptera, etc. It is a typical species of the Mediterranean landscape with a small-scale mosaic of open habitats and shrublands. It usually hunts in scrub, oak woodland and along ecotones in fragmented landscapes. It hunts exclusively in flight and systematically forages for insects. It can and does move very flexibly and captures its food close to vegetation or ground. It is a species that is quite dependent on the presence of water and is associated with watercourses and other water surfaces. Little is known about the breeding habits of *R. blasii*, but mating takes place in autumn within the shelters. In Crete, juveniles fly as early as the beginning of June, probably when the climate of the previous spring is favourable, while in southern Bulgaria, births take place in late June. Females mature reproductively after their second year of age and give birth to a single young. Summer colonies typically host 20-30 individuals, although colonies have been observed hosting up to 300 females. In winter the species concentrates in mixed groups with other *Rhinolophus* species (up to 800 individuals in Bulgaria and up to 2 000 individuals in Serbia). There are large colonies of the species in Bulgaria, Serbia and Greece.

Populations of the species are estimated to be declining due to the loss of Mediterranean forests and disturbance in caves, and it is considered vulnerable in many areas (e.g. western Balkans, although it is considered stable in the eastern Balkans). It is an epidemic species, with its summer and winter refuges located at relatively close distances. Its feeding sites are located within a few kilometres of its refuges.

Threats listed on the IUCN red list are the loss of Mediterranean forests and the loss and destruction of subterranean kurnias (Kryštufek 1999). It is also a species particularly sensitive to cave disturbance, such as that of cave tourism and the use of caves as wildlife refuges.

Mehely's rhinolophus (*Rhinolophus mehelyi*)

The species is of medium size, slightly larger than *R. Euryale* and smaller than *R. Ferrumequinum,* with a wingspan of up to 34 cm and a weight ranging from 10 to 23 g (Wilson and Mittermeier 2019). The belly and facial fur is light (almost white), while on the back it is grey-brown. Most adults have dark hairs around the eyes, like a "mask", which is sometimes seen in other species of the genus. The upper projection of the saddle is slightly rounded, and only in this species is the lanceolate narrowed sharply from the middle to the tip. On the fourth toe the first phalanx is less than half as long as the second, unlike in *R. blasii.*

According to the Greek Red Data Book in Greece and the IUNC red list at European level, the species is classified as threatened (VU).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 declining significantly throughout its range and is approaching extinction in some areas. The species is largely restricted to the Mediterranean region and occurs up to 2,000 m altitude locally in some areas, although it is usually found at lower altitudes.

It is a rare species, which as mentioned above has declined throughout its distribution range where data are available. It has a fragmented distribution and is distributed in a narrow band in several Mediterranean countries: from NW Morocco to the SE Iberian Peninsula, Sardinia, Sicily and the Balkan Peninsula, to Asia Minor. It is absent from the Adriatic countries and mainland Italy, and in recent decades has ceased to occur in Croatia and has almost disappeared from France. It is also spreading to northern Algeria, Tunisia, Bulgaria, south-eastern Romania and Moldova, but also to southern Russia, Iraq, Iran and even Afghanistan. In the region of Andalusia in Spain, the rate of decline is estimated at 10% over the last ten years. The species is almost extinct in France (Rodrigues and Palmeirim 1999), Romania (Botnariuc and Tatole 2005) and northeastern Spain. In Romania, for example, the population is estimated to have numbered 5,000 individuals in the 1950s, but now numbers around 100. It is also steadily declining in southern Spain (Franco and Rodrigues 2001), in Portugal (Rodrigues et al. 2003), Summer colonies usually number 30-500 individuals (although colonies of up to 3,000 individuals, divided into smaller groups within the same cave, have been recorded). Winter colonies are estimated to number up to 5,000 individuals.

In Greece, the Méhelÿ rhinolophos has a fragmented distribution with confirmed presence in Central and Eastern Macedonia, Thrace, Attica, Peloponnese and Lesvos, while it is absent from Crete and the other islands of the country. Its distribution in our country is probably wider, although it does not seem to be common, like other species of the genus Rhinolophus. Its populations appear to be few and isolated, as it has been reported from less than 20 sites in Macedonia, Thrace, Central Greece, Lesvos and Kos (Hanak et al. 2001; Paragamian et al. 2004). Most known locations and the highest abundance have been observed in eastern Macedonia and Thrace and western Greece. In Greece, the species has been little studied. It is a typical cave-dwelling species, as it takes refuge in caves all year round, although only in our country has it been found to use other underground shelters (mines in Lesvos)

R. mehelyi prefers karstic areas of low or moderate altitude (up to 535 m in Greece) with caves, which it uses as shelters. It also forms colonies in mines and less frequently in buildings and cellars. Its diet consists mainly of moths (moths), and to a lesser extent of
beetles, tooth beetles, diptera and other insects. It seeks its food in areas with low vegetation (arable land, steppe areas) and few trees, but also in oak forests and olive groves. It has a flexible flight that allows it to forage close to the ground. It occasionally hangs from branches of tall plants and scans the surrounding area for passing insects.

Its mother colonies rarely exceed 500 individuals. In autumn it forms dense aggregations of males and females in caves, at close distances, where mating takes place. In both winter and summer, they often form dense aggregations with other species (*R. ferrumequinum, Miniopterus schreibersii, which* adds great management value to their shelters). Births occur from early June to mid-July. Females mature reproductively in their second or third year of life and give birth to a single young

(Schober and Grimmberger 1997), which begins to fly out of their shelter after about a month. Males mature reproductively in their second year of life. The maximum recorded age is 12 years. Summer roosting sites are found in warm caves, often in karstic areas, while winter colonies are found in cooler underground locations (usually large caves with a stable microclimate). The species roosts only in caves and does not use artificial habitats. It is mostly an epidemic species and maximum recorded seasonal movements are 90 and 93 km in Portugal (Palmeirim and Rodrigues 1992) and Bulgaria respectively.

The Conservation Status of *R. mehelyi*, based on the 4th National Report under Article 17 of Directive 92/43/EEC for the period 2013-2018, was assessed as Unknown (Unknown, XX), while the overall trend of the Conservation Status has not been assessed (EEA 2019). The total population size was estimated at approximately 500 - 1,000 individuals with 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 Chironomids, nearly 1,300 individuals have been counted in 6 refuges (Georgiakakis and Papamichael 2020), but the actual number is undoubtedly higher.

The threats according to the Greek Red Data Book of Endangered Species (Legakis and Marangou 2009) are the degradation and destruction of its refuges. The presence of cavers and other visitors in them during the period of birth and lactation can result in the death of dozens of cubs and the abandonment of the site by the colony. The presence of humans in caves where the species overwinters also has negative effects. The tourist management of caves and their subsequent management is often carried out without taking into account the impact on the bats present. In caves of archaeological interest, inappropriate gates are placed in caves or excavations are carried out at the wrong time (e.g. Cyclops Polyphemus Cave, Maroneia), with disastrous results for this and other species of manatee. Finally, blocking the entrance to dangerous caves or mines by various means (doors, rocks, rubble, rubbish) traps bats inside them or prevents them from visiting them at the right time of year. The degradation of habitats where bats forage (e.g. due to fires, overgrazing, use of agrochemicals) is also thought to be a threat, but no data are available on this.

The threats listed in the IUCN red list are disturbance and loss of underground habitats, changes and degradation of foraging habitats, as well as cave tourism, which has an impact beyond disturbance and destruction of caves.

Wolf (*Canis lupus*)

The largest of the 41 species of the family Canidae. The 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: only Greek populations south of the $39^{ου}$ parallel, Annex IV: except Greek populations north of the $39^{ου}$ parallel, Annex V: Greek populations north of the $39^{ου}$ parallel) 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 spreads in the northern hemisphere from the Arctic to the 20^{o} parallel, namely 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. herders), it is currently 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-$20^{ου}$ century, the range of the species' distribution was significantly reduced 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 km2 to less than one per 120 km2 (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 greatly 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 Book 2009, there are estimated to be about 600 wolves in Greece (minimum population size of 600 individuals in the spring season). The area of the species' distribution exceeds 40,000 km2 (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 was 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 shows the species' adaptability to the most extreme (both natural and anthropogenic) 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 herd, 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 sometimes it is active during the day. It lives in family groups 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 covers 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 over 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). Population density ranges from 50-60 km2 per person, while in Italy it is 80 km2 per person (Macdonald and Barrett 1993).

The threats mentioned in the Greek Red Book (Legakis and Maragou 2009) are the following: Anthropogenic mortality, reduction of food availability throughout the species' distribution range due to the reduction of 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.

According to the NRC (Legakis and Marangou 2009), the conservation measures required are the following: Increasing the availability of the wolf's natural prey (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 packs (Iliopoulos 1999c, Iliopoulos et al. 2009).

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).

Brown Bear (*Ursus arctos*)

The species is a priority species of the 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 Book in Greece the species is classified as endangered (EN), while according to the IUCN at European level it is listed as a species of reduced concern (LC) (IUCN red list), while it is also protected by the International Convention CITES (Annex I and II).

Brown bears in parts of North-Eastern Europe (Baltic) are linked to the large population in Northern Eurasia (about 100,000) spreading across 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 regime that allows for the removal of problem individuals. The Greek portion is strictly protected, as are the few specimens in Serbia.

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 is estimated at about 3,940 individuals and is distributed 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-areas. 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 left 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, this 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 dispersing 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 connections 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 distribution of the brown bear in Greece, according to the Greek Red Book (Legakis and Marangou 2009), covers a total area of 13,500 km and consists, as mentioned above, of two main geographically isolated population nuclei, the first covering the wider Rhodope Mountains and the second the wider Pindos Mountains, which is the southernmost range of the species 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 land carnivores. Its length is 1 - 2.8 metres. 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 of the mountainous and semi-mountainous zone are the main habitat of the brown bear (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 can 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 Book are poaching, the use of poisoned baits (Antoniou et al. 1998) and habitat destruction/downgrading by large infrastructure projects (e.g. motorways e.g. Egnatia Odos) and forest fires.

According to the N.C.B. (Legakis and Maragou 2009) the conservation measures required are the following: a) intensification of information to producers to reduce incentives for deliberate eradication, b) strict environmental control on 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 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.

Hare *(Spermophilus citellus)*

The species has experienced a significant 30% decline across its distribution range in the Mediterranean region.

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 UCN at European level, the species is classified as endangered (EN and VU respectively).

The subspecies *macedonicus* in Greece has practically disappeared as a result of extensive habitat loss and the subspecies *gradojevici* has a very limited range in Greece. In European Turkey, habitat destruction is causing severe ongoing declines and the population there should also be closely monitored as it may become extinct within the next decade. The species is very sensitive to habitat changes e.g. conversion and abandonment of short grass habitats can cause very rapid population declines.

The species occurs at altitudes from 0 - 2,500 metres. At the southeastern end of its distribution range it spreads from southern Serbia, FYROM, Greece, Bulgaria, Bulgaria, southern Romania to European Turkey, Moldova and Ukraine (Panteleyev 1998, Kryštufek 1999).

The species' population has become fragmented and there have been extinctions in peripheral parts of its range in Germany (where it disappeared around 1985 due to forestry) and Poland (where the last clear native records date from the 1970s, although the species has recently been reintroduced (Kryštufek 1999)). Although some large and apparently stable subpopulations remain, there have been many reports of declines, especially in the northwestern part of its range. In optimal habitat, densities of 18-48 individuals per hectare have been recorded, although lower values of 5-14 individuals per hectare have been reported (Kryštufek 1999). In Romania, the population has been estimated at about 15,000 (Botnariuc and Tatole 2005). In parts of Romania and Bulgaria, populations may have stabilized and begun to increase since 1989 as a result of the abandonment of intensive agriculture after the fall of the communist regime. In Greece, populations of two subspecies *macedonicus* and *graolojenici* have been lost.

In the Czech Republic there were 83 known sites in 1995, but by 2000-2001 only 26 of these sites still existed (Cepáková and Hulová 2002).

Greece, according to the Greek Red Book (Legakis and Marangou 2009), is the southernmost range of the species. More specifically, in Greece the species is found in three distinct areas of Macedonia and Thrace. Macedonia, in the wider area of the Axios valley, in the French, Hortiatis, Thermi, Pylia and the area of Serres; b) in Western Macedonia, in areas of Kozani and Grevena; and c) in Thrace, in areas of Alexandropoulis, the Evros Delta and isolated areas of NE Evros (Chatzisarantos et al. 1962, Ondrias 1966, Ondrias 1966, Fraguedakis-Tsolis and Ondrias 1977, Fraguedakis-Tsolis and Ondrias 1985). Thus, the range of the species is estimated to be approximately 4,320 km2, while its home range is estimated to be approximately 2,650 km2. The exact population size of the species in Greece is not known, since no systematic indirect or direct counting of the species has been carried out and therefore no clear scientific data are available. An optimistic estimate, using known measured densities and habitat suitability, would put the population at around 50,000 individuals. However, this size is threatened by a trend of systematic decline, which seems to have become more pronounced in recent years.

The hare is found mainly in the eusocial and the Mediterranean vegetation zone. Its main habitats are temperate grasslands, grasslands, subalpine grasslands and relatively large clearings. At the same time it can be found in relatively bare soils, evergreen and hardwood shrubs, managed pastures, up to urban gardens and parks, airports or even golf courses (Kryštufek 1993, 1996, 1999; Amori 1996). A prerequisite is good drainage and the maintenance of low vegetation height in these habitats (Katona et al. 2002). The rabbit grouse is a semi-subterrestrial mammal and spends a significant part of its activity period in underground burrows (Lagaria and Youlatos 2006). Burrows extend to a depth of <1 m and consist of 2 - 4 entrances (Hut and Schraff 1998). Typically, burrows are either located at slight elevations for good observation or near shrubs, low trees and rocks for relative cover. Thus, at small scales they exhibit a clustering pattern, while at larger scales they exhibit a random distribution in space (Boutsis 2002). Within these burrows, the rabbits overwinter for about six months. Male and female individuals of the species become active and begin wintering on different dates. Thus, in Greece, males wake up on average in early March, while females wake up towards the end of March. A relatively short 10-day breeding period follows and females gestate for about 26-28 days. Births take place underground and the number of young varies from 2-8, which are suckled for about 25-30 days. Juveniles first emerge around late May to early June. Adult females begin overwintering around the end of July and males in early to mid-August. After these dates, the active population of hare traps consists only of juveniles born in the current year and will start overwintering in mid to late September (Millesi et al. 1999; Hoffmann et al. 2003a; Youlatos et al. 2007). The hare is a diurnal mammal. During the early months of the active season, the animals are characterized by relatively high activity in mid-day, while as the summer progresses they seem to become active early in the morning and late towards dusk, avoiding strong sunshine and high temperatures. In all cases, the main behaviours are feeding and vigilance, and less moving, marking, grooming or digging (Boutsis 2002; Everts et al. 2004; Youlatos et al. 2007). Rabbits, although they appear to inhabit colonies, are antisocial animals and social contacts, except during the breeding season, are minimal and random. Each animal has its own burrow system, and males may also contribute to the construction of the burrow where the female will give birth (Millesi et al. 1998). The diet of the species includes seeds, roots, shoots, flowers and arthropods (Nowak 1999)

The threats to the species according to the Greek Red Data Book are agricultural cultivation on any scale, nomadic livestock farming, abandonment of certain types of agriculture, change of management regime in non-agricultural areas, development of infrastructure (e.g. (Amori 1996; Hoffmann et al. 2003b). Significant losses are also due to mortality from entrapment, collisions with vehicles or even predation by domestic animals such as dogs and cats. Drought and extreme temperatures tend to cause behavioural and foraging dysfunctions (Paraschis 1992). In addition, inbreeding and limited and fragmented dispersal seem to genetically diminish populations, but this is not scientifically documented.

According to the NRC (Legakis and Marangou 2009), the conservation measures required are the following: Implementation of European and Greek legislation. In addition, awareness-raising is required, both at the decision-making and local level. Primary data are required to record the biology, ecology and distribution of the species in Greece. In addition, it is very important to diagnose whether and how distinct the partial subpopulations/sub-species are, and to what extent, from each other and whether and to what extent there is genetic flow between them and between the fragmented sub-populations of these. These combined with long-term biomonitoring will allow assessment of population trends and their relationships with various anthropogenic or non-anthropogenic factors. On the basis of such scientific data, new, or declassified, protection zones and safe communication corridors can be established.

Threats listed on the IUCN red list are the conversion of grasslands and pastures to cultivated fields, the abandonment of pastures and their subsequent reversion to tall grass meadows or shrubby habitats that are not suitable for the species (Kryštufek 1999). Although not a significant threat, some Gypsy communities in Central and Eastern Europe still prey on the species.

Mediterranean turtle (*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 threatened (VU and NT respectively). It is also protected by the CITES Convention (Appendix 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 density can reach up to 60 individuals per hectare in exceptional cases, while 1-5 individuals per hectare is more common (Stubbs 1989b).

The species lives in 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 during the hottest hours of the day in shade under shrubs and in dense undergrowth (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 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 cores.
- 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 Marangou 2009), the conservation measures required are the following: 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, conservation 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, 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.

Grey turtle *(Testudo graeca)*

The distribution range of the species is from the Mediterranean basin, east to Iran, with populations in North Africa, Southern Europe and Western Asia. It occurs from almost sea level to an altitude of 1,900 m (Buskirk et al. 2001). In North Africa it is distributed from western and northern Morocco, to northern Algeria and northern and central Tunisia to northwestern Libya. In southern Europe it 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 considered 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 I and IV) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece the species is not classified as endangered (LC), while according to the IUCN at European level the species is classified as threatened (VU). It is also protected by the International Convention CITES (Annex II).

The species inhabits a variety of habitats from dry open scrub, grassland and pasture, dunes, woodland, heathland 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.

Oriental lamprey (*Elaphe sauromates*)

The species spreads from eastern Greece (Thrace) northwards through Bulgaria, southern and eastern Romania, Moldova, southern Ukraine and southern Russia to western Kazakhstan, western Turkmenistan, the Caucasus, most of Turkey, northern and western Iran and northern Iraq. It occurs from sea level to 2,500 m elevation and is usually found at low population densities.

In Greece it is found in Eastern Macedonia and Thrace and on the island of Thassos. There is a report of the presence of the species in Samothrace, but this has not been confirmed and is considered doubtful.

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 not classified as threatened, but is listed as a species of reduced concern (LC).

The species is non-venomous, with a length of up to 150 cm (rarely more). It has similar characteristics to the related species *Elaphe quatuorlineata* (Lappet-faced snake), but is considerably faster and more nervous than the common lappet-faced snake, which will defend itself more vigorously if threatened. It is found on rocky slopes with Mediterranean-style shrubby vegetation, on the edges of forests in open woodland with several gaps. Females lay between 4 and 16 eggs.

According to the IUCN red list there are no significant threats to this species. It is generally persecuted throughout its distribution range, but not to the level that it is a threat to the species. It is significantly declining in Romania, mainly due to habitat loss. The expansion of cultivation in steppes and similar habitats leads to an overall decline in the species' population.

Spotted knotweed (*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 as 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.

The 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.

Roach myomaxus (*Myomimus roachi*)

The species is found in Bulgaria and Turkey (both in the European and Asian part). It is also found in eastern Greece. It is mainly a lowland species.

The species is protected by Directive 92/43/EEC (Annex II) 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 as poorly known (DD), while according to IUCN at European level the species is classified as endangered (EN).

This species, with its limited distribution range, is not well known. In European Turkey, there are only clear records from a small number of sites, and none of these records are recent, as despite intensive surveys, the species has not been observed in the last five years (Global Mammal Assessment SW Asia workshop 2005). Throughout its fragmented distribution range, which as mentioned above is limited, the vast majority of suitable habitat has been converted to cropland.

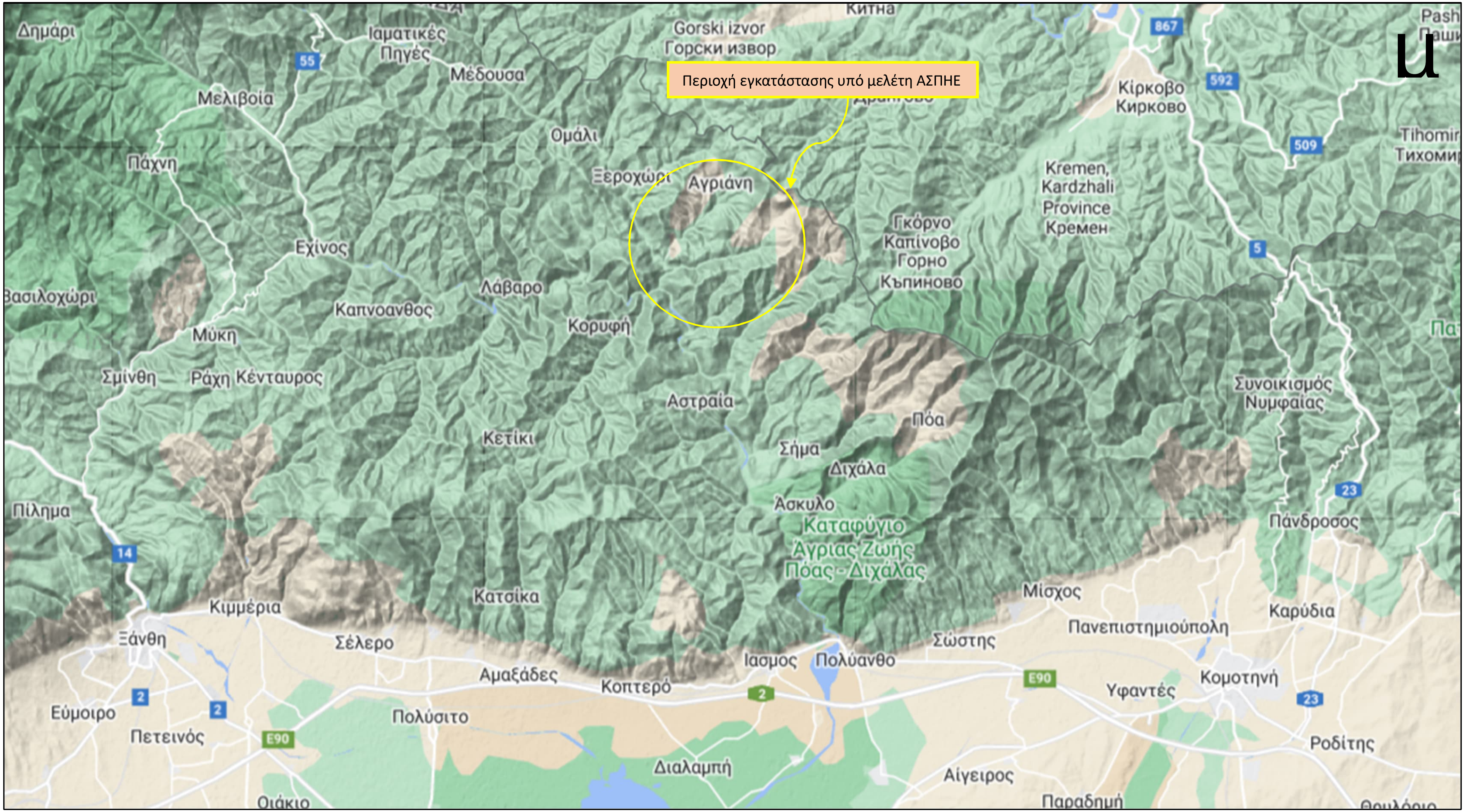
The species inhabits scrubby habitats with scattered trees, orchards, vineyards, hedgerows between cultivated areas and river banks. Although it occurs in some extensively managed agricultural fields, it is absent from intensively cultivated areas. The species' diet consists mostly of seeds.

The threats listed in the IUCN red list are the conversion of the species' habitats to intensive farming. In the European part of Turkey, most of the species' habitat has been converted to agricultural land. Despite intensive surveys, the species has not been found in the last five years. It is clear that the range of the species is shrinking.

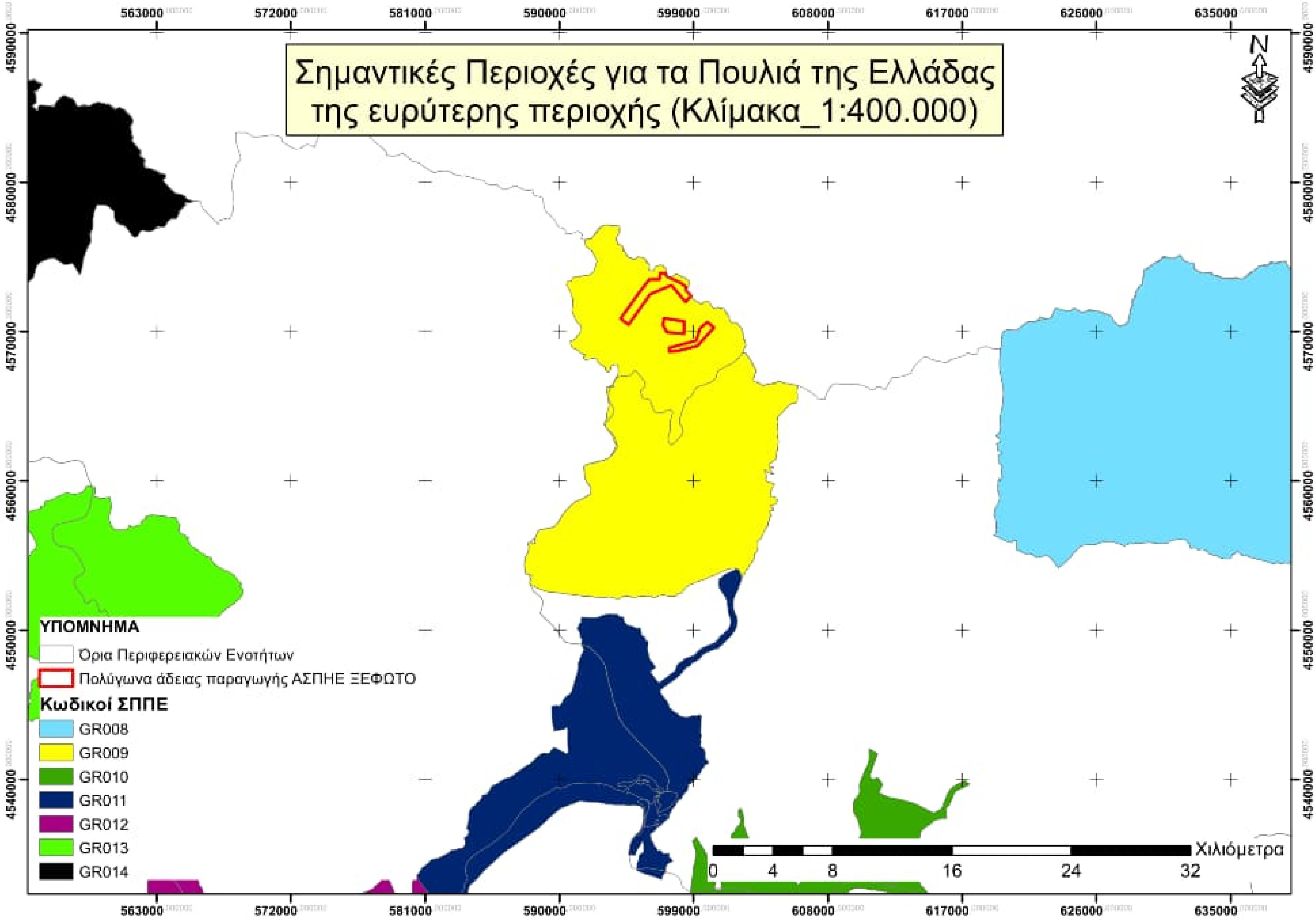
Mapping of the above on Documentation Maps

The following sets out all of the points made in the previous sections regarding the project site and the field survey area and their location outside the Natura network sites of the wider area, outside the RPAs of the wider area, and in relation to National Parks and Wildlife Reserves. The land use map of the wider area is also presented, according to the land use mapping of the Corine land cover database 2018, which also shows the location of the project's production licence blocks and the field survey area.

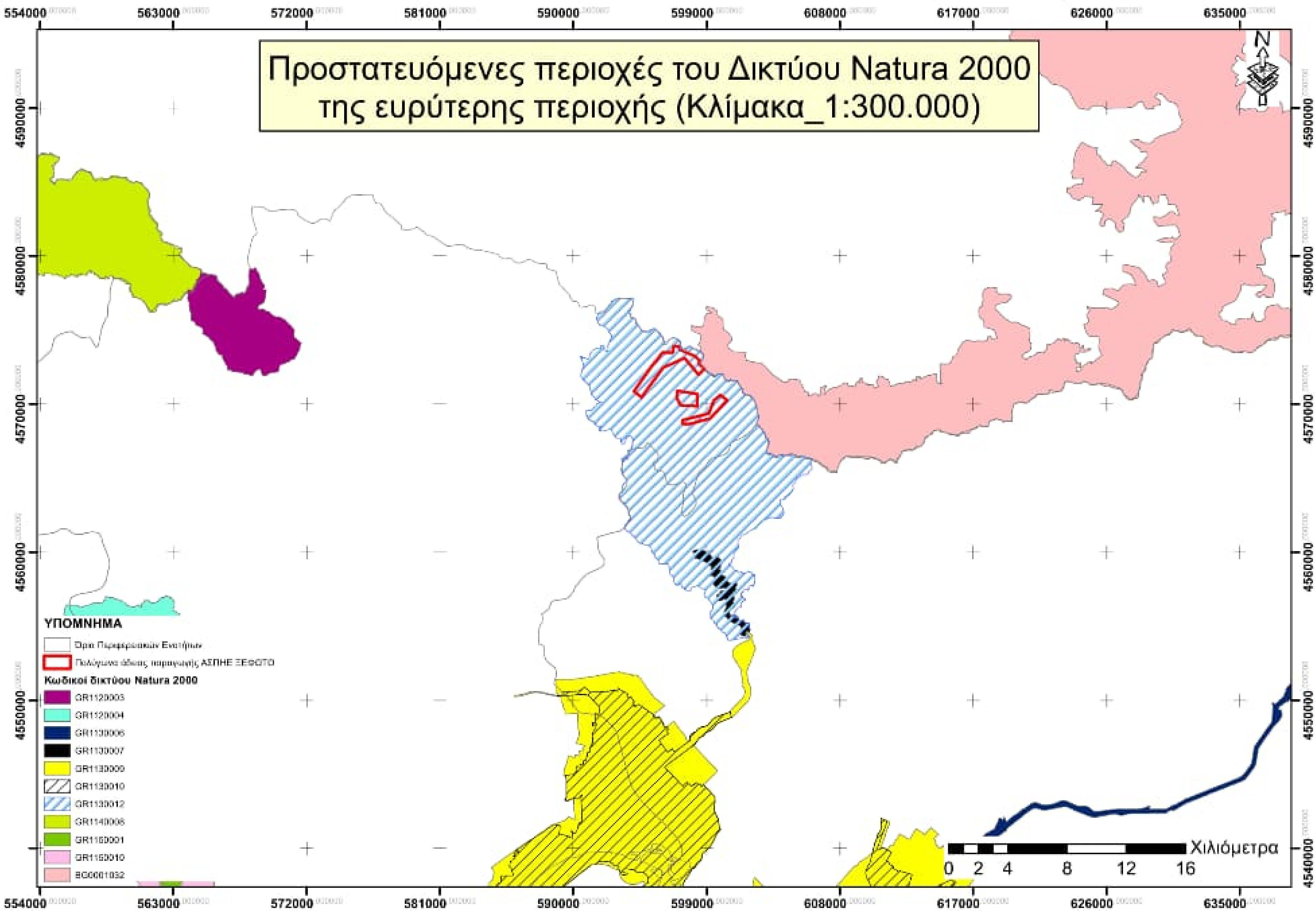
Regarding the species of interest, as defined on the basis of the data examined in the previous section, maps with their distribution and their habitats in the wider project area are presented below, according to the data from the Monitoring and Evaluation Programme of the Conservation Status of Species and Habitat Types in Greece of the Ministry of Environment, Nature Conservation and Nuclear Safety of Greece in response to the country's obligations under Directives 92/43/EEC and 2009/147/EC (currently known as 79/409/EEC), the cartographic distribution data of the International Union for the Conservation of Nature (IUCN), and the data of the International Union for Conservation of Nature (IUCN).iucnredlist.org/, available online on 20/06/2021), the data from the Red Book of Endangered Animals of Greece (Legakis and Marangou 2009). The critical habitat data were not extracted from the critical habitat data available on the YPEKA website for 76 of the country's SPAs (www.ypeka.gr/el-gr/Περιβάλλον/Διαχείριση-Φυσικού-Περιβάλλοντος/ European-Ecological-Network-NATURA-2000), as these do not exist for the study area . To fulfill the above obligation, based on the specifications of the EAA, habitat maps were created, in the field of which the suitable habitats of the species of interest are depicted based on their ecological requirements, as extracted from the database and mapping for land cover (Corine land cover 2018), while for large raptors and black-tailed godwit, in an additional field integrated into the above habitat maps of species of interest, these were re-mapped from satellite imagery and potential areas of use (foraging, roosting, etc.etc.) based on their ecology, site morphology and vegetation structure, as assessed by the study team. In addition, as mentioned above, the site of the project under study is adjacent to the SPA BG0001032, the protected habitat types of Annex I of Directive 92/43/EEC and the fauna and flora species of Annex II of the same Directive. The area where the project is to be carried out does not constitute an EEZ, and for this reason there is no requirement, in accordance with the specifications of the EOA, to survey the habitat types listed in Annex I to the above Directive. With regard to the fauna species of Annex II of the above Directive, as selected by the study team, maps of their distribution in the wider project area are presented below, according to the distribution map data of the International Union for Conservation of Nature/IUCN (https://www.iucnredlist.org, available online on 15/10/2022), and the distribution map data of the 3rd and 4th National Implementation Report-Report of the Directive 92/43/EEC.



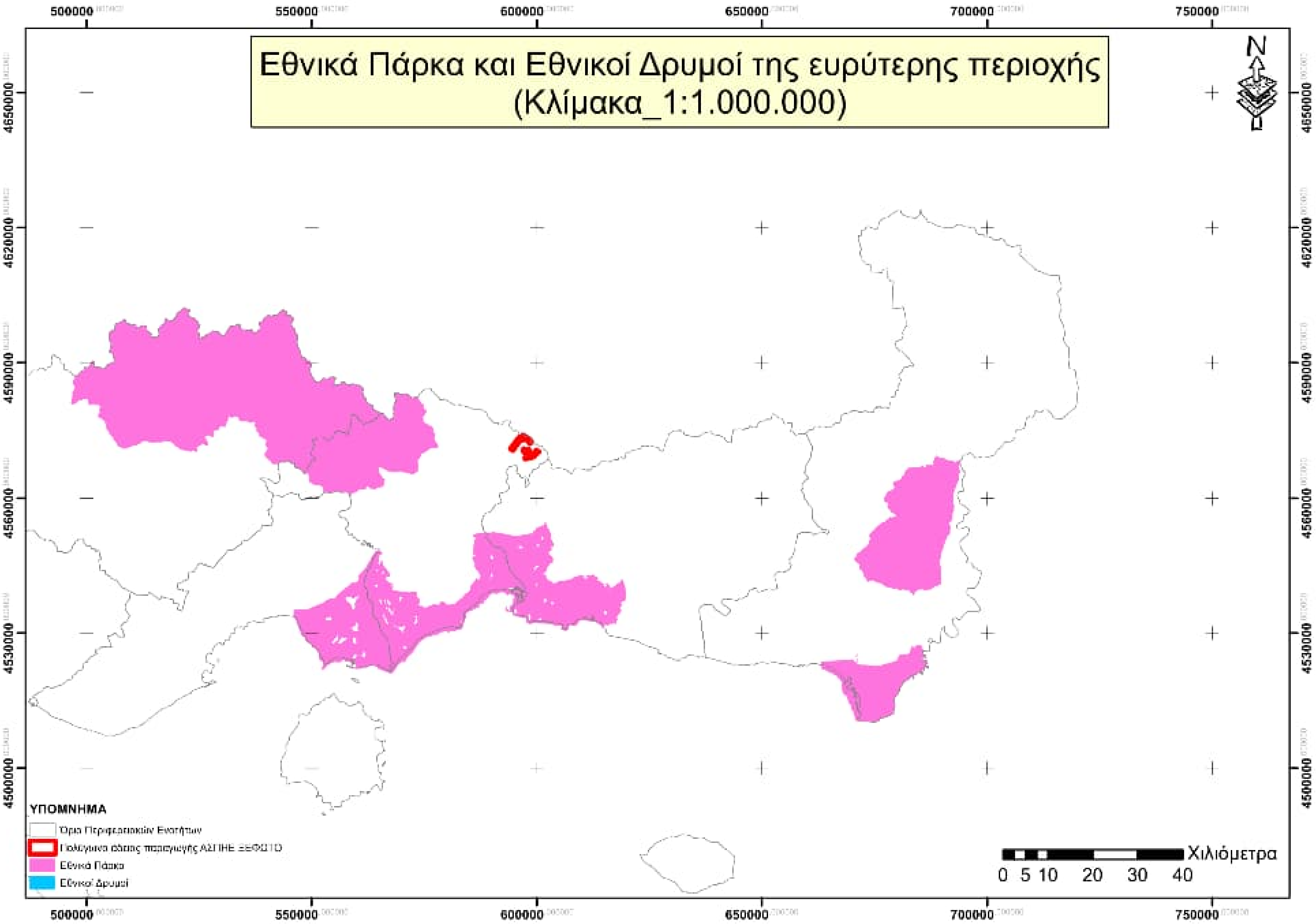
Map 1: Orientation map of the study area and the wider area of the W/F at the XEFOTO site.



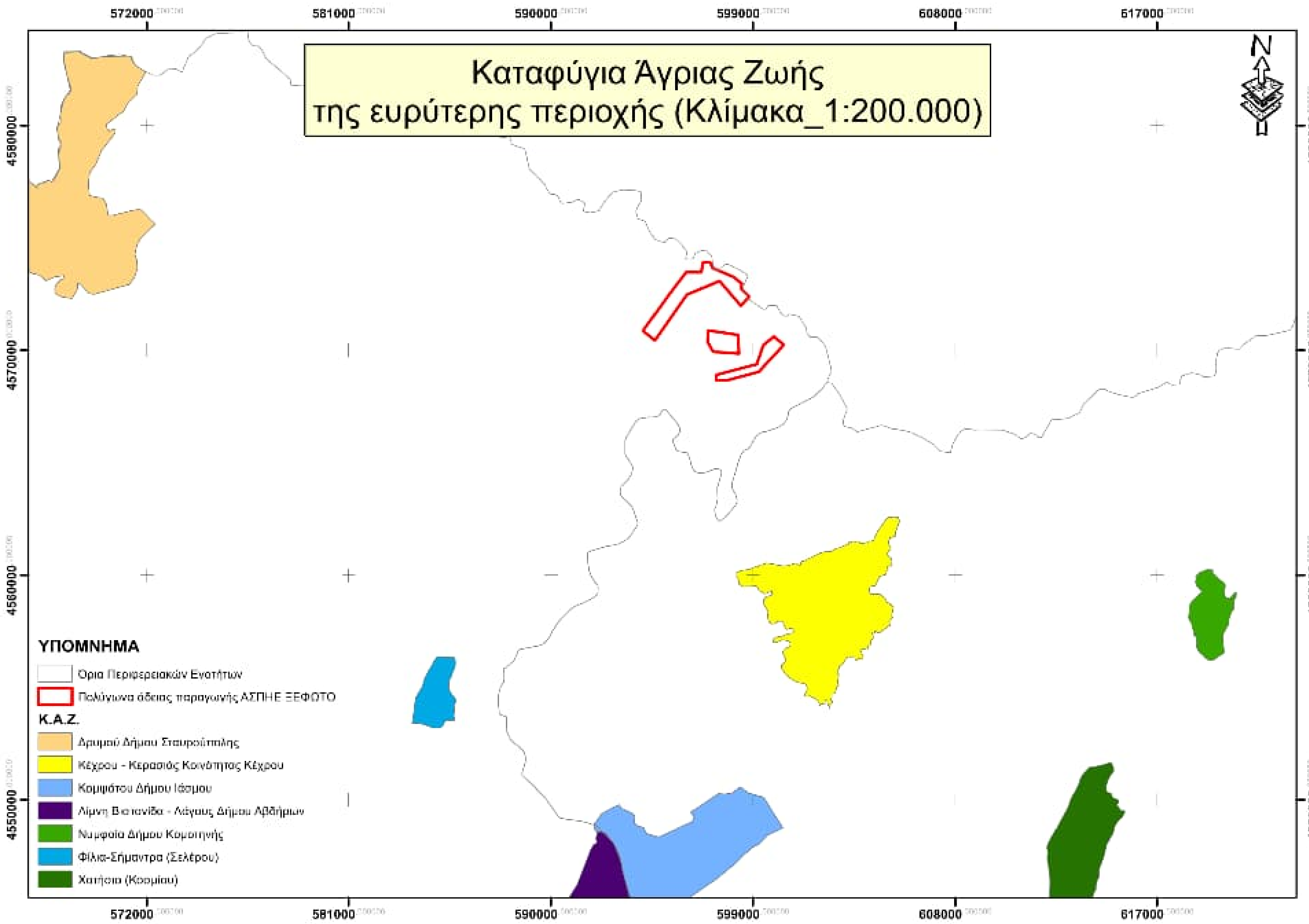
Χάρτης 2: Χάρτης χωροθέτησης της περιοχής εγκατάστασης του ΑΣΠΗΕ στη θέση ΞΕΦΩΤΟ εντός της ΣΠΠΕ GR009



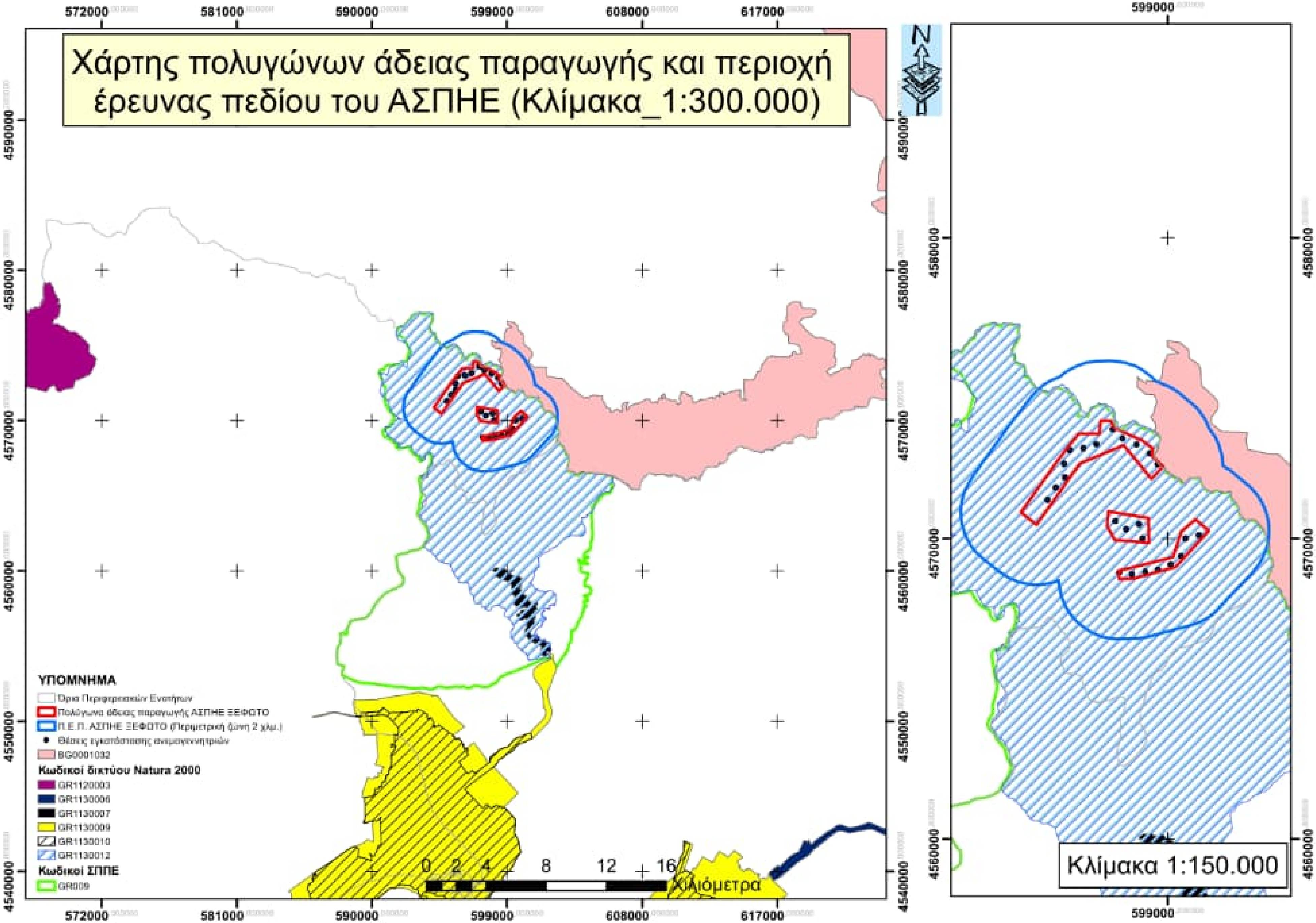
Χάρτης 3: Χάρτης χωροθέτησης της περιοχής εγκατάστασης του ΑΣΠΗΕ στη θέση ΞΕΦΩΤΟ εντός της περιοχής του δικτύου Natura 2000 ΖΕΠ GR1130012



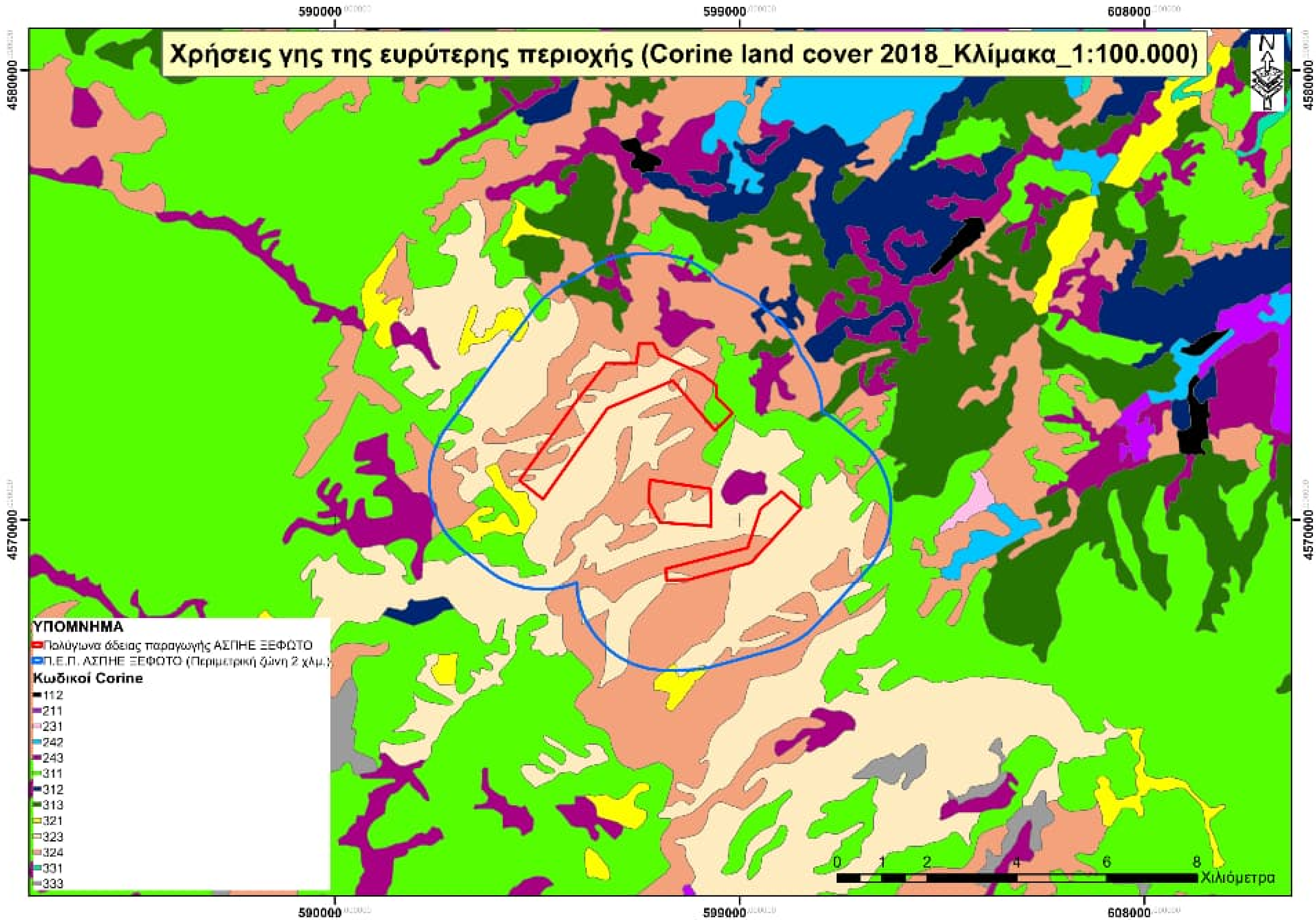
Map 4: Map of the location of the installation area of the W/F at the XEFOTO site outside the National Parks and National Forests.



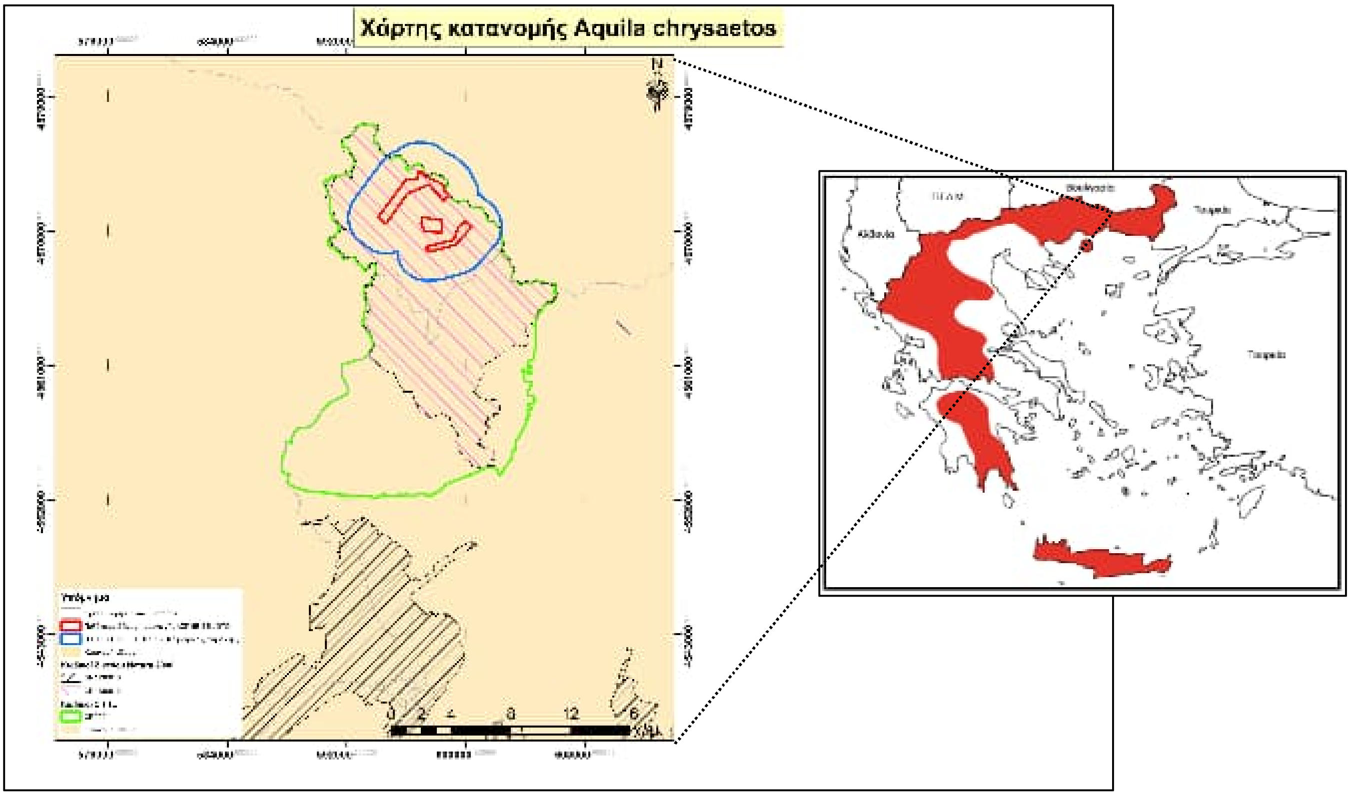
Χάρτης 5: Χάρτης χωροθέτησης της περιοχής εγκατάστασης του ΑΣΠΗΕ στη θέση ΞΕΦΩΤΟ εκτός των Καταφυγίων Άγριας Ζωής της ευρύτερης περιοχής.



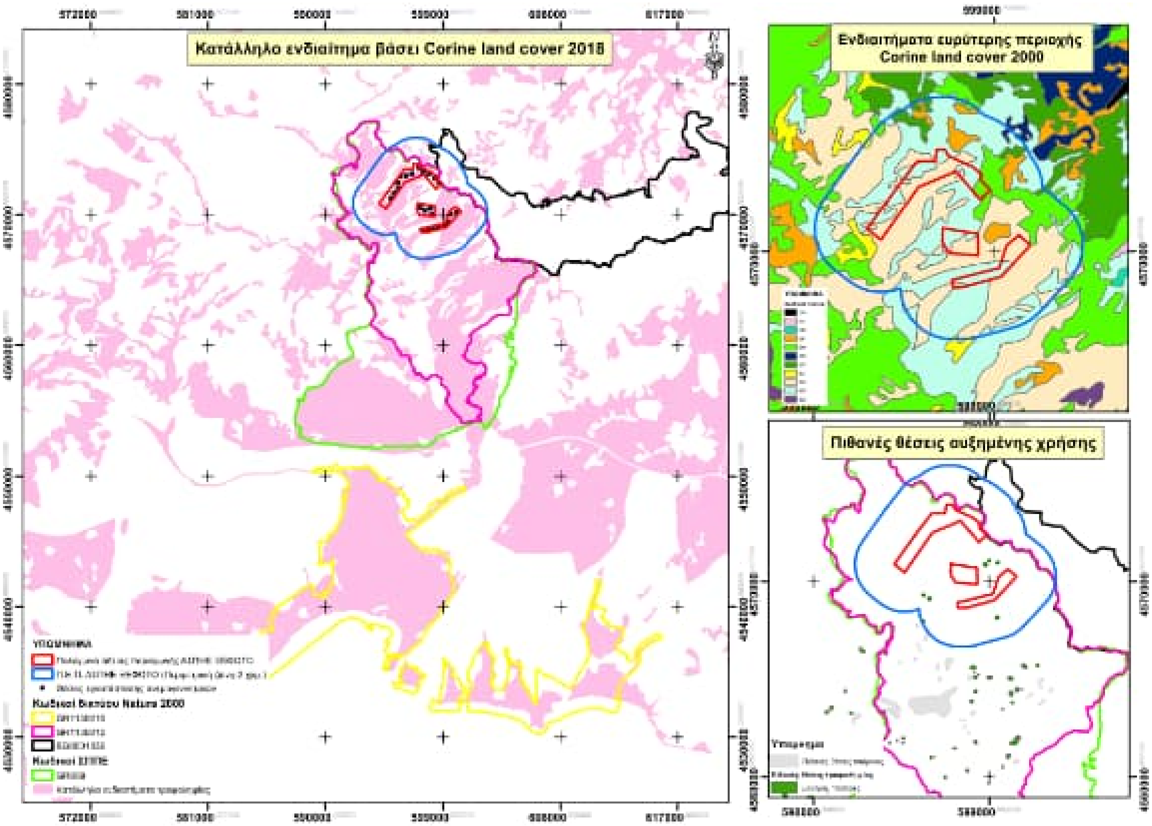
Map 6: Polygonal map of the production license and field survey area of the ASPHE under study at the XEFOTO site.



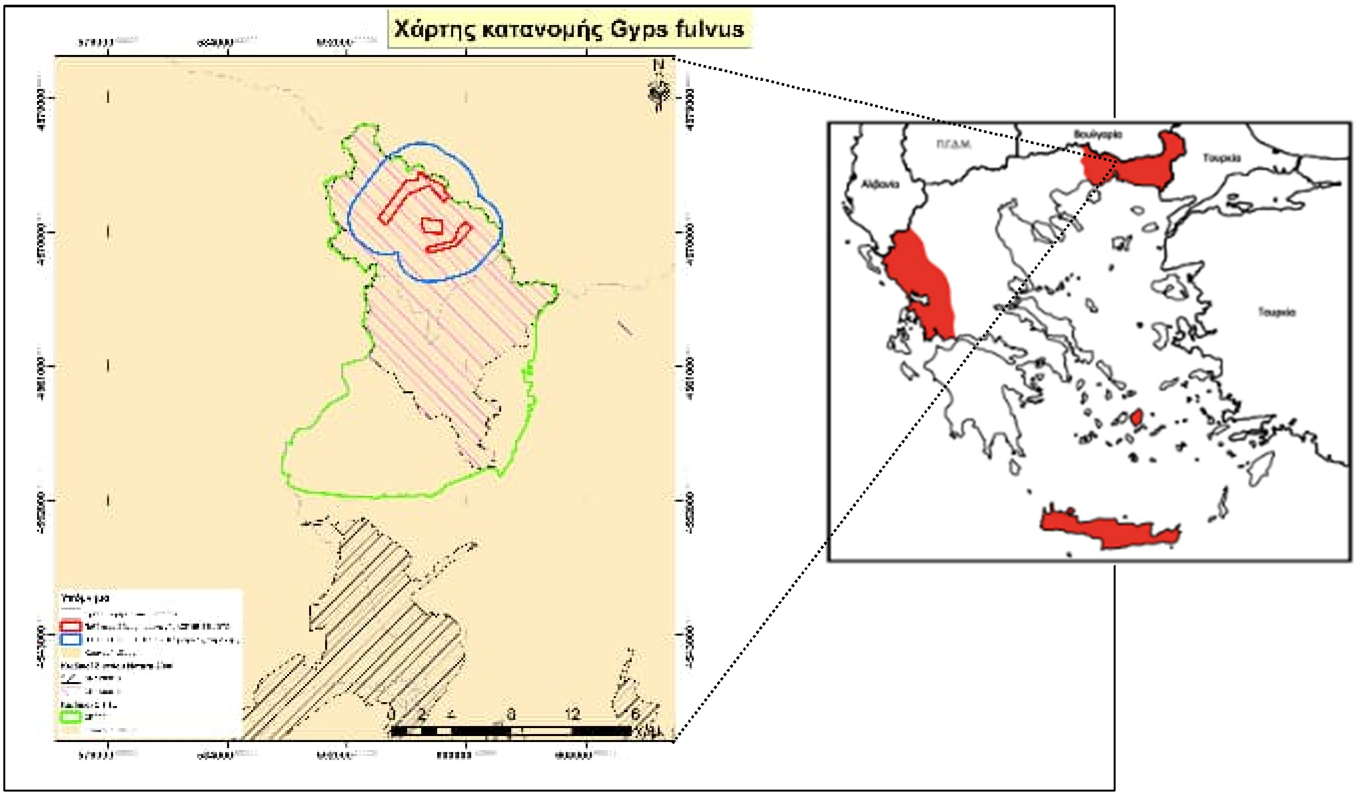
Map 7: Land use map of the study area, according to the land cover database and mapping (Corine land cover 2018).



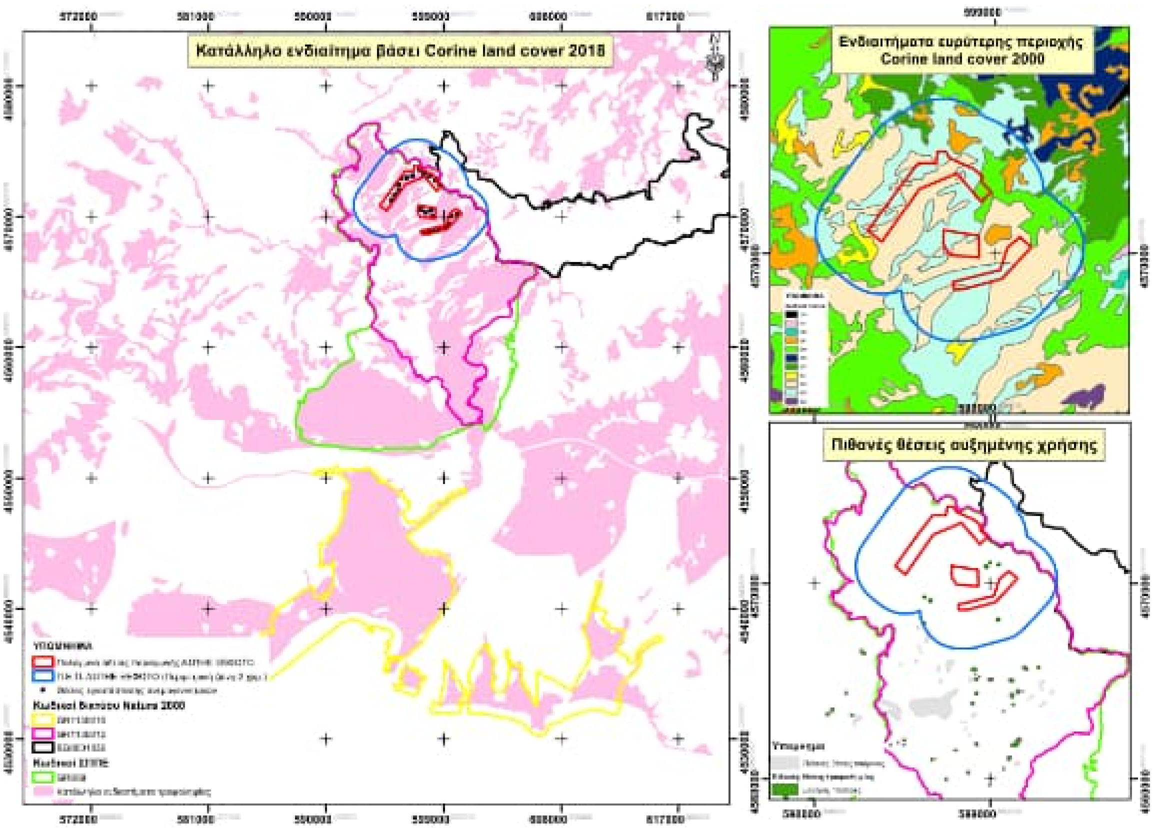
Χάρτης 8: Χάρτης κατανομής του χρυσαετού (*Aquila chrysaetos*) στην ευρύτερη περιοχή μελέτης



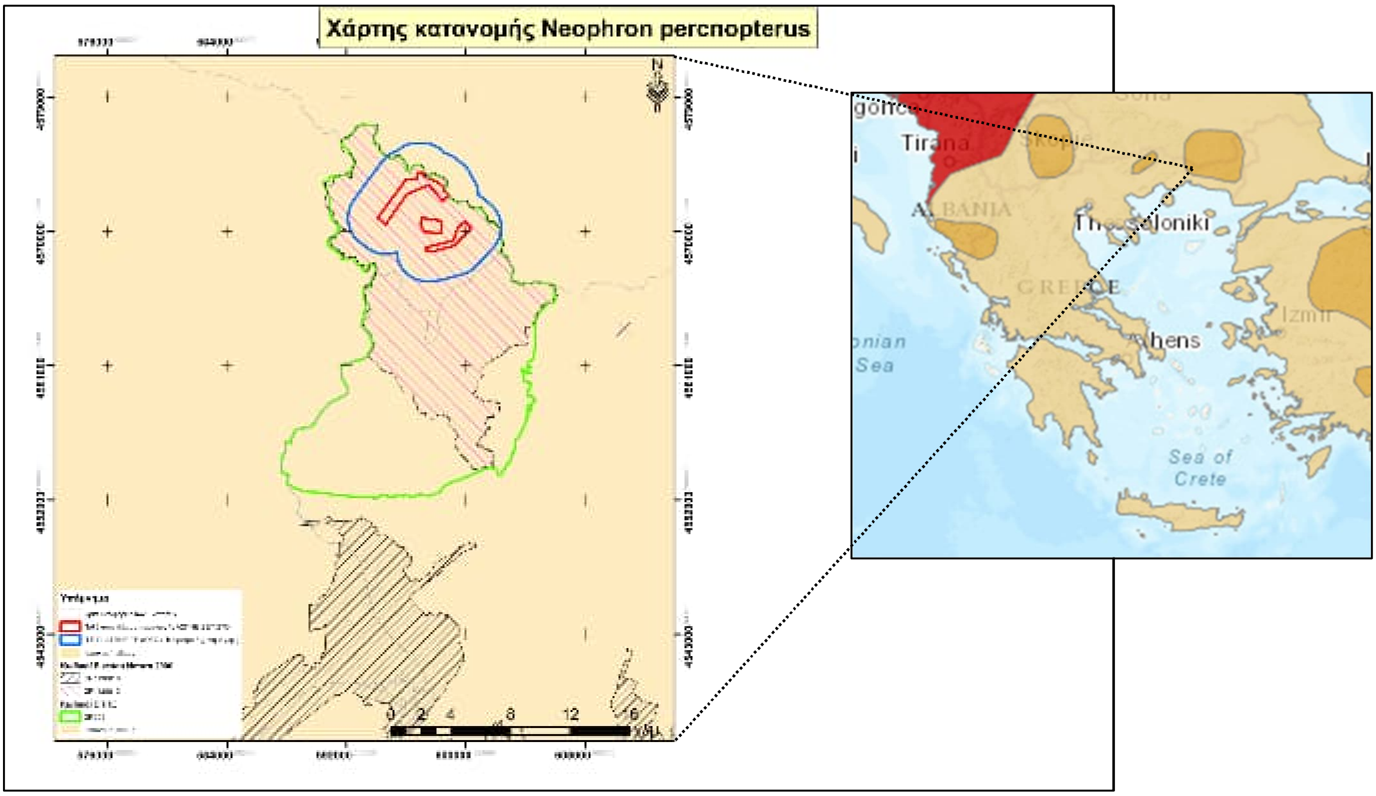
Χάρτης 9: Χάρτης ενδιαιτημάτων του χρυσαετού (*Aquila chrysaetos*) στην ευρύτερη περιοχή μελέτης



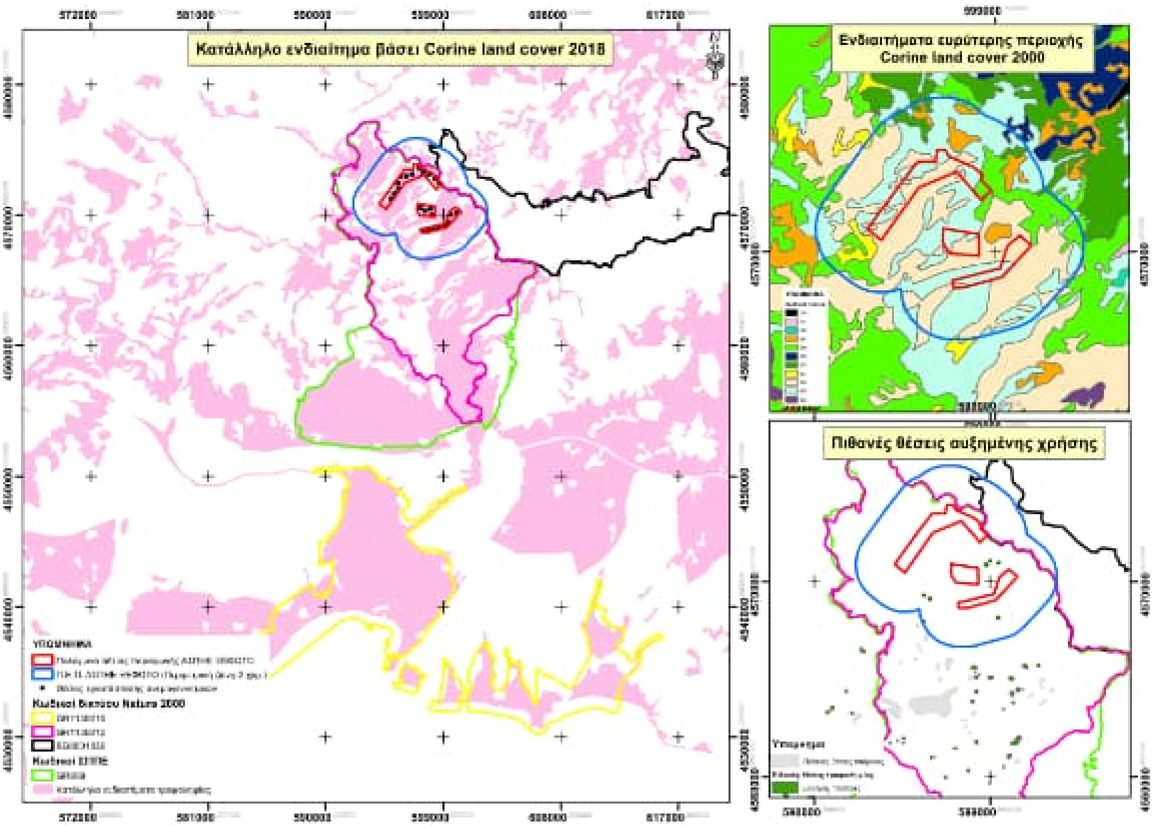
Χάρτης 10: Χάρτης κατανομής του ορνίου (*Gyps fulvus*) στην ευρύτερη περιοχή μελέτης



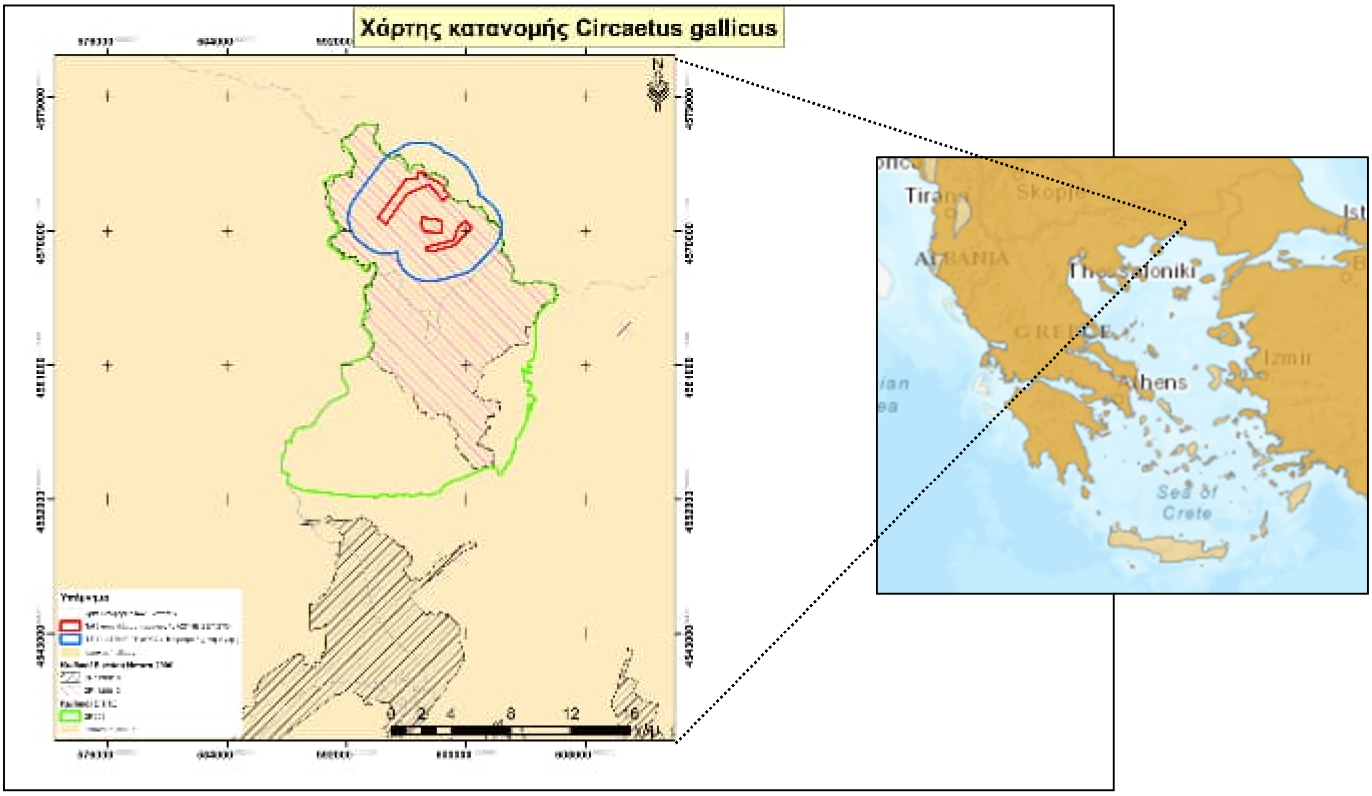
Χάρτης 11: Χάρτης ενδιαιτημάτων του ορνίου (*Gyps fulvus*) στην ευρύτερη περιοχή μελέτης



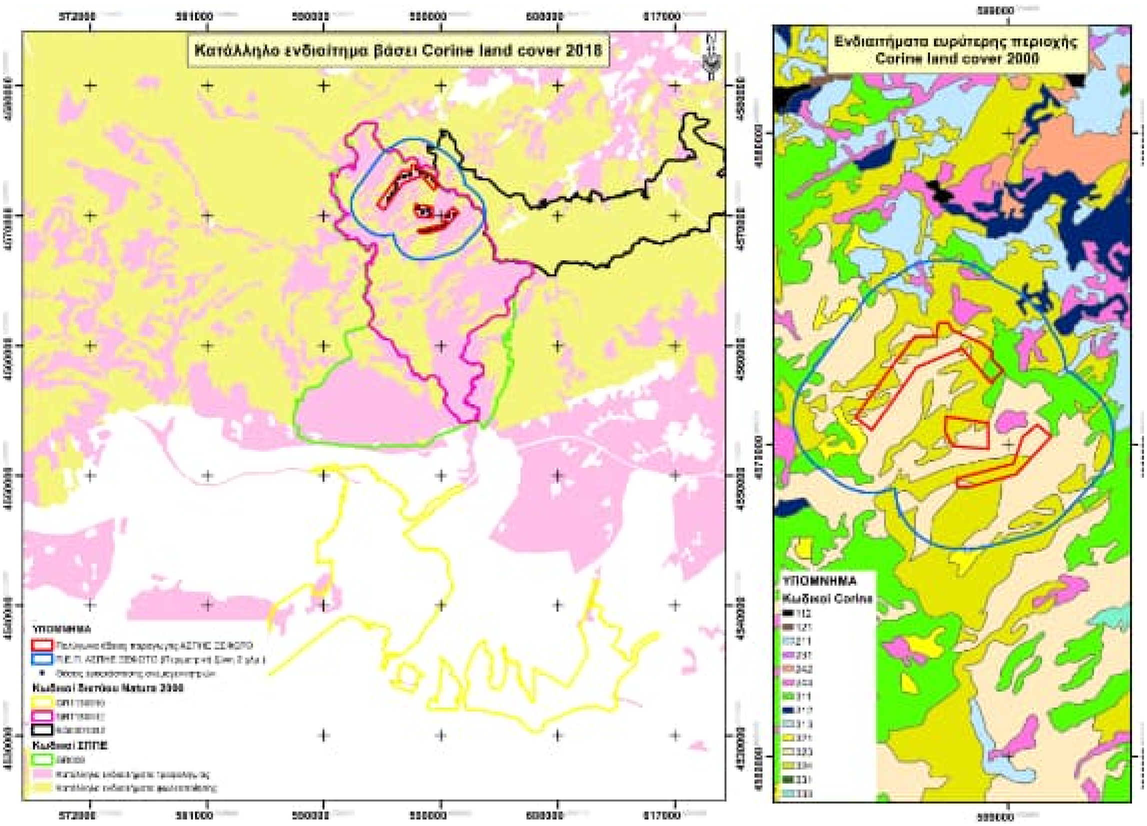
Χάρτης 12: Χάρτης κατανομής του ασπροπάρη (*Neophron percnopterus*) στην ευρύτερη περιοχή μελέτης



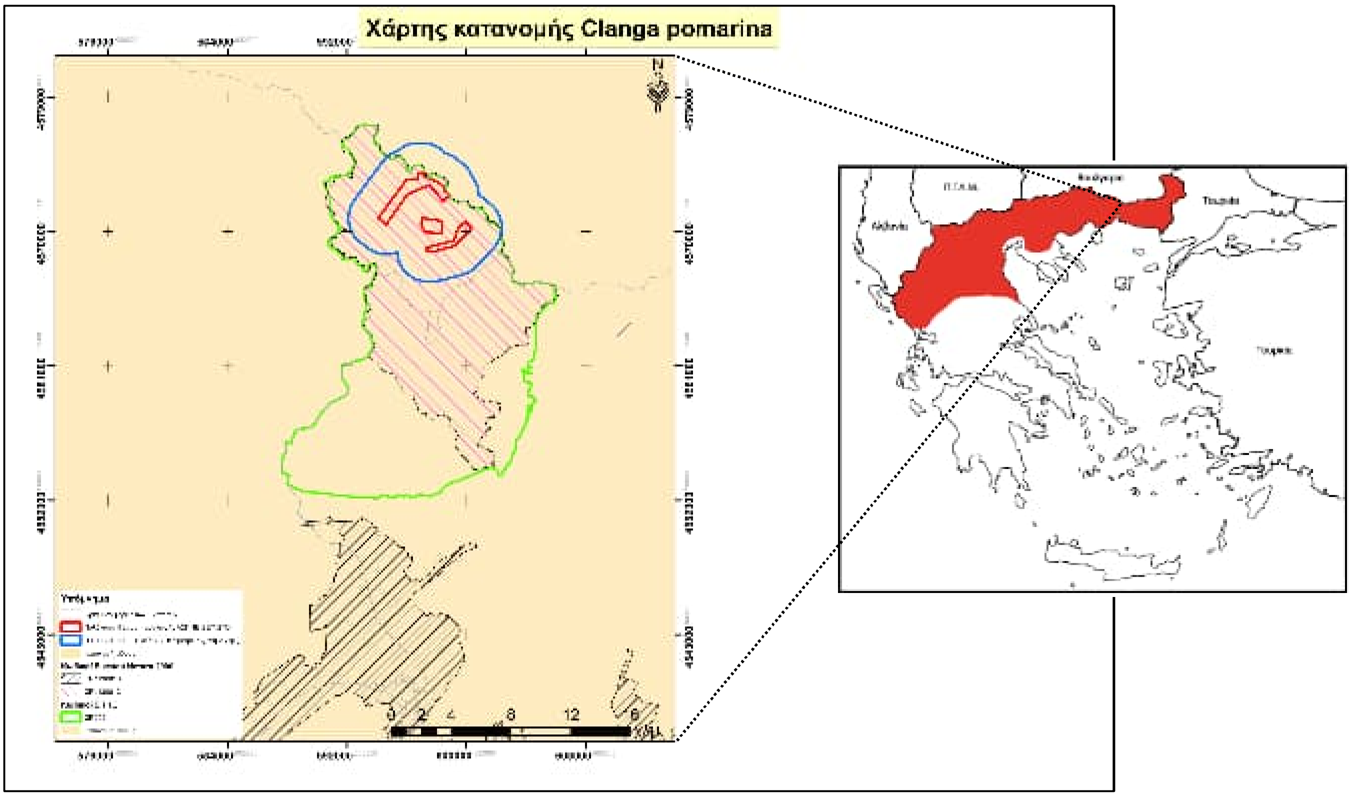
Χάρτης 13: Χάρτης ενδιαιτημάτων του ασπροπάρη (*Neophron percnopterus*) στην ευρύτερη περιοχή μελέτης



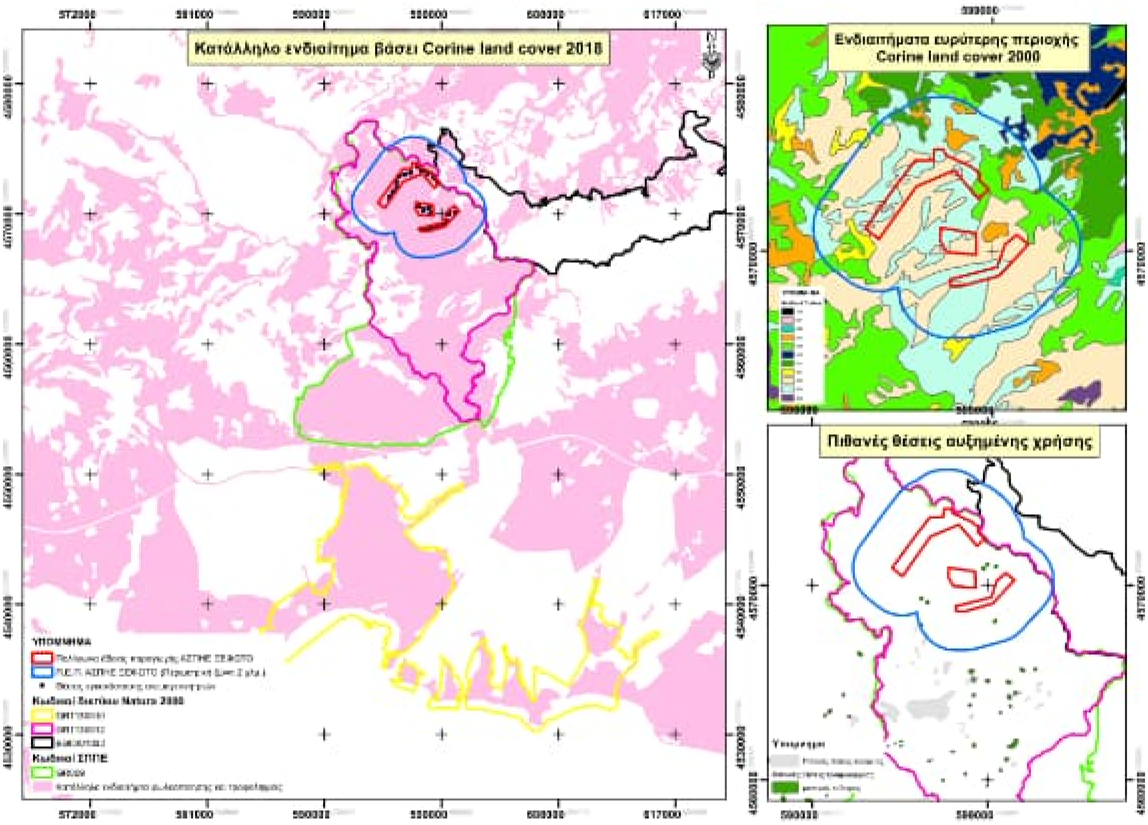
Χάρτης 14: Χάρτης κατανομής του φιδαετού (*Circaetus gallicus*) στην ευρύτερη περιοχή μελέτης



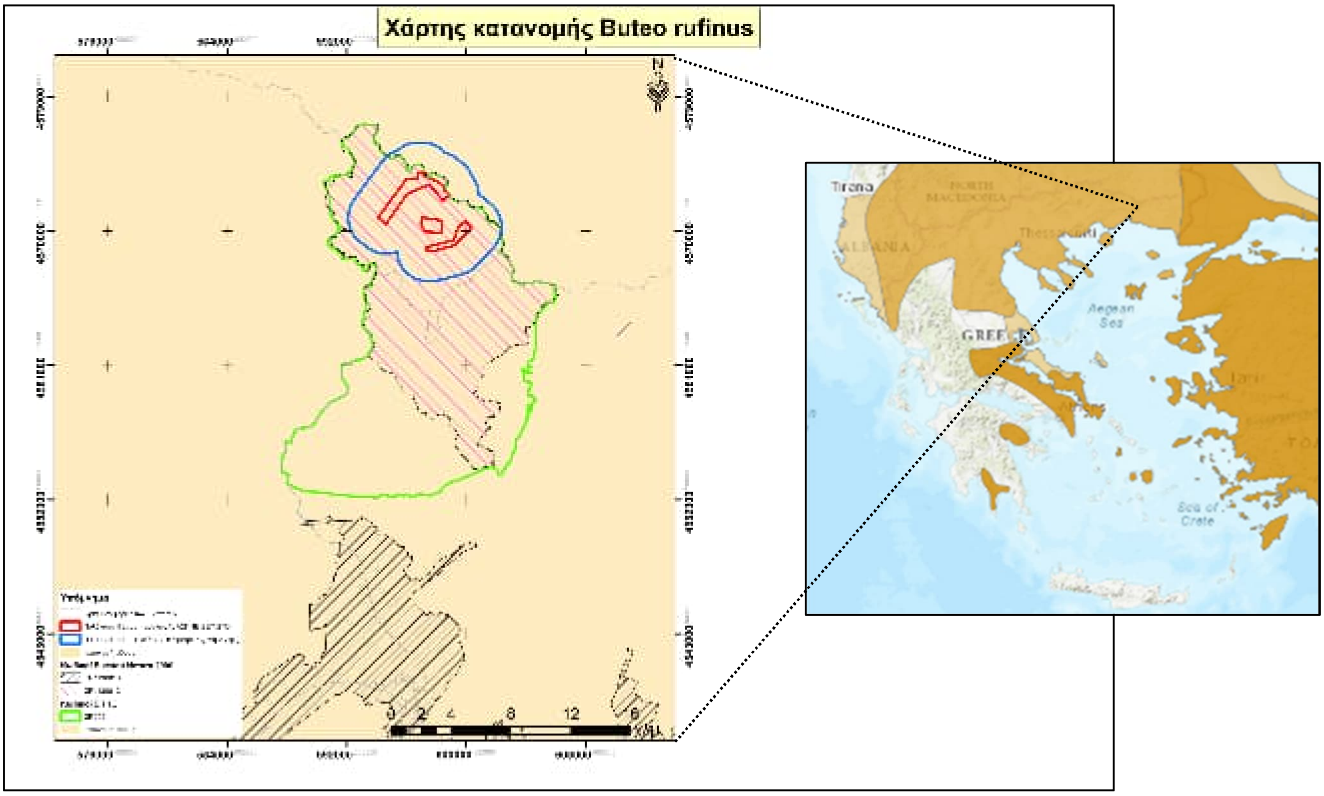
Χάρτης 15: Χάρτης ενδιαιτημάτων του φιδαετού (*Circaetus gallicus*) στην ευρύτερη περιοχή μελέτης



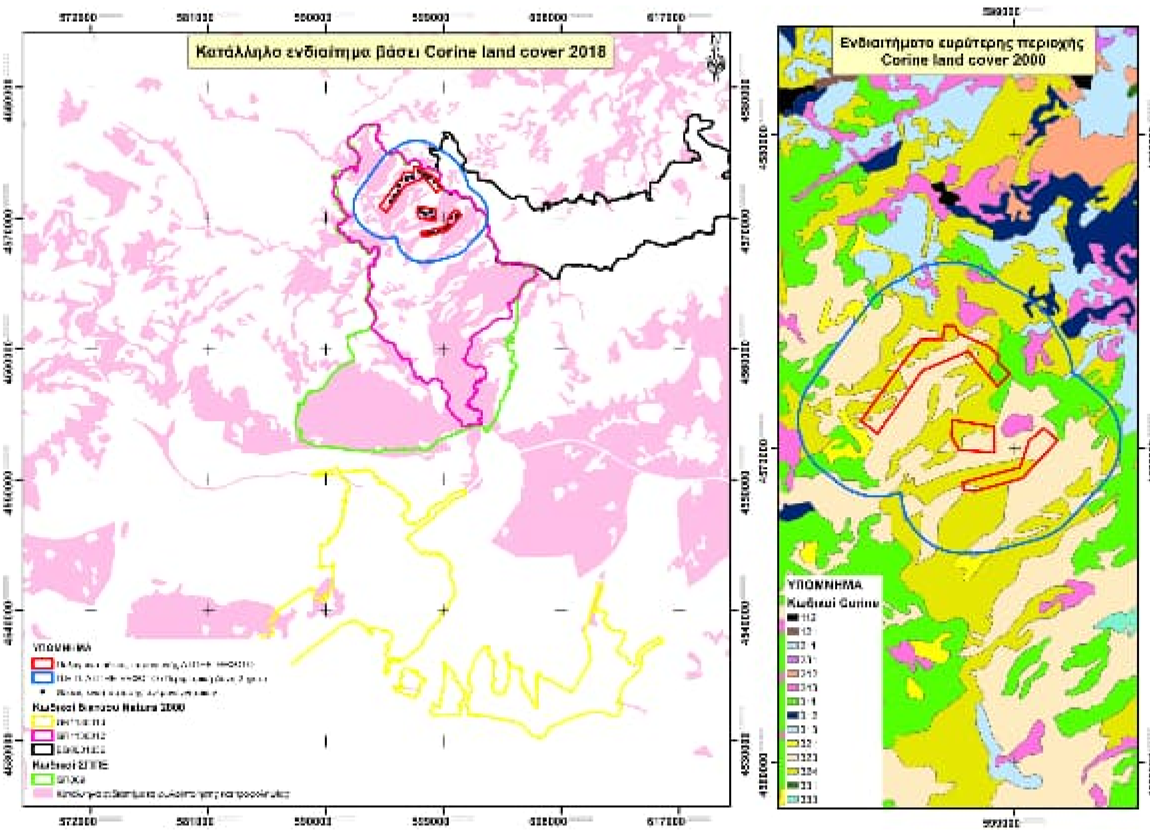
Χάρτης 16: Χάρτης κατανομής του κραυγαετού (*Clanga pomarina*) στην ευρύτερη περιοχή μελέτης



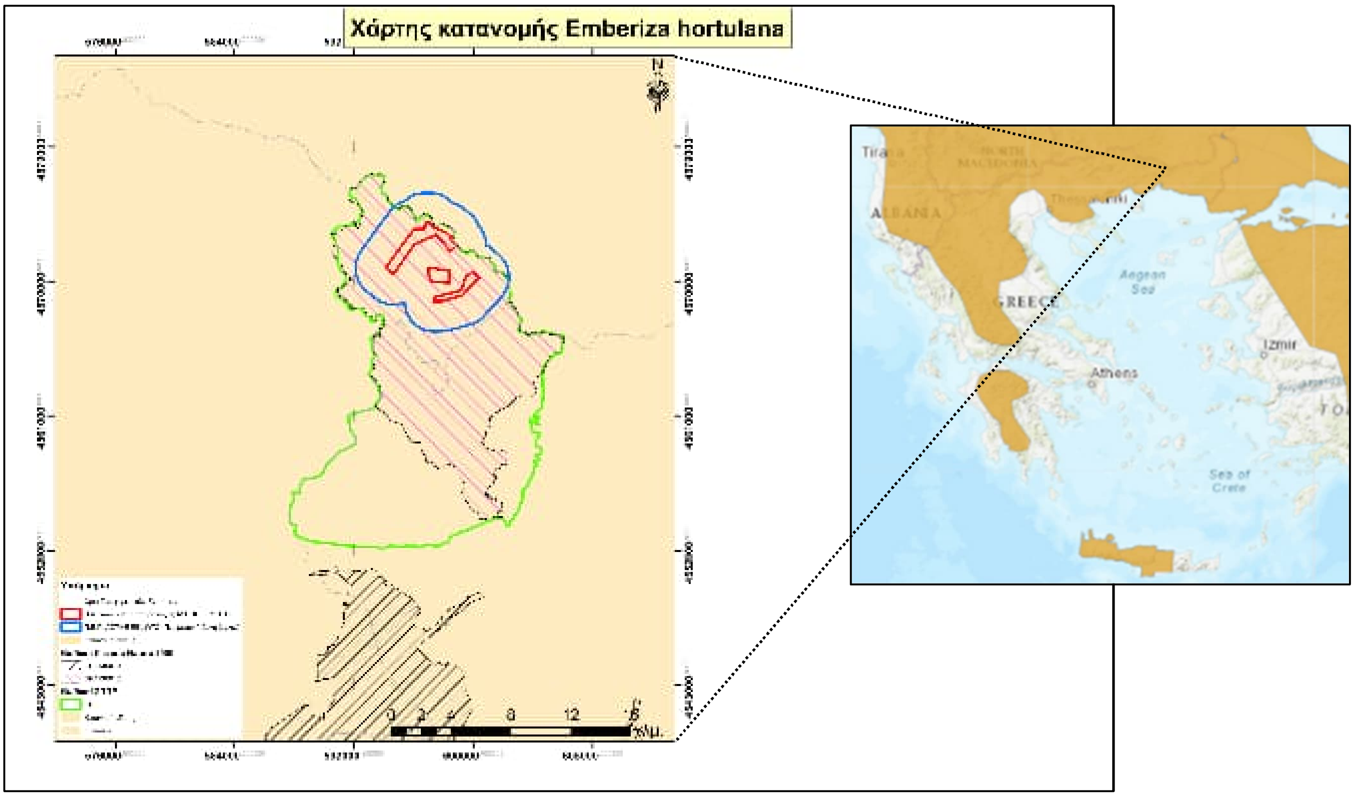
Χάρτης 17: Χάρτης ενδιαιτημάτων του κραυγαετού (*Clanga pomarina*) στην ευρύτερη περιοχή μελέτης



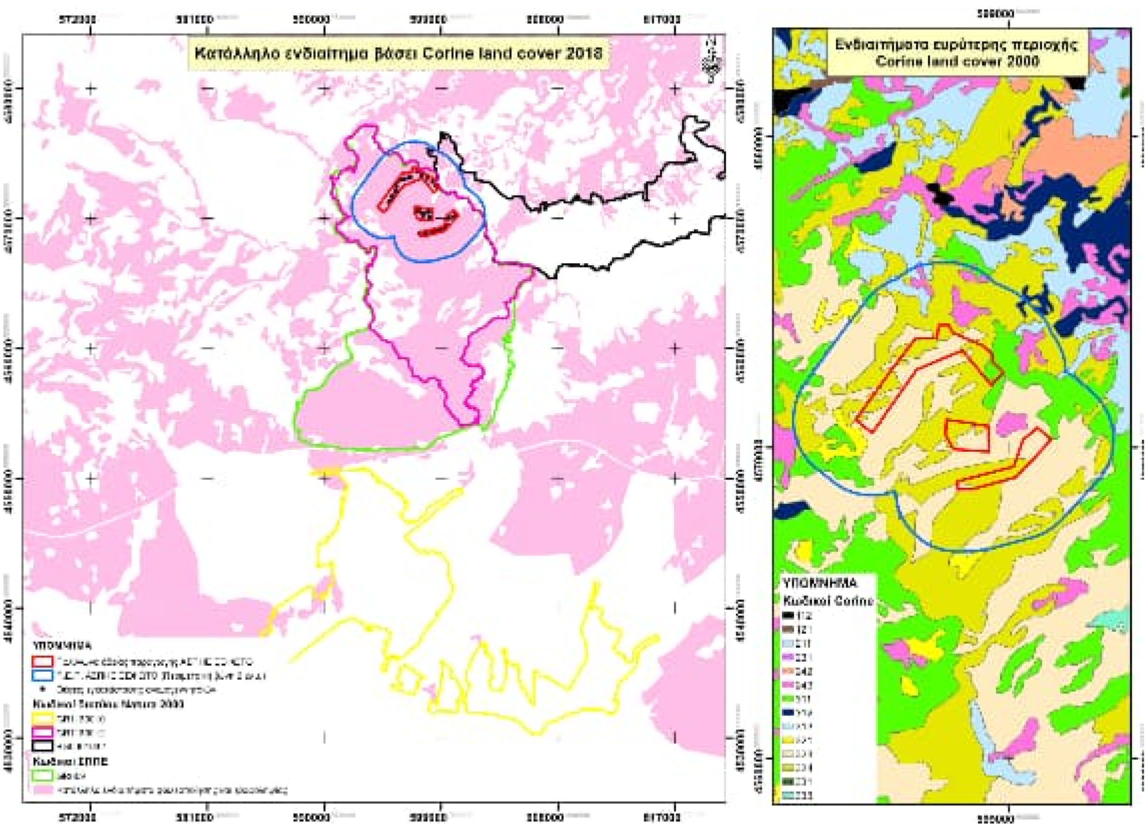
Χάρτης 18: Χάρτης κατανομής της αετογερακίνας (*Buteo rufinus*) στην ευρύτερη περιοχή μελέτης



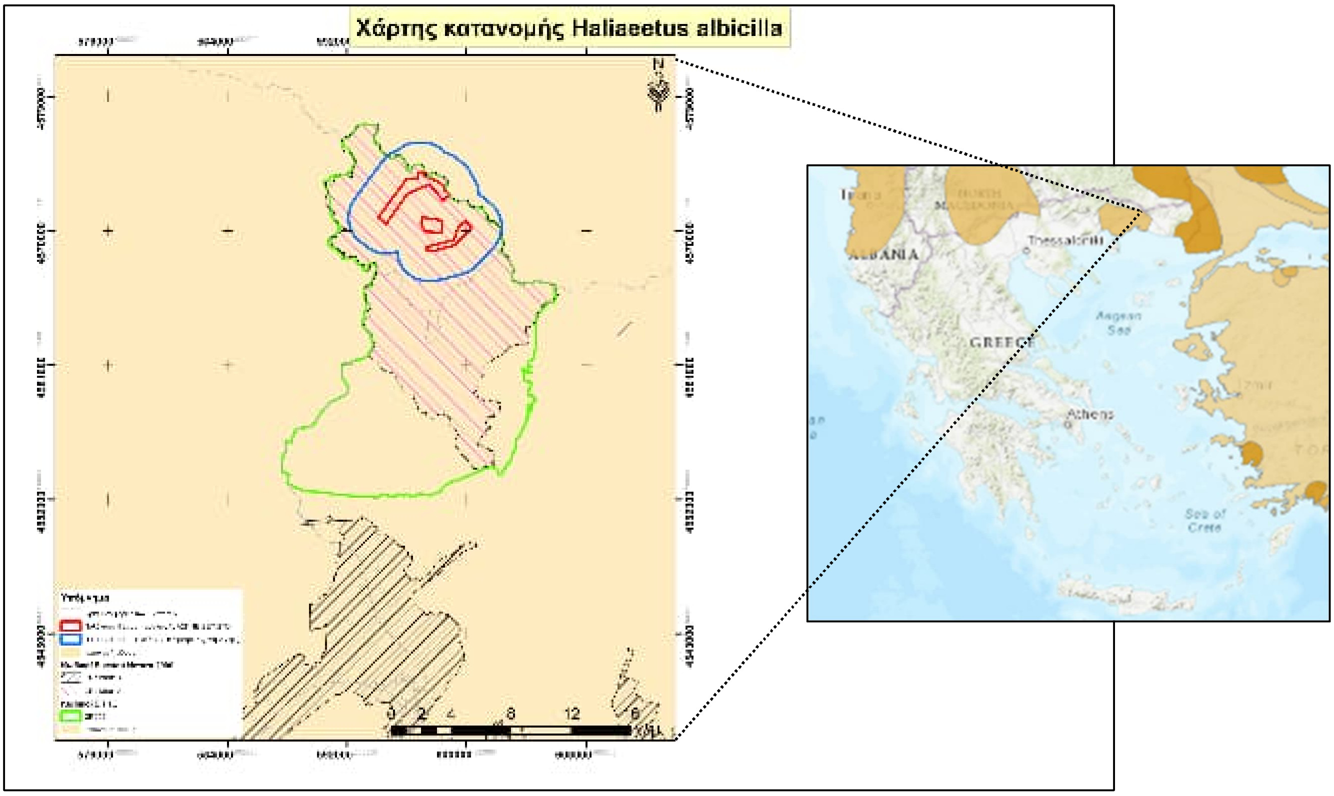
Χάρτης 19: Χάρτης ενδιαιτημάτων της αετογερακίνας (*Buteo rufinus*) στην ευρύτερη περιοχή μελέτης



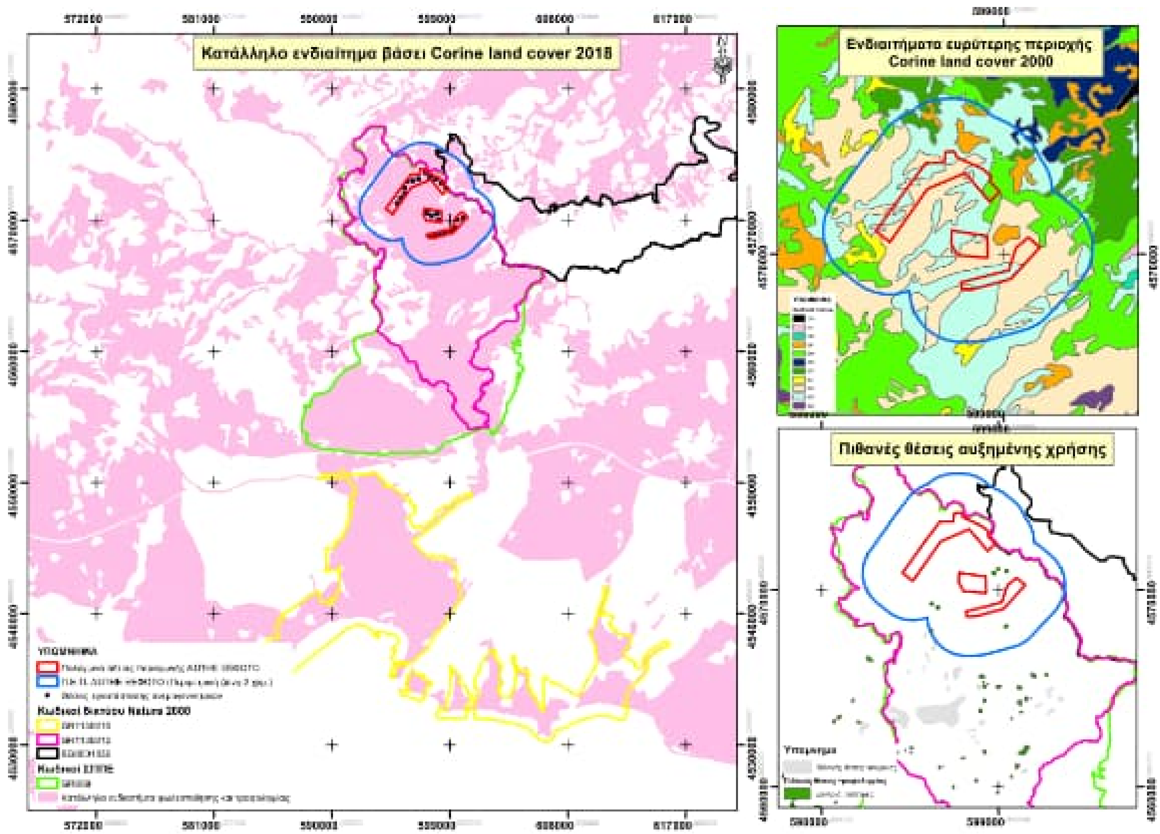
Χάρτης 20: Χάρτης κατανομής του βλαχοτσίχλονου (*Emberiza hortulana*) στην ευρύτερη περιοχή μελέτης



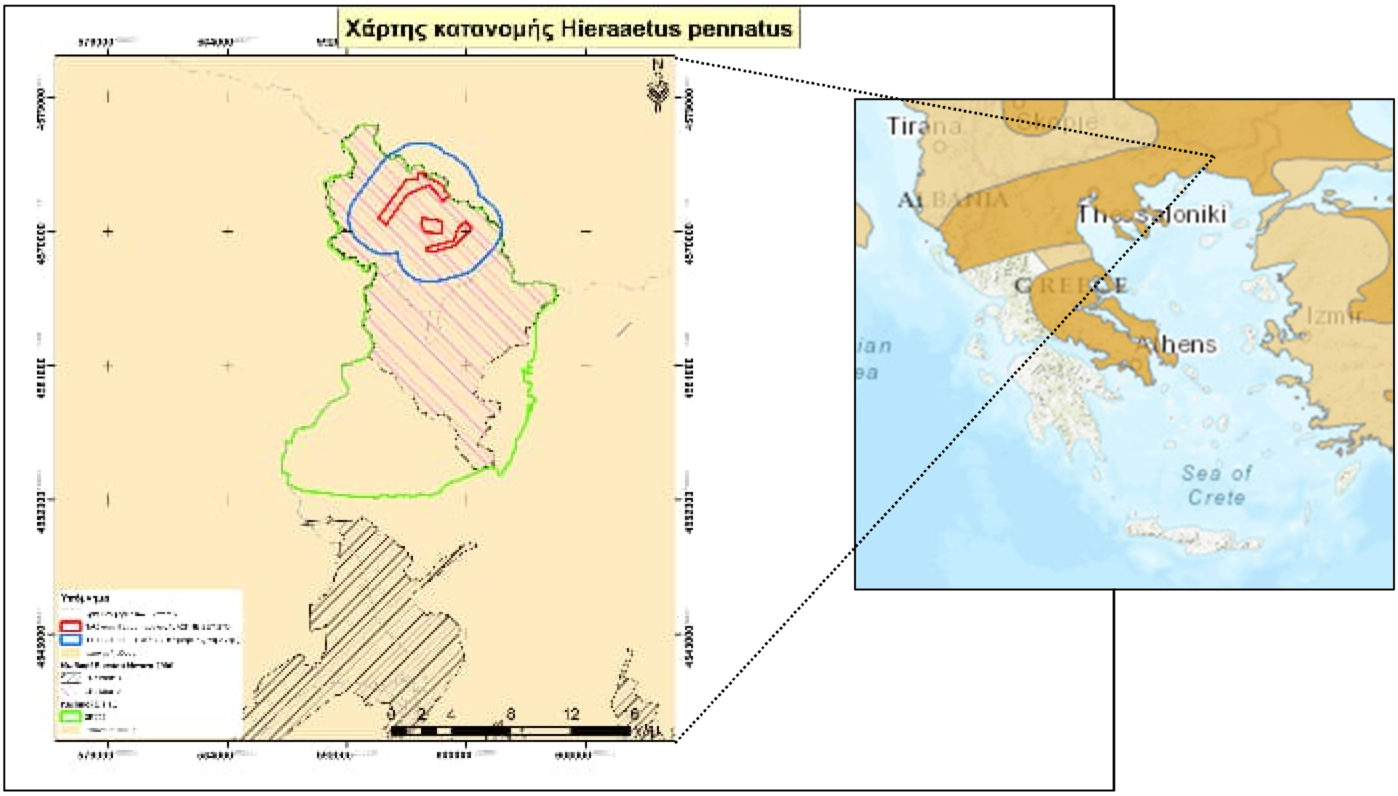
Χάρτης 21: Χάρτης ενδιαιτημάτων του βλαχοτσίχλονου (*Emberiza hortulana*) στην ευρύτερη περιοχή μελέτης



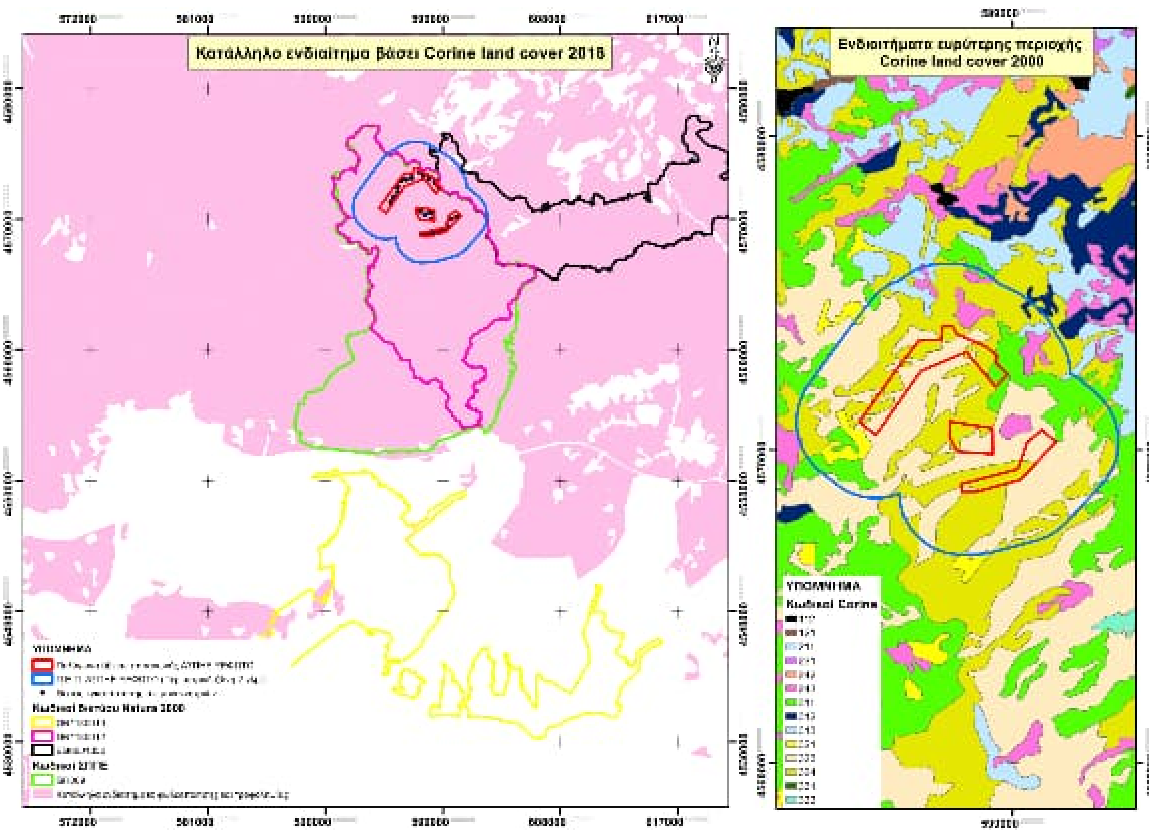
Χάρτης 22: Χάρτης κατανομής του θαλασσαετού (*Haliaeetus albicilla*) στην ευρύτερη περιοχή μελέτης



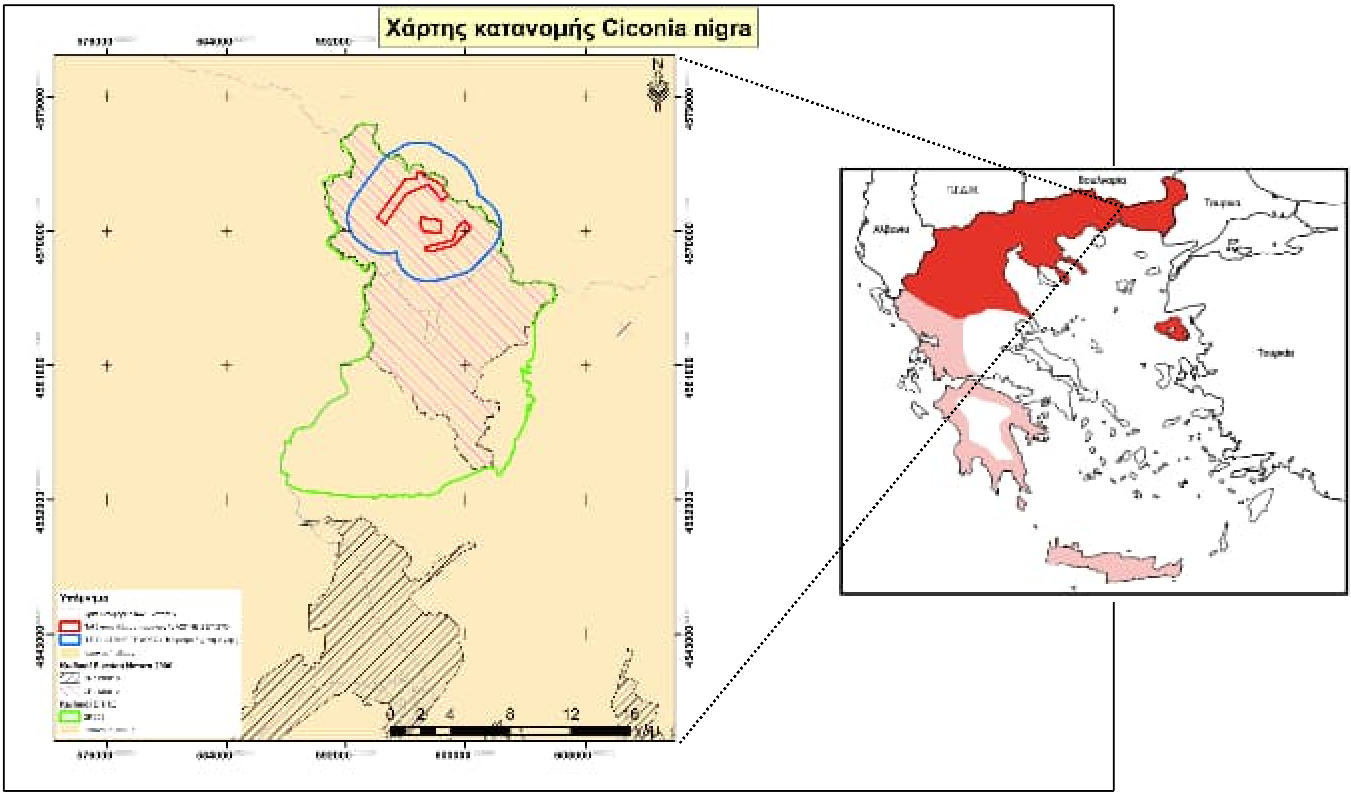
Χάρτης 23: Χάρτης ενδιαιτημάτων του θαλασσαετού (*Haliaeetus albicilla*) στην ευρύτερη περιοχή μελέτης



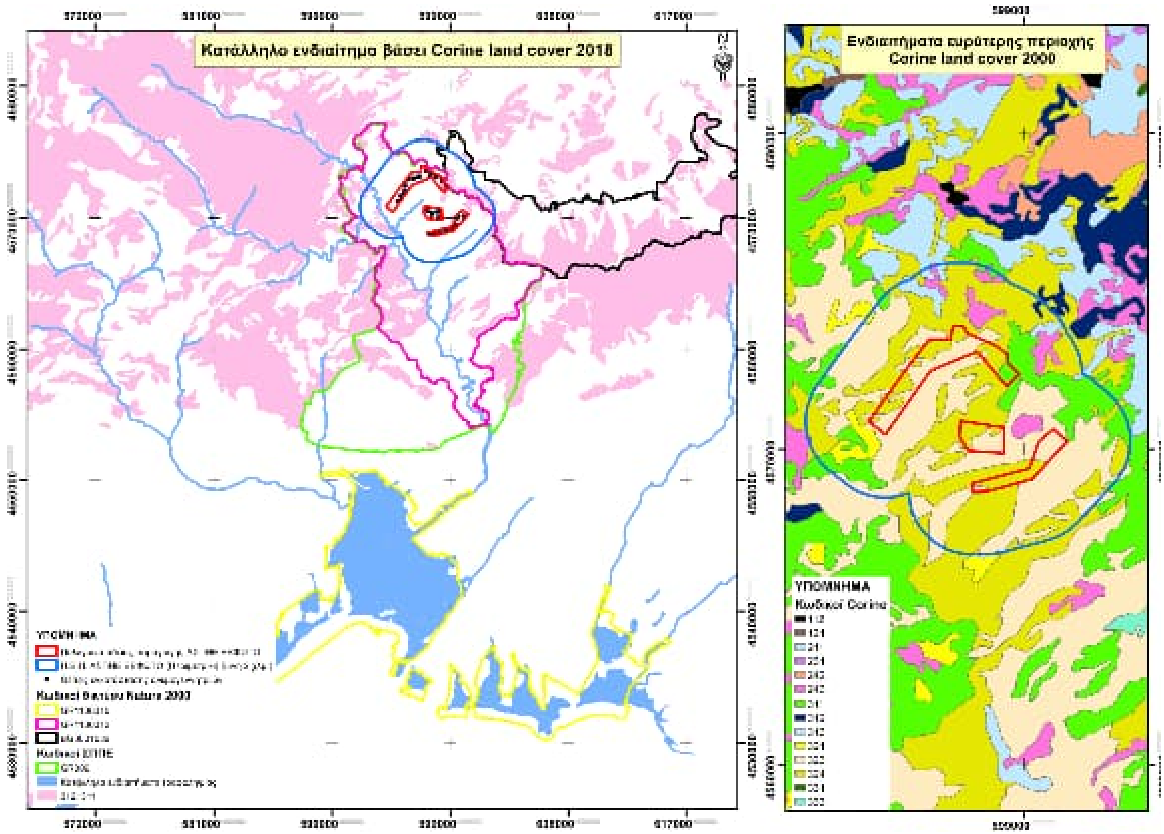
Χάρτης 24: Χάρτης κατανομής του σταυραετού (*Hierraetus pennatus*) στην ευρύτερη περιοχή μελέτης



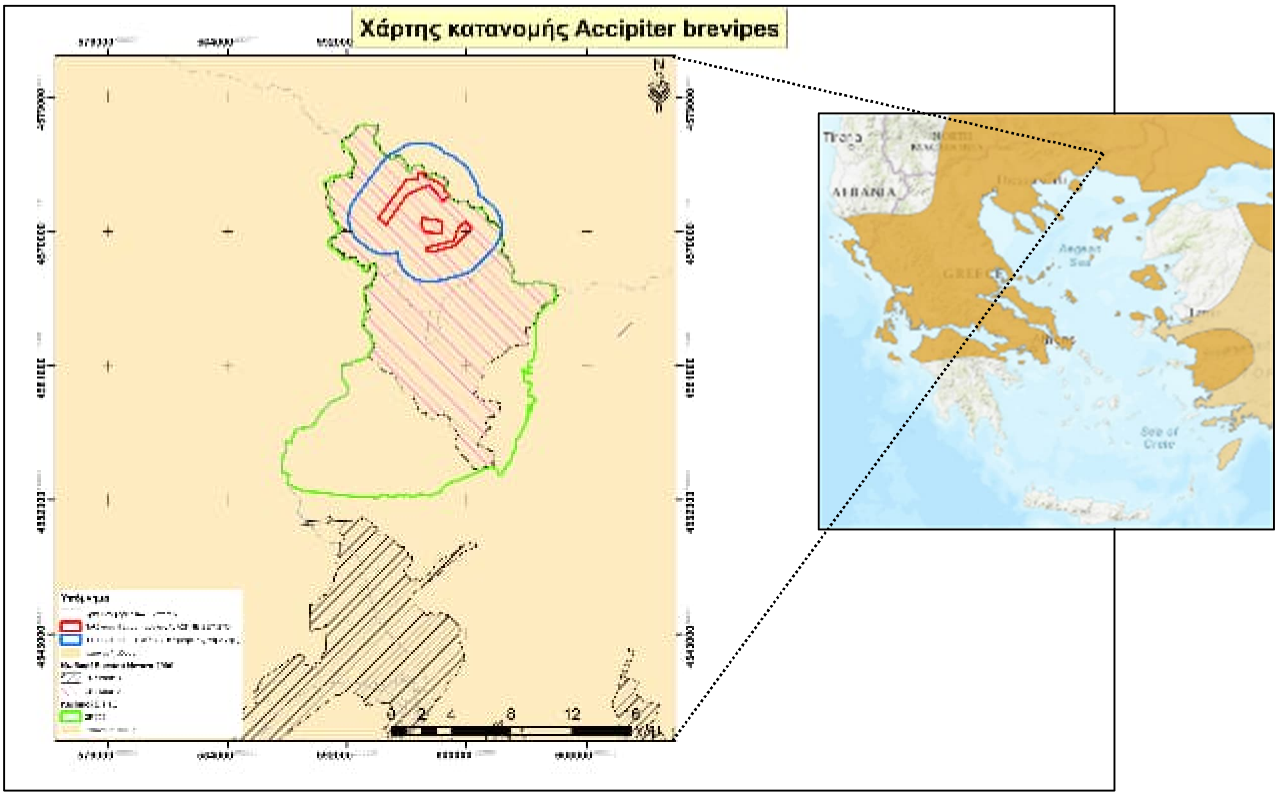
Χάρτης 25: Χάρτης ενδιαιτημάτων του σταυραετού (*Hierraetus pennatus*) στην ευρύτερη περιοχή μελέτης



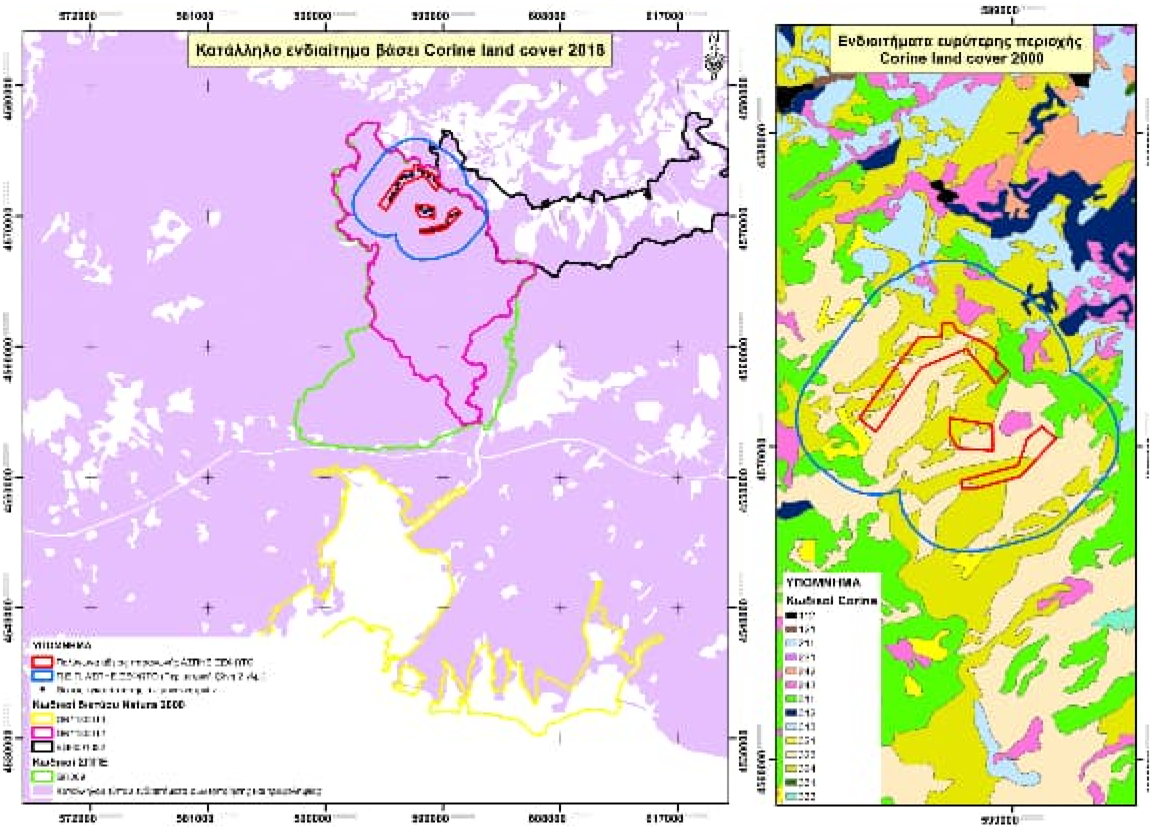
Χάρτης 26: Χάρτης κατανομής του μαυροπελαργού (*Ciconia nigra)* στην ευρύτερη περιοχή μελέτης



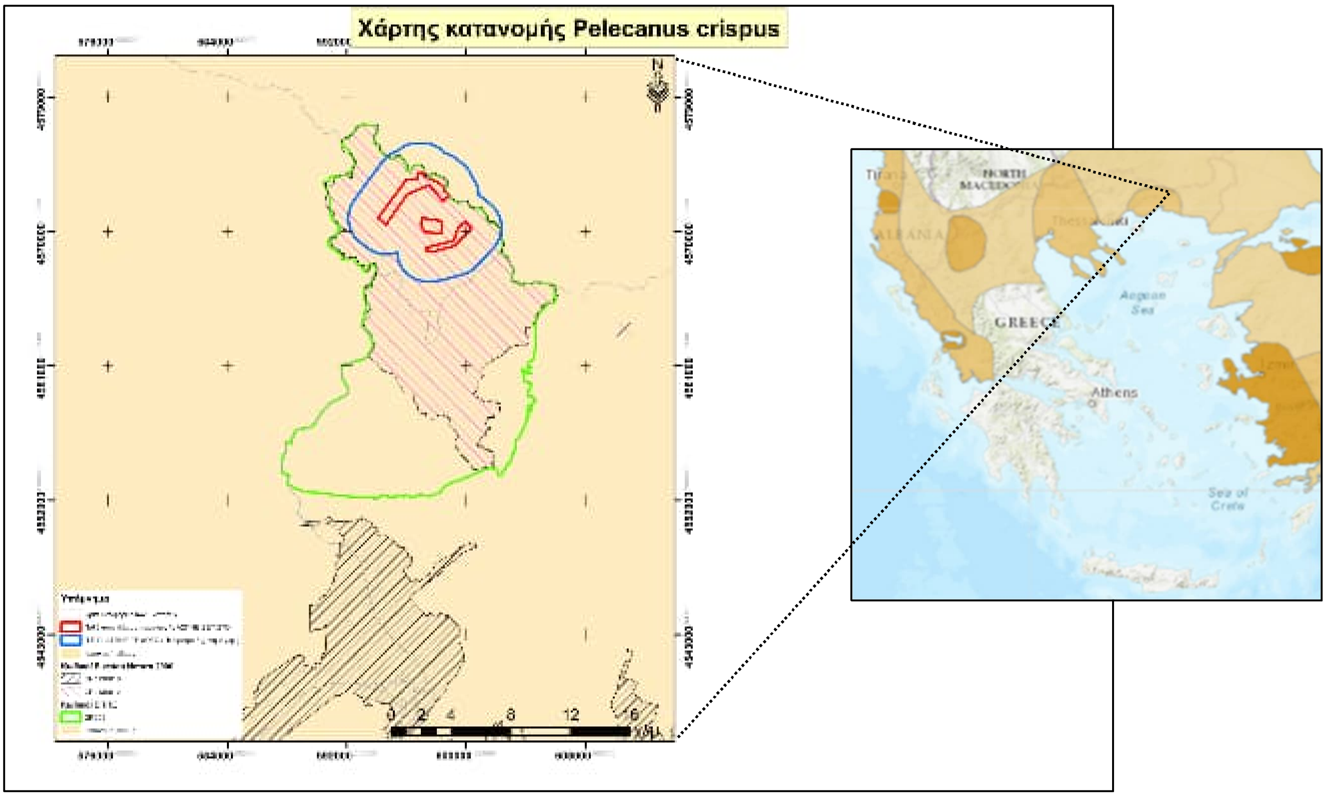
Χάρτης 27: Χάρτης ενδιαιτημάτων του μαυροπελαργού (*Ciconia nigra)* στην ευρύτερη περιοχή μελέτης



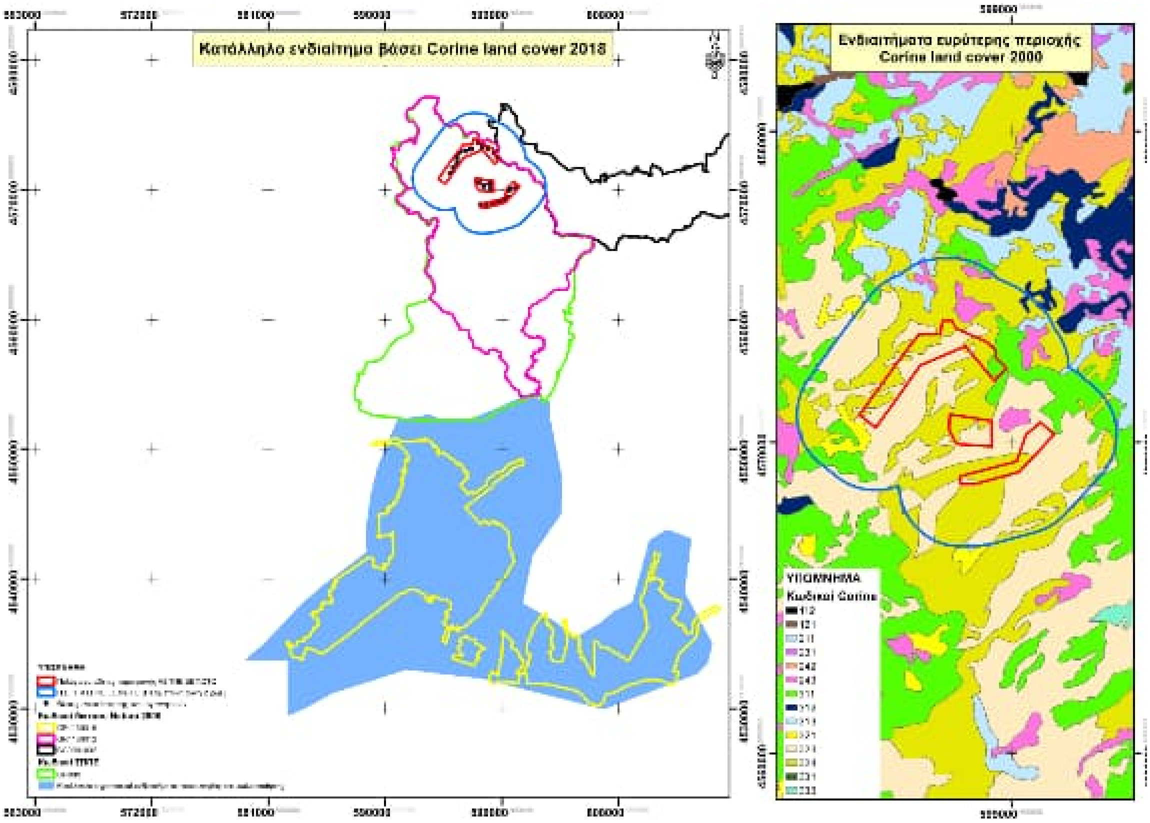
Χάρτης 28: Χάρτης κατανομής του σαϊνιού (*Accipiter brevipes)* στην ευρύτερη περιοχή μελέτης



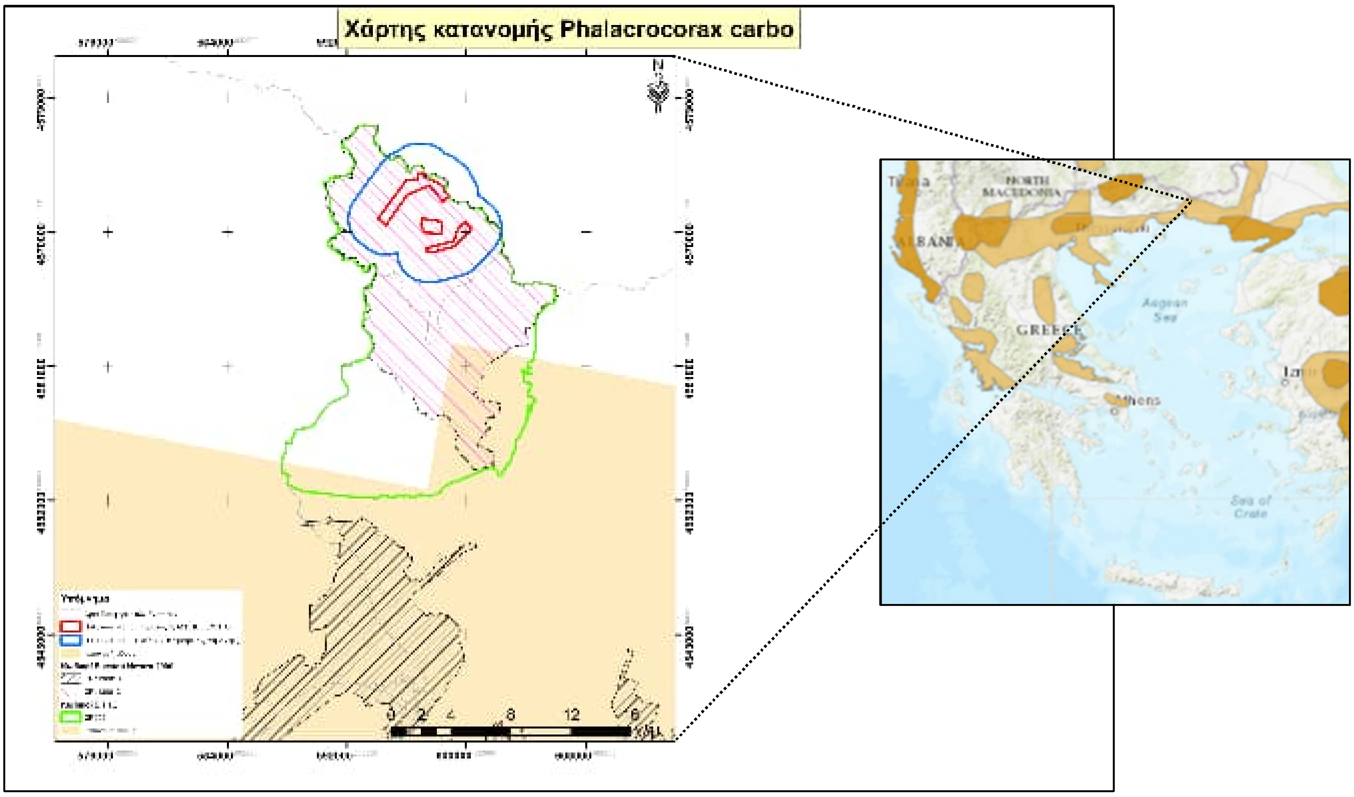
Χάρτης 29: Χάρτης ενδιαιτημάτων του σαϊνιού (*Accipiter brevipes)* στην ευρύτερη περιοχή μελέτης



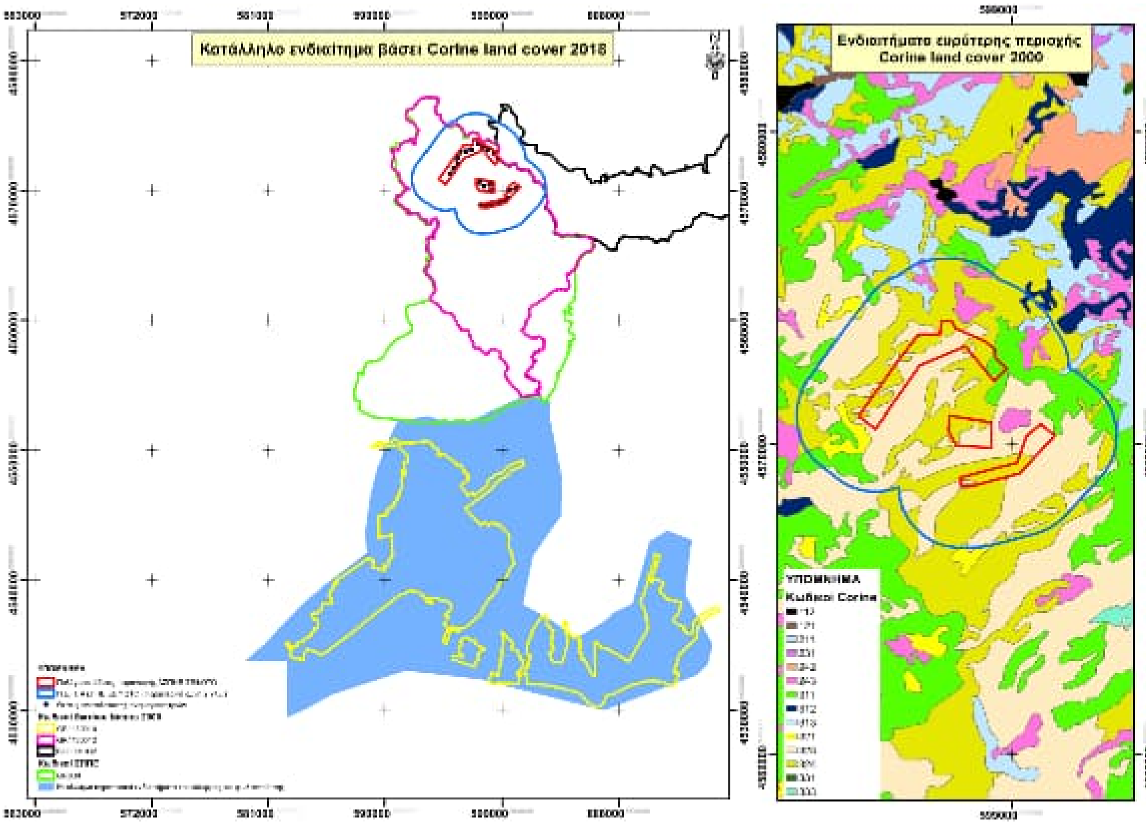
Χάρτης 30: Χάρτης κατανομής του αργυροπελεκάνου (*Pelecanus crispus)* στην ευρύτερη περιοχή μελέτης



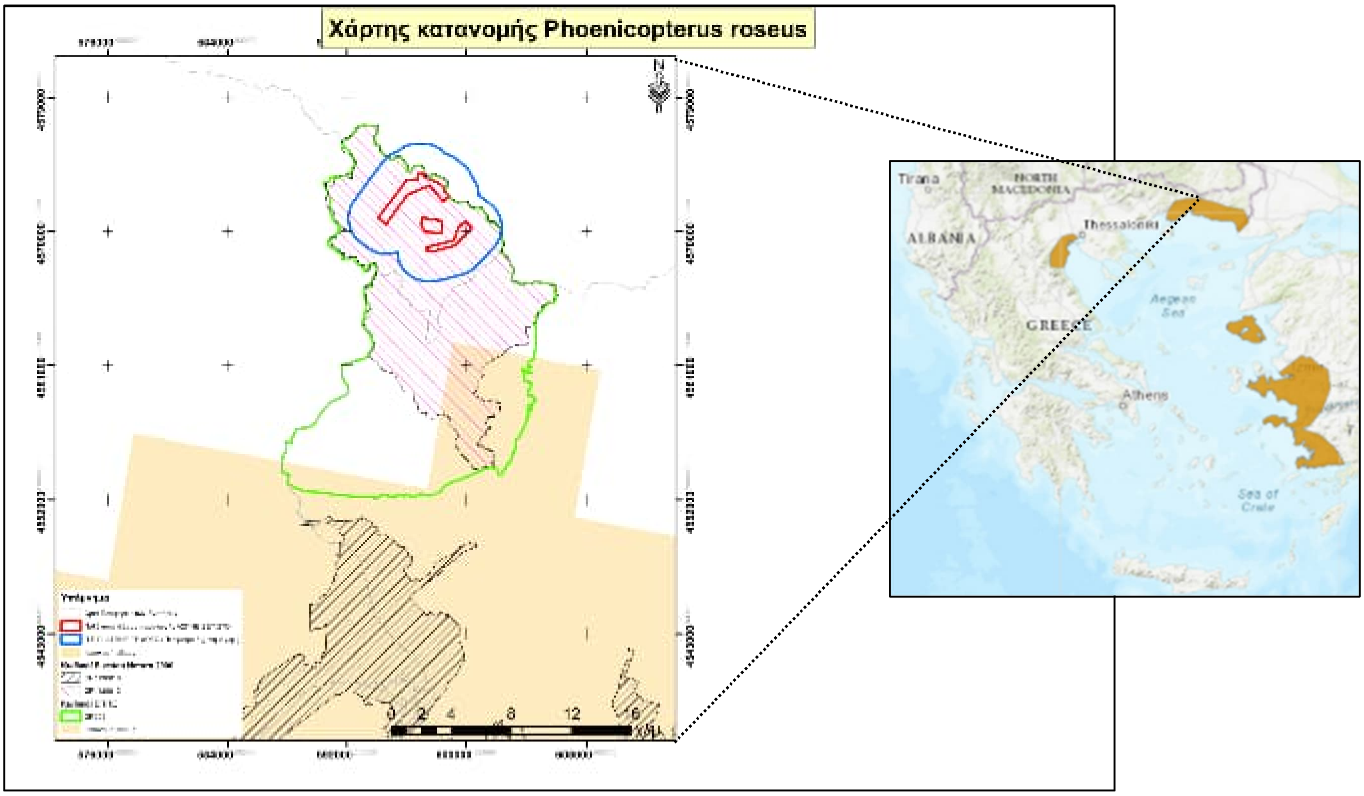
Χάρτης 31: Χάρτης ενδιαιτημάτων του αργυροπελεκάνου (*Pelecanus crispus)* στην ευρύτερη περιοχή μελέτης



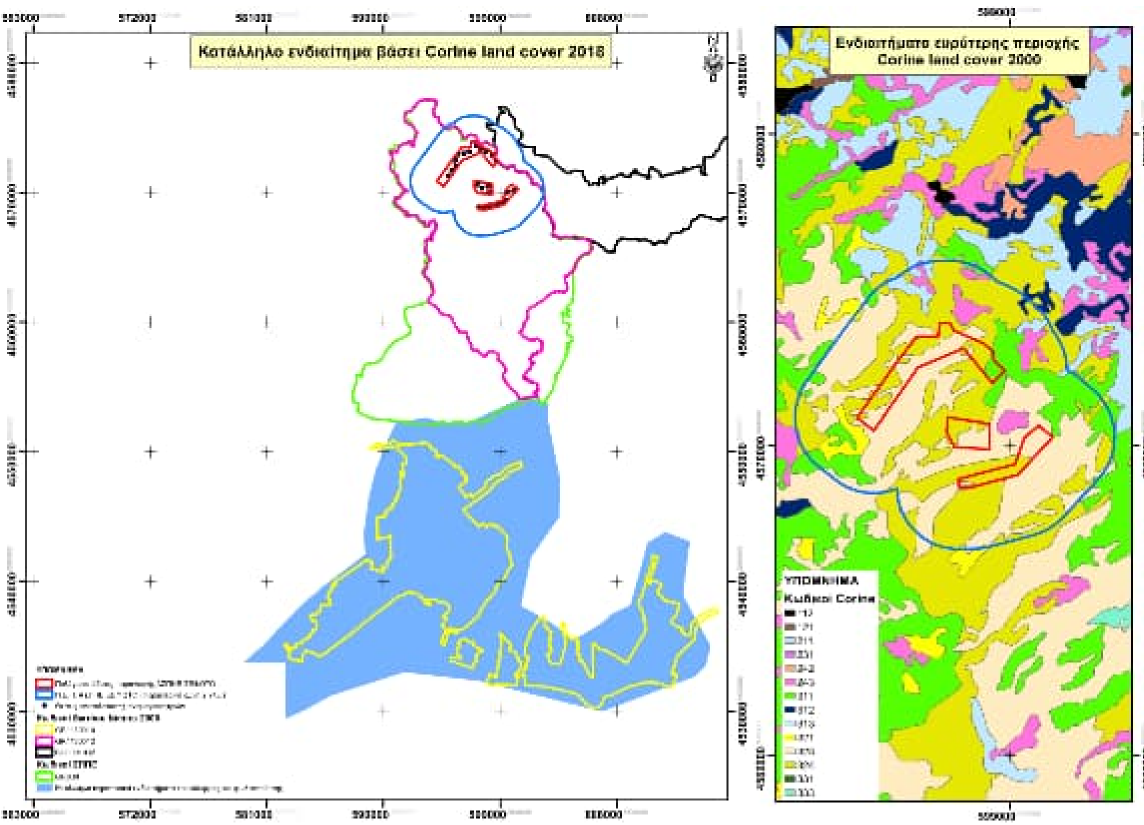
Χάρτης 32: Χάρτης κατανομής του κορμοράνου (*Phalacrocorax carbo*) στην ευρύτερη περιοχή μελέτης



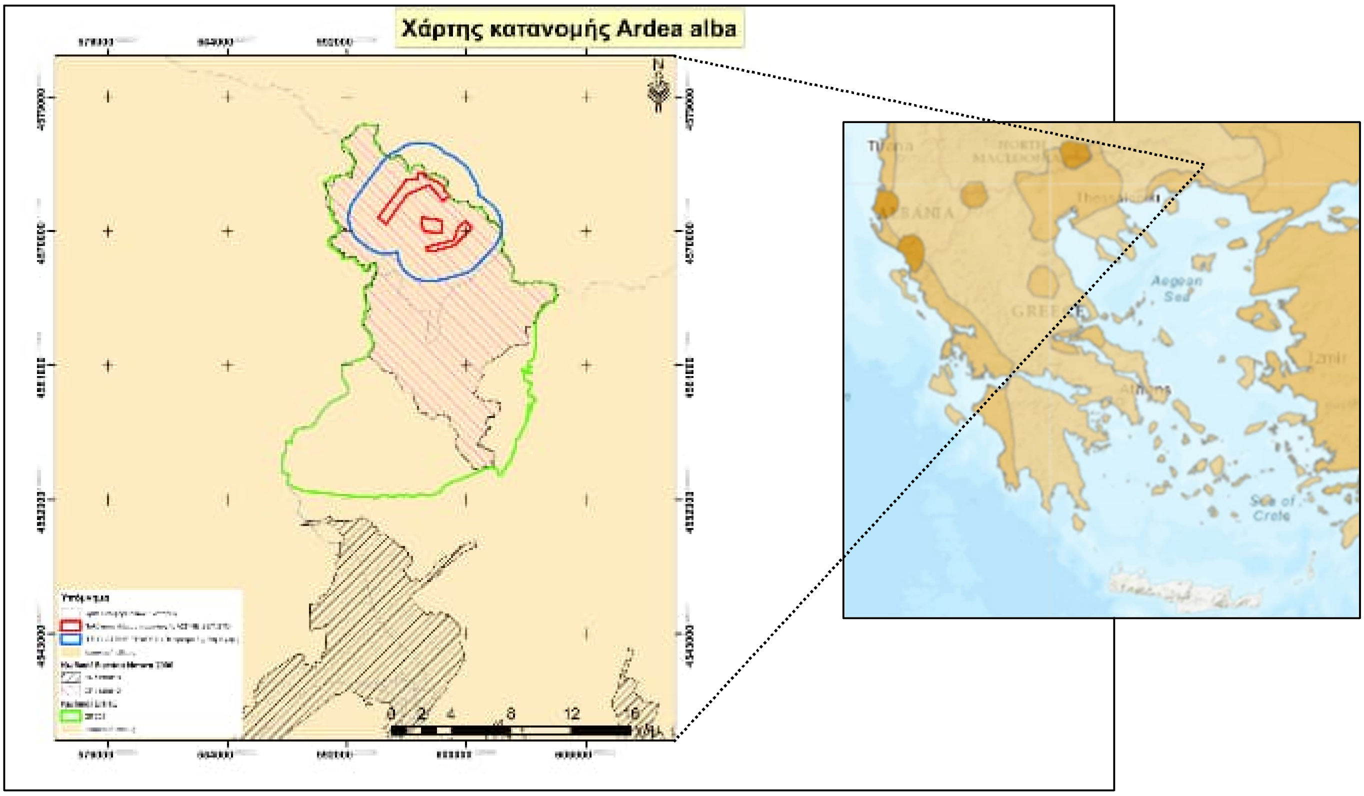
Χάρτης 33: Χάρτης ενδιαιτημάτων του κορμοράνου (*Phalacrocorax carbo*) στην ευρύτερη περιοχή μελέτης



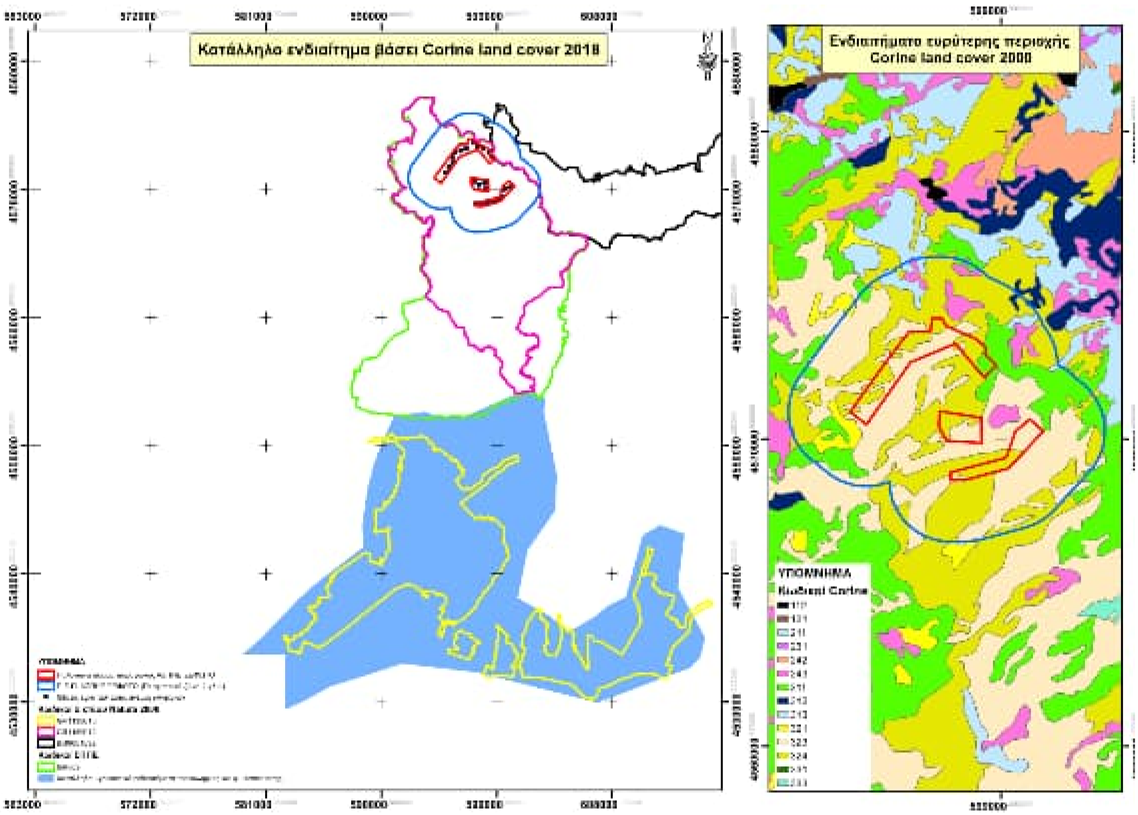
Χάρτης 34: Χάρτης κατανομής του φοινικόπτερου (*Phoenicopterus roseus*) στην ευρύτερη περιοχή μελέτης



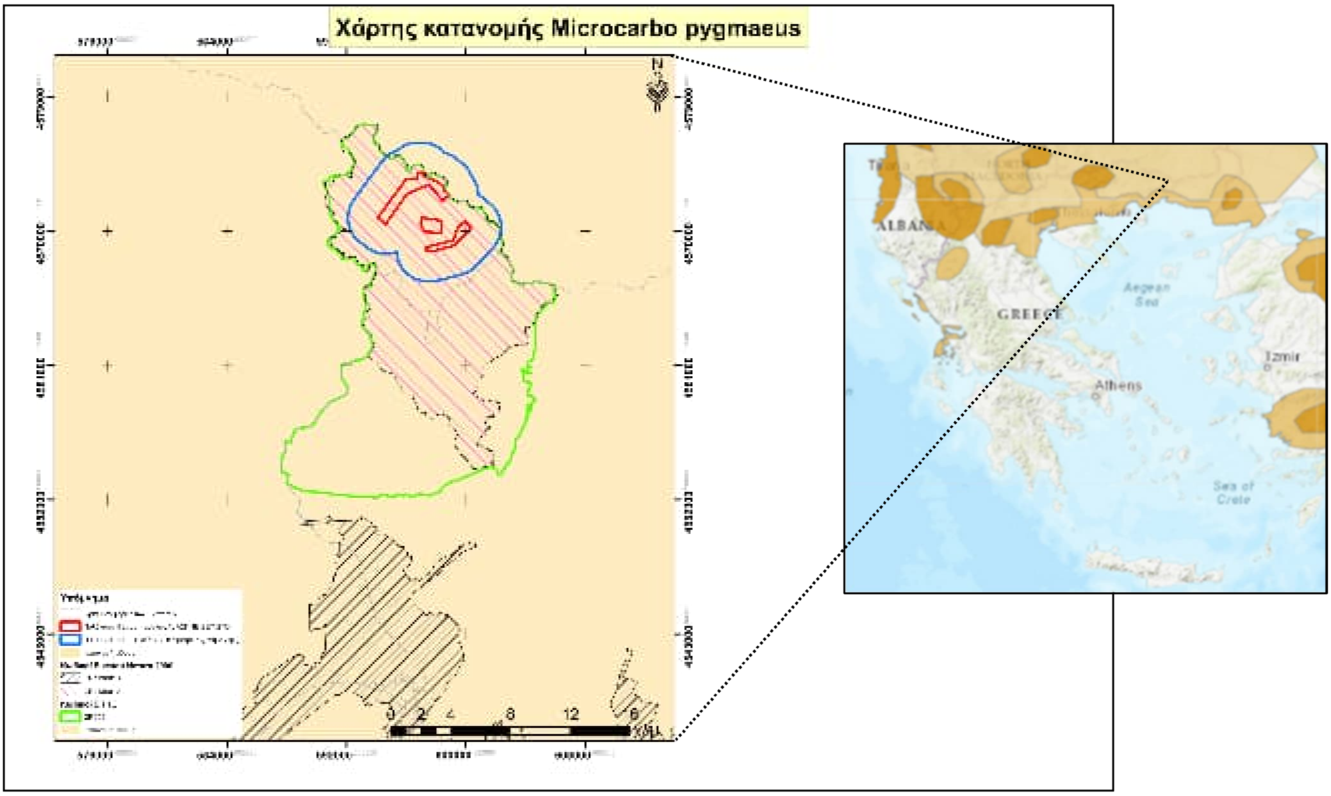
Χάρτης 35: Χάρτης ενδιαιτημάτων του φοινικόπτερου (*Phoenicopterus roseus*) στην ευρύτερη περιοχή μελέτης



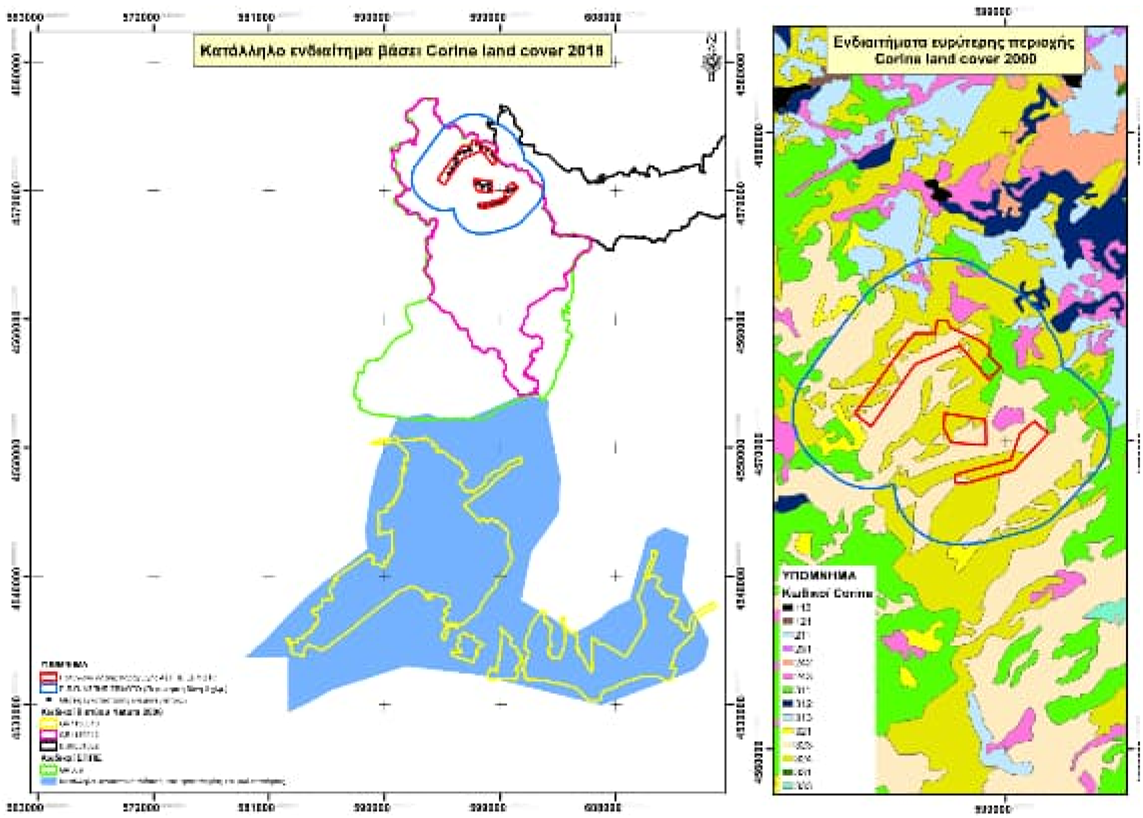
Χάρτης 36: Χάρτης κατανομή του αργυροτσικνιά (*Ardea alba*) στην ευρύτερη περιοχή μελέτης



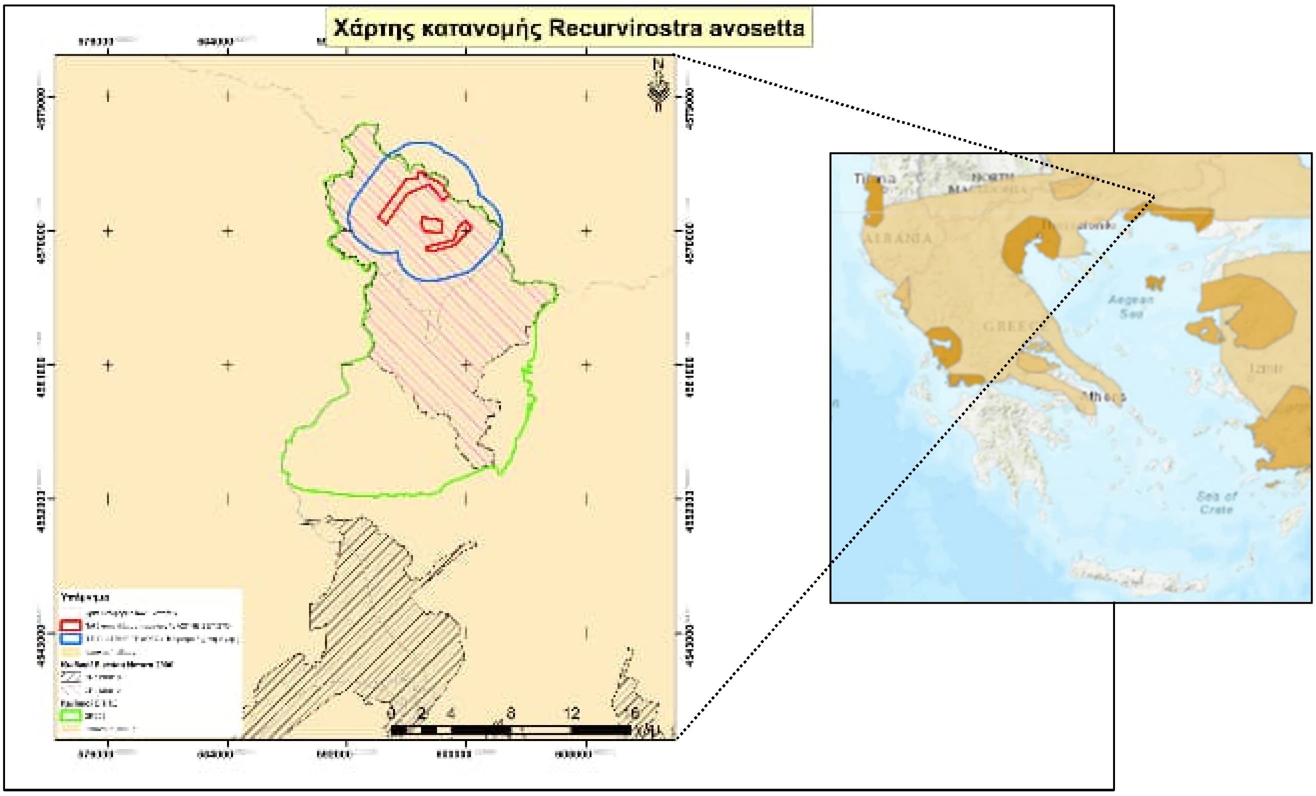
Χάρτης 37: Χάρτης ενδιαιτημάτων του αργυροτσικνιά (*Ardea alba*) στην ευρύτερη περιοχή μελέτης



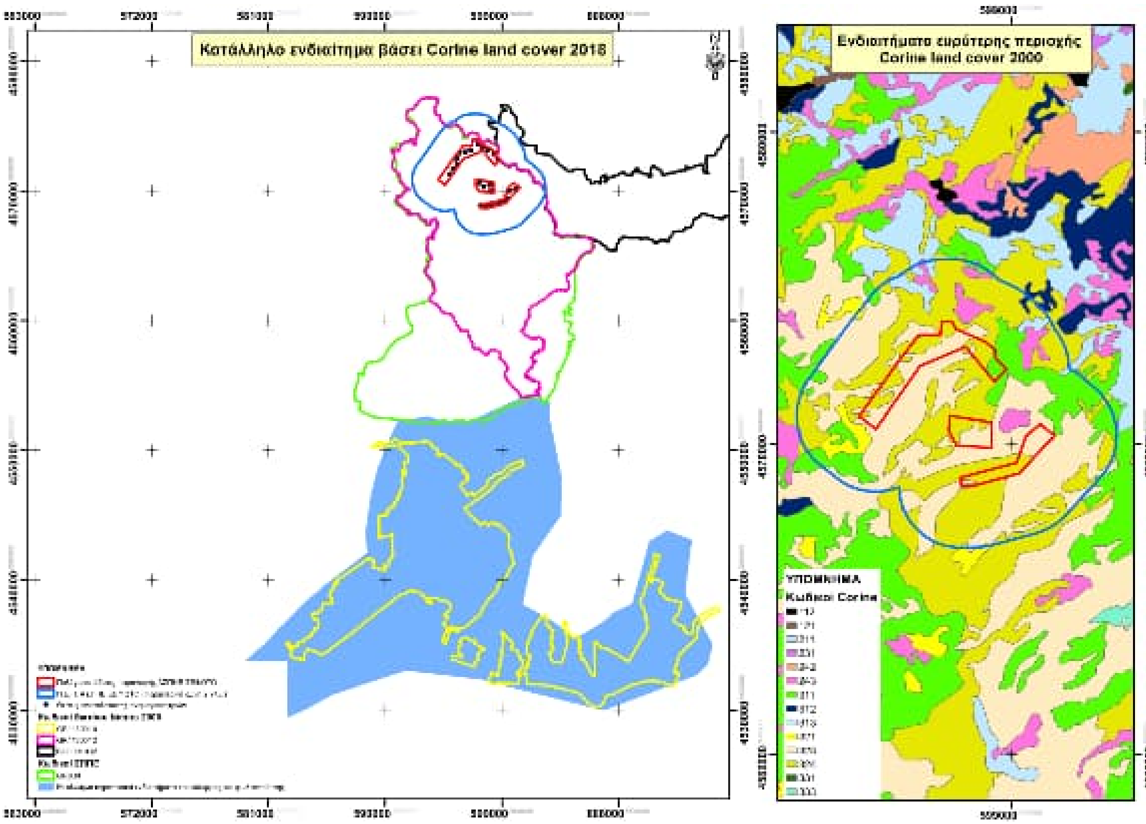
Χάρτης 38: Χάρτης κατανομής της λαγγόνας (*Microcarbo pygmaeus)* στην ευρύτερη περιοχή μελέτης



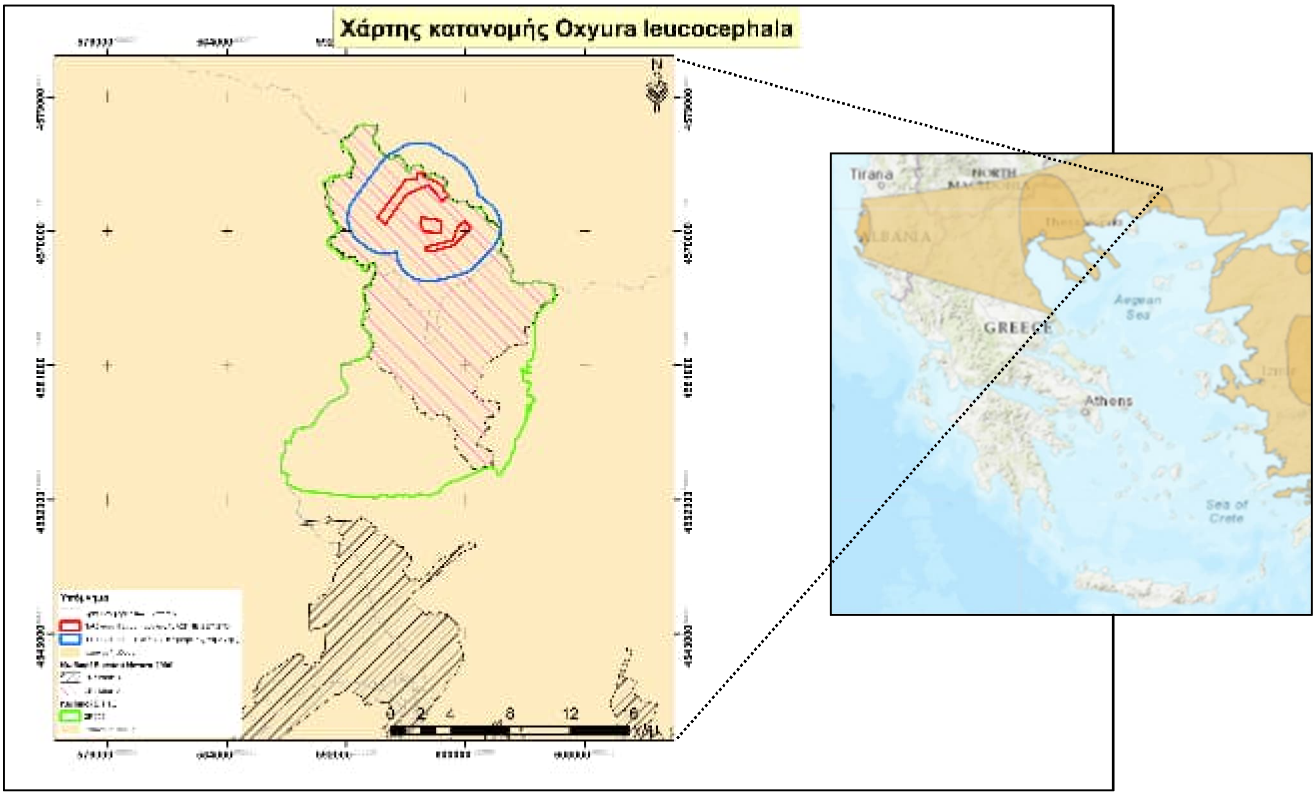
Χάρτης 39: Χάρτης ενδιαιτημάτων της λαγγόνας (*Microcarbo pygmaeus)* στην ευρύτερη περιοχή μελέτης



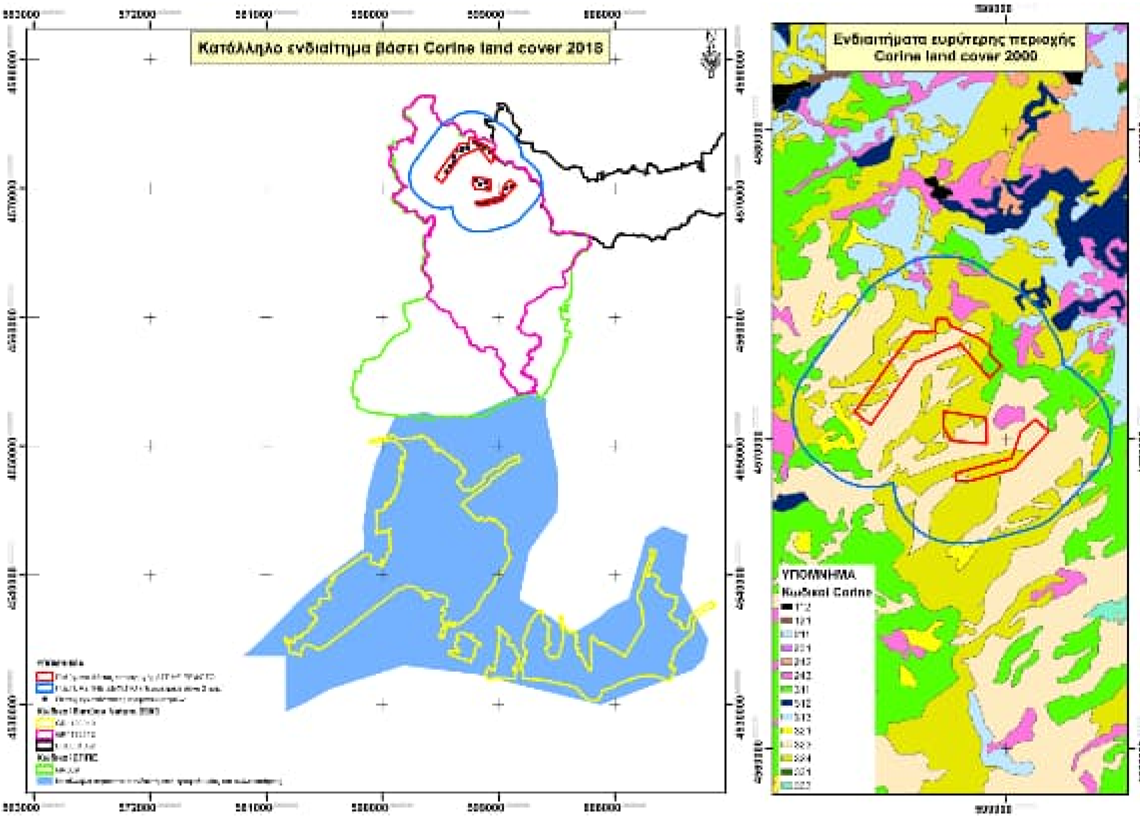
Χάρτης 40: Χάρτης κατανομής της αβοκέτας (*Recurvirosra avosetta*) στην ευρύτερη περιοχή μελέτης



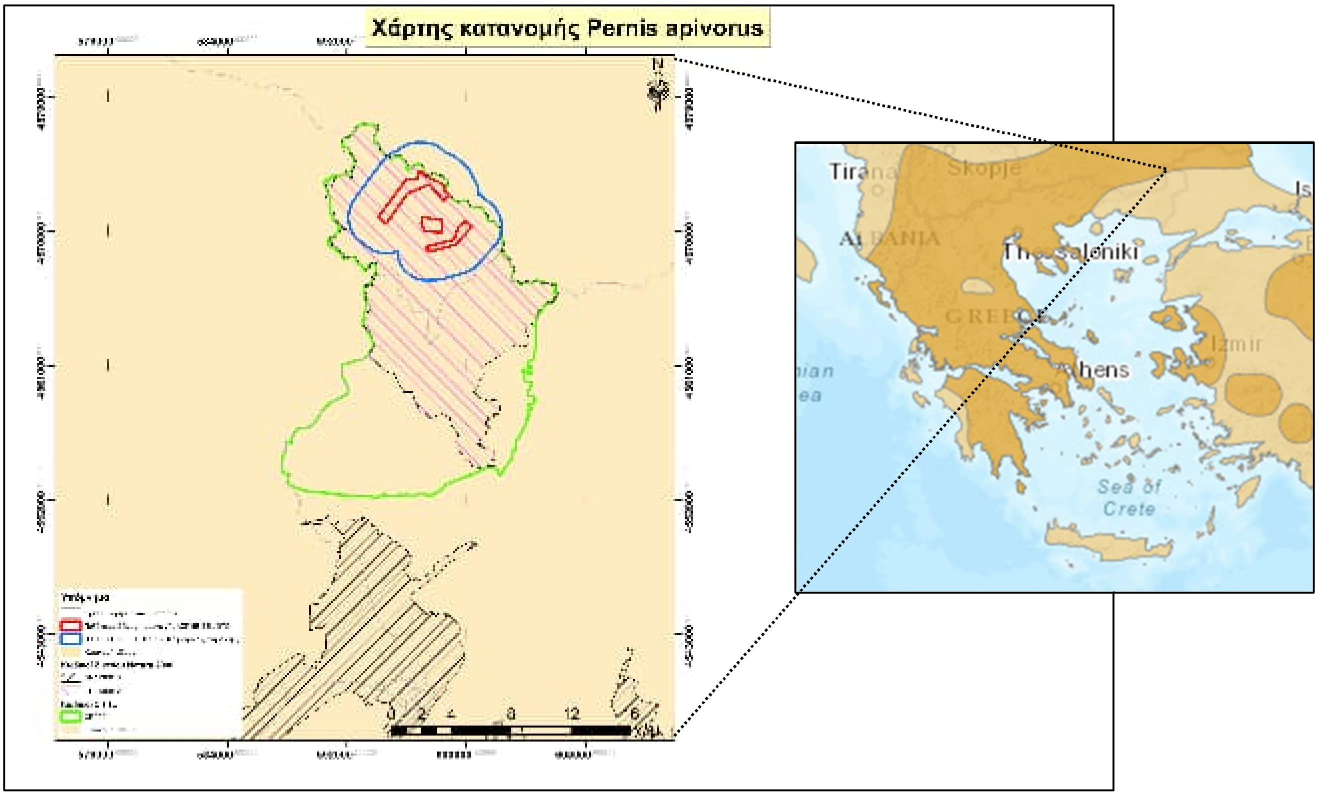
Χάρτης 41: Χάρτης ενδιαιτημάτων της αβοκέτας (*Recurvirostra avosetta*) στην ευρύτερη περιοχή μελέτης



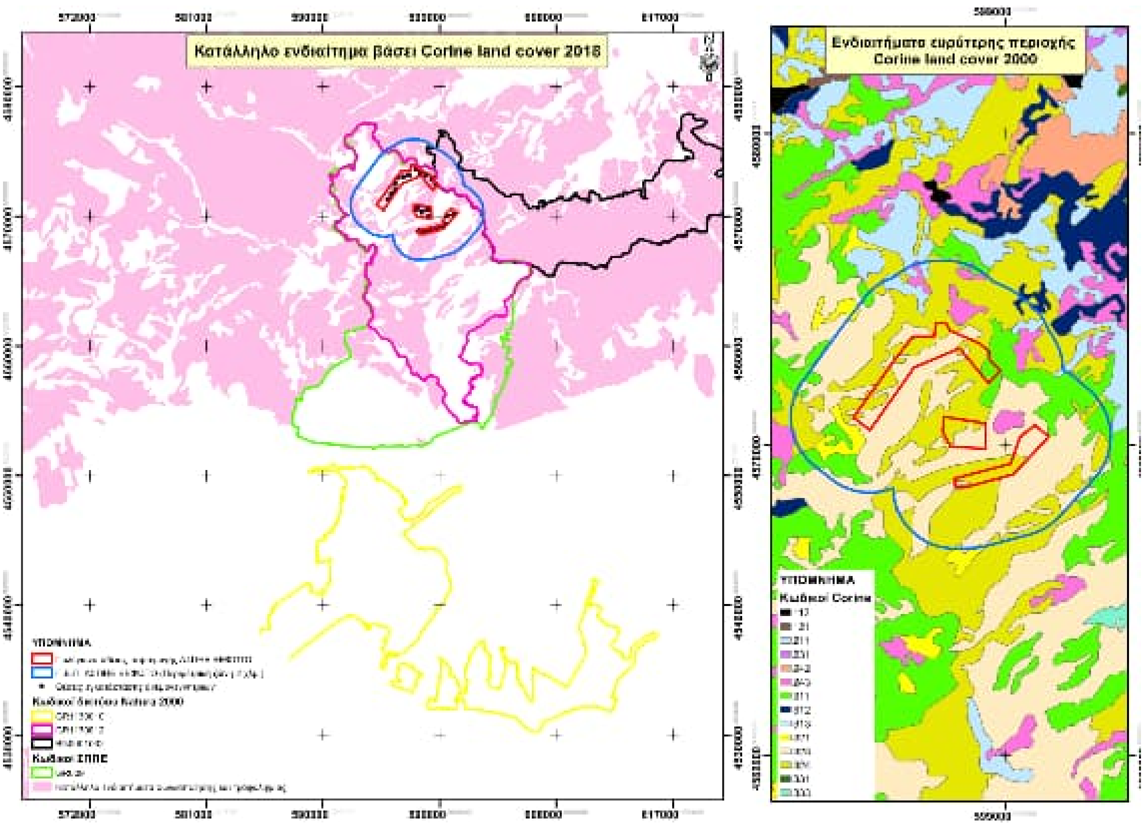
Χάρτης 42: Χάρτης κατανομής του κεφαλουδιού (*Oxyura leucocephala*) στην ευρύτερη περιοχή μελέτης



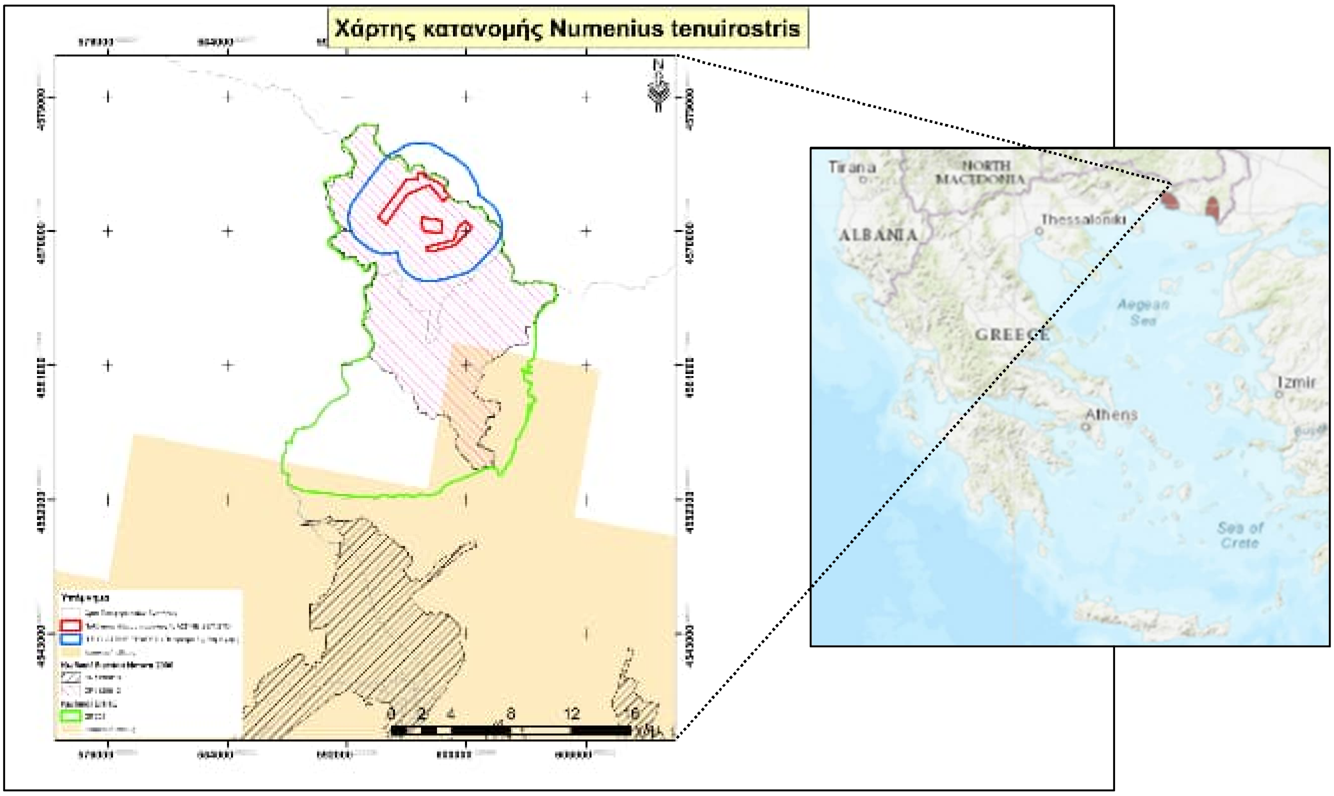
Χάρτης 43: Χάρτης ενδιαιτημάτων του κεφαλοδιού (*Oxyura leucocephala*) στην ευρύτερη περιοχή μελέτης



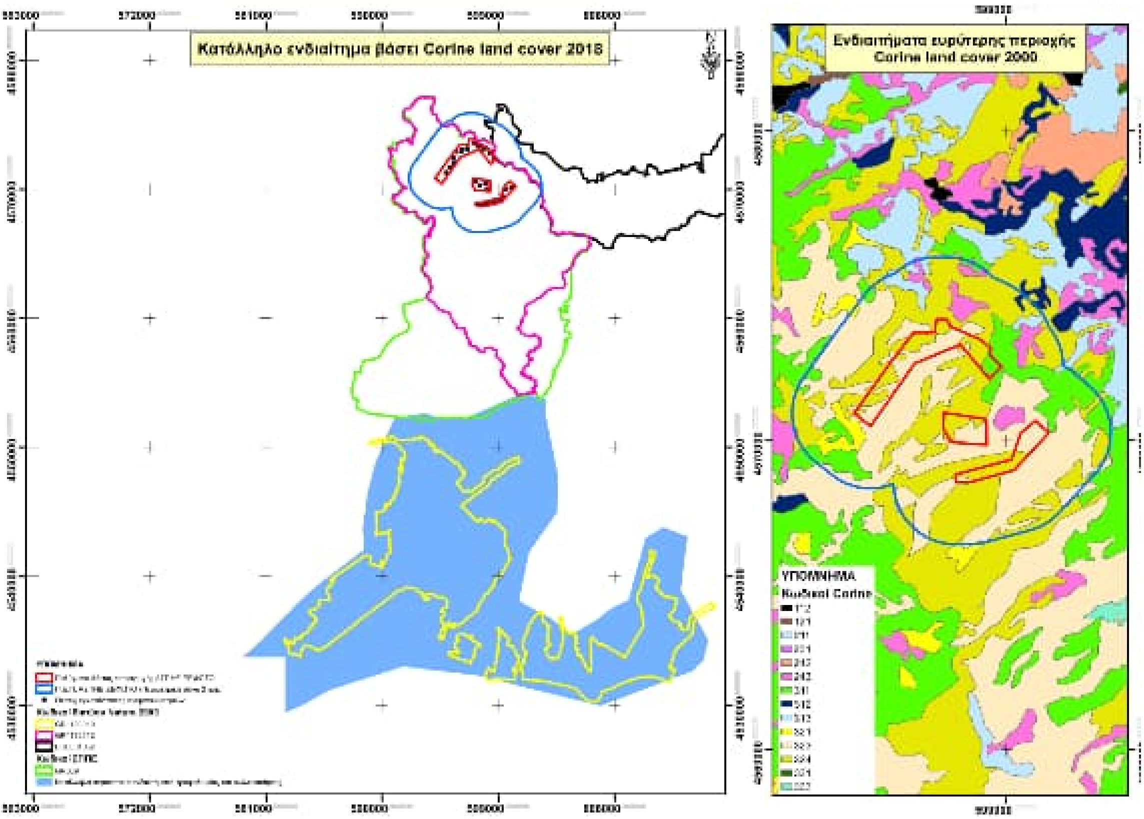
Χάρτης 44: Χάρτης κατανομής του σφηκιάρη (*Pernis apivorus)* στην ευρύτερη περιοχή μελέτης



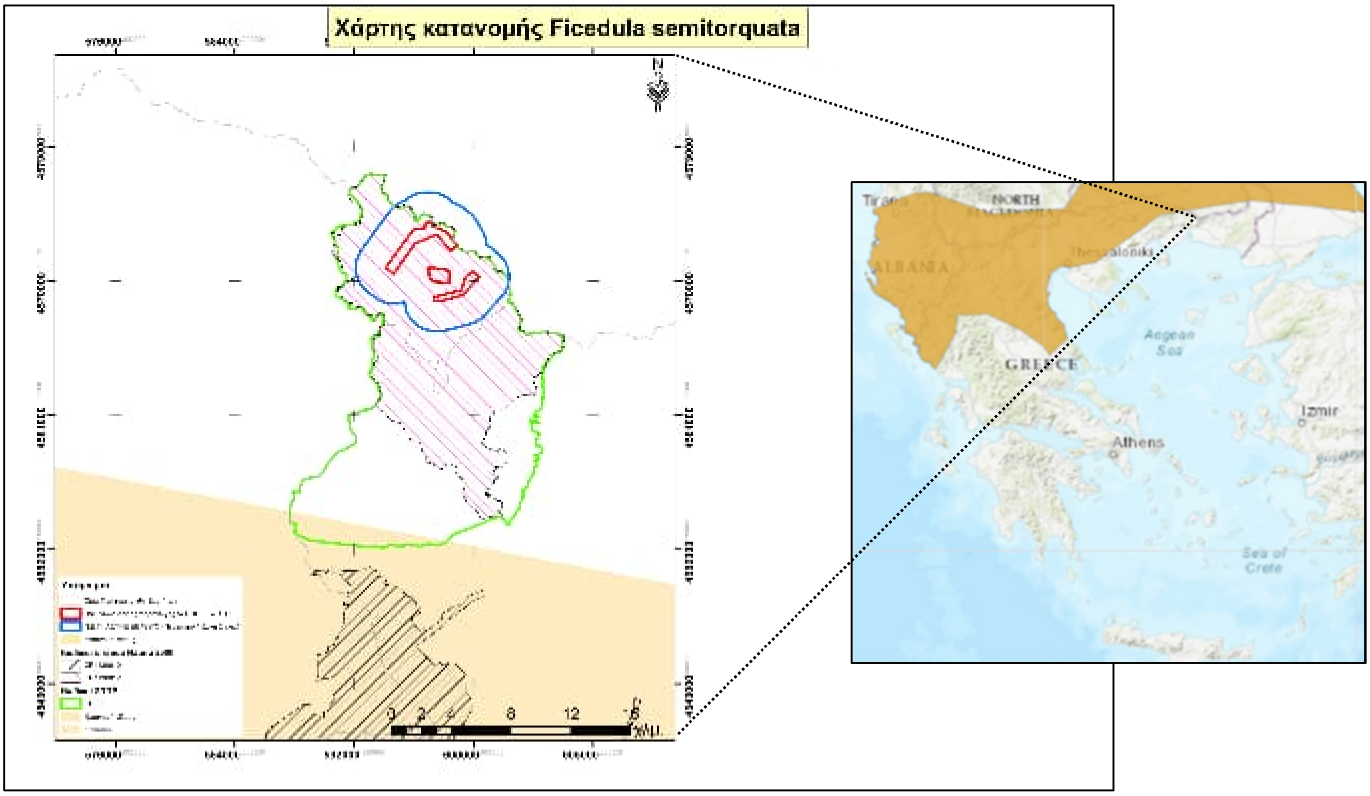
Χάρτης 45: Χάρτης ενδιαιτημάτων του σφηκιάρη (*Pernis apivorus)* στην ευρύτερη περιοχή μελέτης



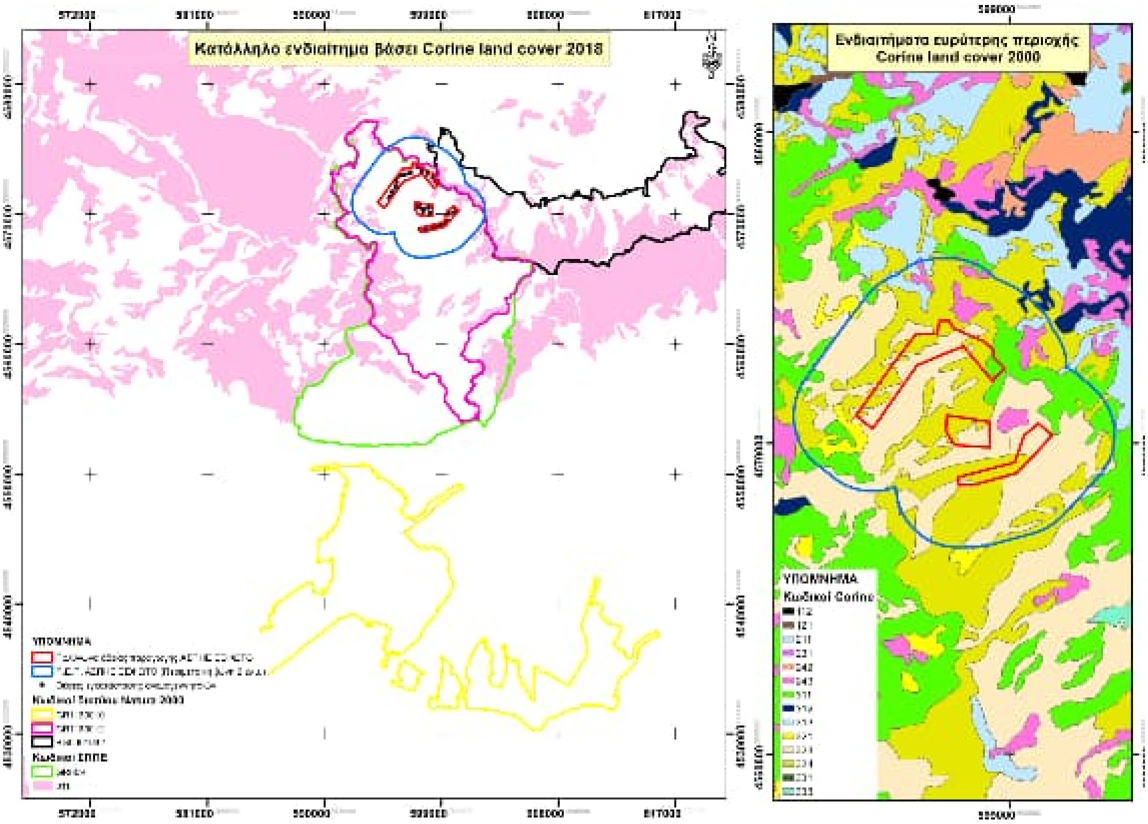
Χάρτης 46: Χάρτης κατανομής της λεπτομύτας (*Numenius tenuirostris*) στην ευρύτερη περιοχή μελέτης



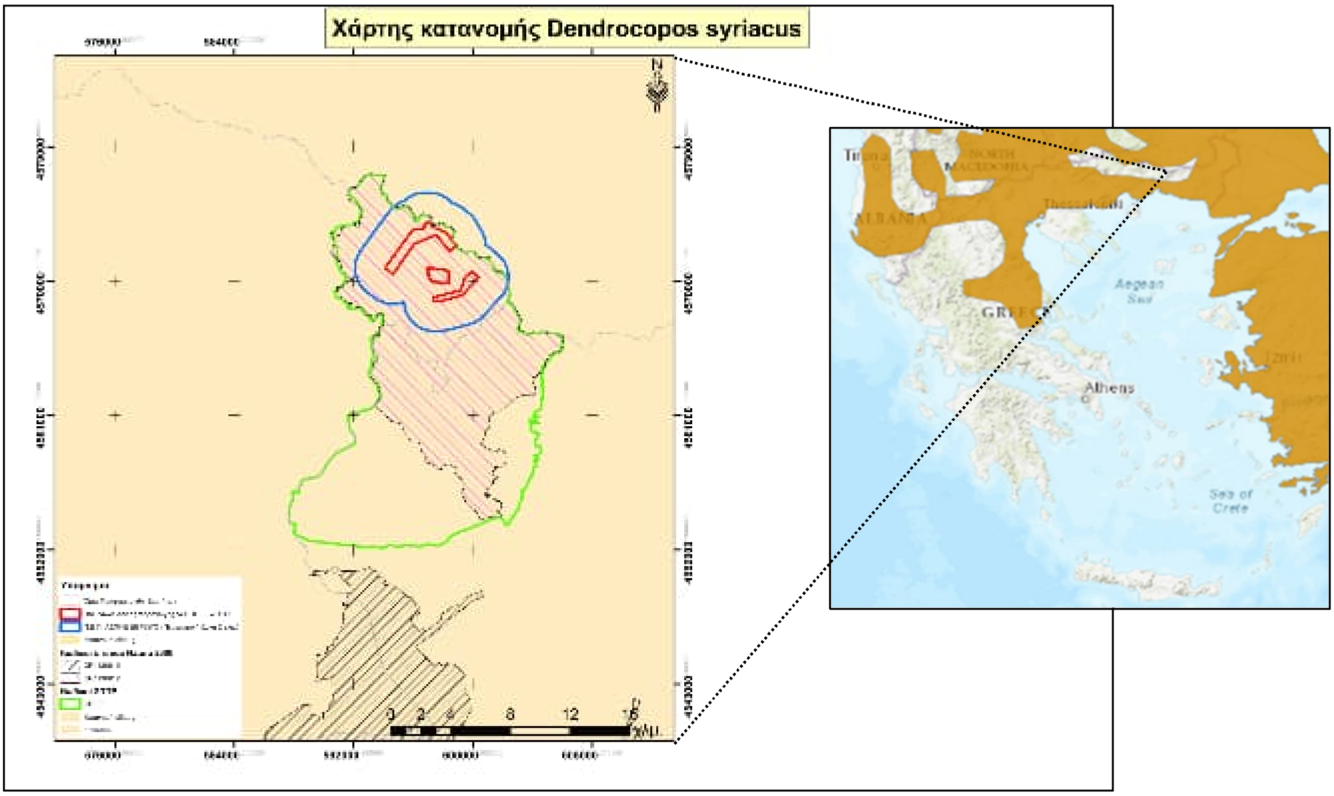
Χάρτης 47: Χάρτης ενδιαιτημάτων της λεπτομύτας (*Numenius tenuirostris*) στην ευρύτερη περιοχή μελέτης



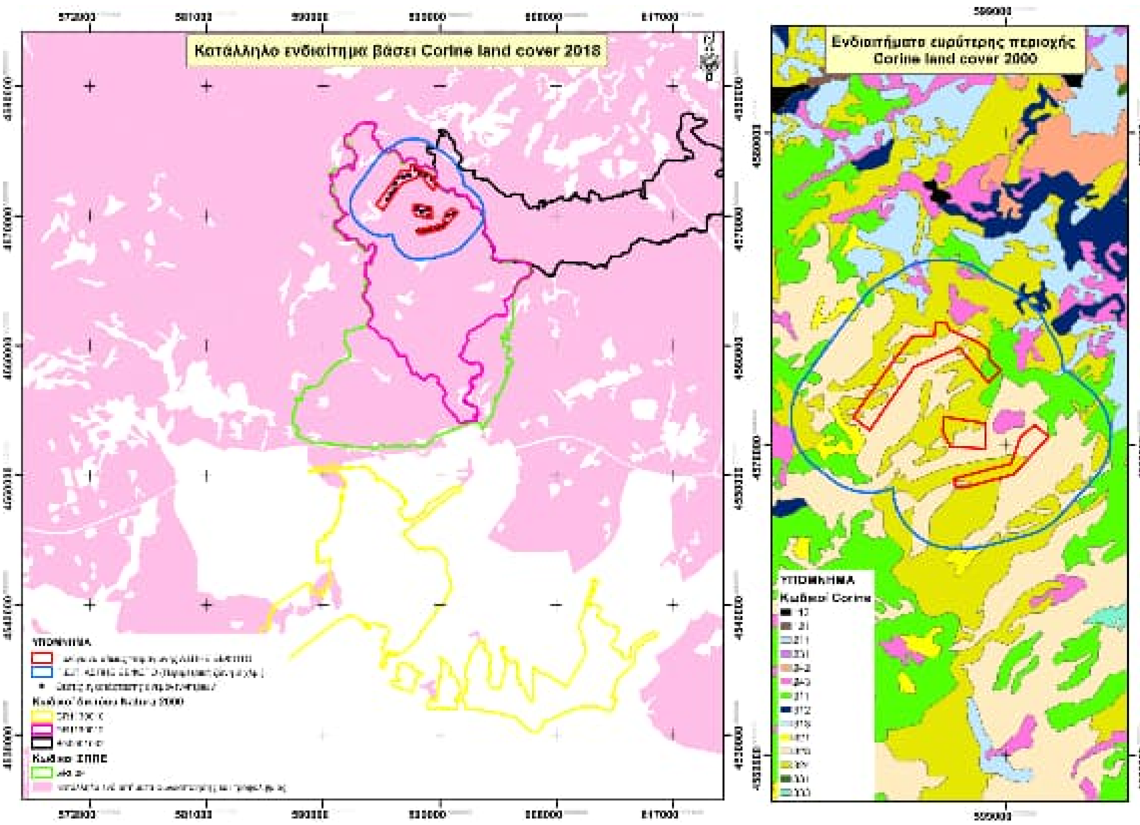
Χάρτης 48: Χάρτης κατανομής του δρυομυγοχάφτης (*Ficedula semitorquata*) στην ευρύτερη περιοχή μελέτης



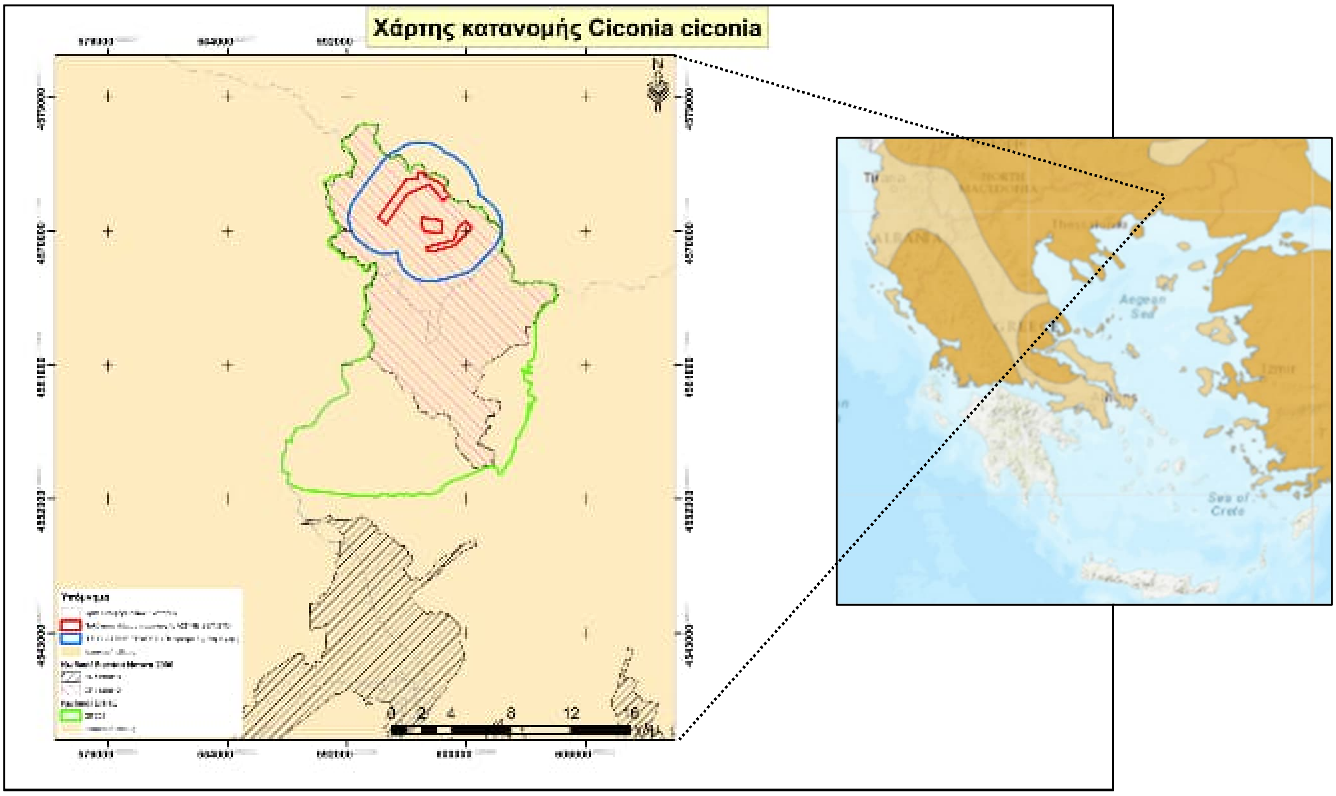
Χάρτης 49: Χάρτης ενδιαιτημάτων του δρυομυγοχάφτη (*Ficedula semitorquata*) στην ευρύτερη περιοχή μελέτης



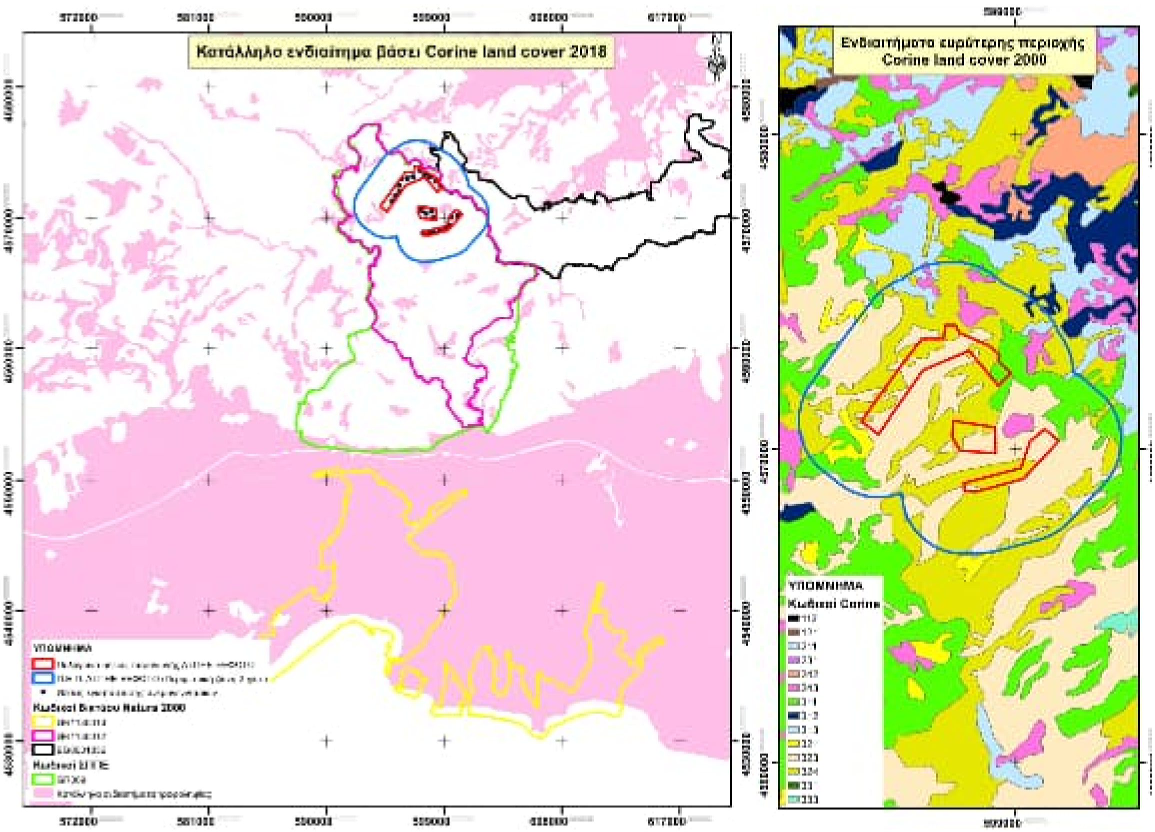
Χάρτης 50: Χάρτης κατανομή του βαλκανικού δρυοκολάπτη (*Dendrocopos syriacus)* στην ευρύτερη περιοχή μελέτης



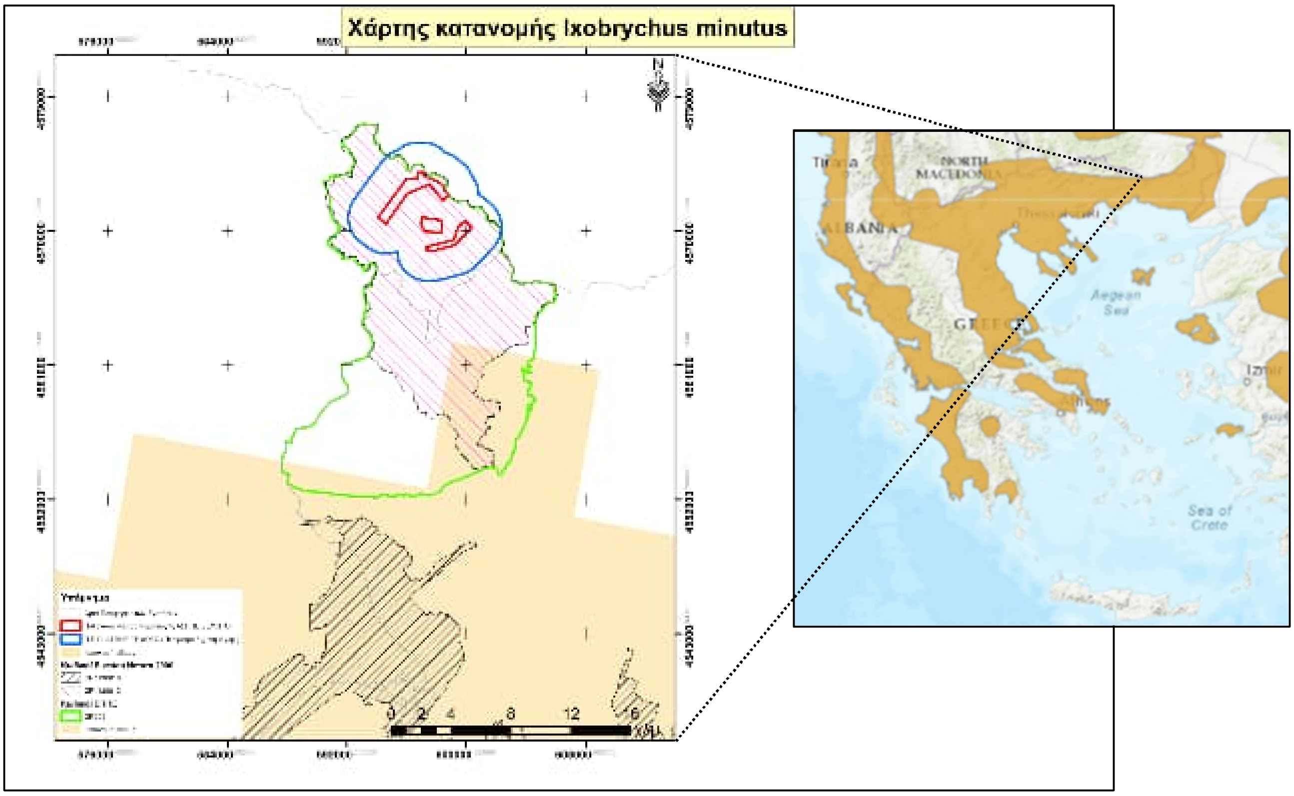
Χάρτης 51: Χάρτης ενδιαιτημάτων του βαλκανικού δρυοκολάπτη (*Dendrocopos syriacus)* στην ευρύτερη περιοχή μελέτης



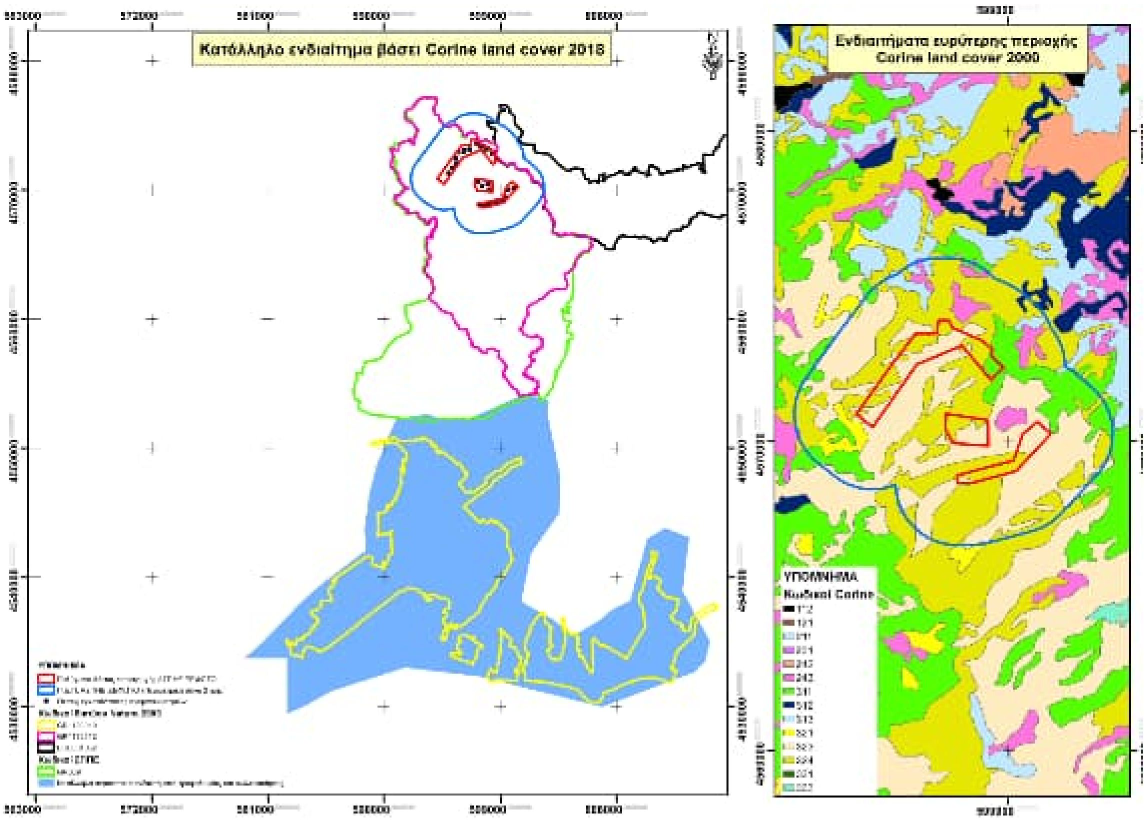
Χάρτης 52: Χάρτης κατανομής του λευκοπελαργού (*Ciconia ciconia)* στην ευρύτερη περιοχή μελέτης



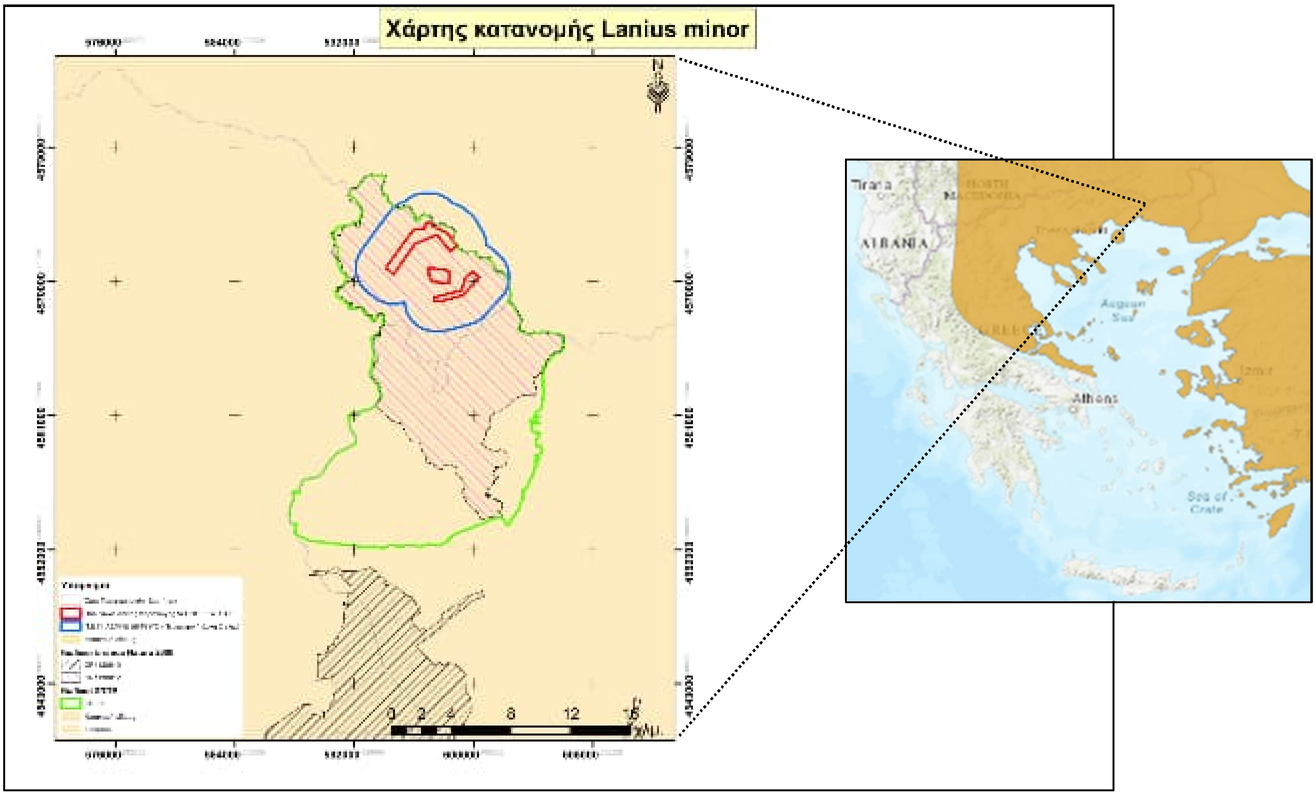
Χάρτης 53: Χάρτης ενδιαιτημάτων του λευκοπελαργού (*Ciconia ciconia)* στην ευρύτερη περιοχή μελέτης



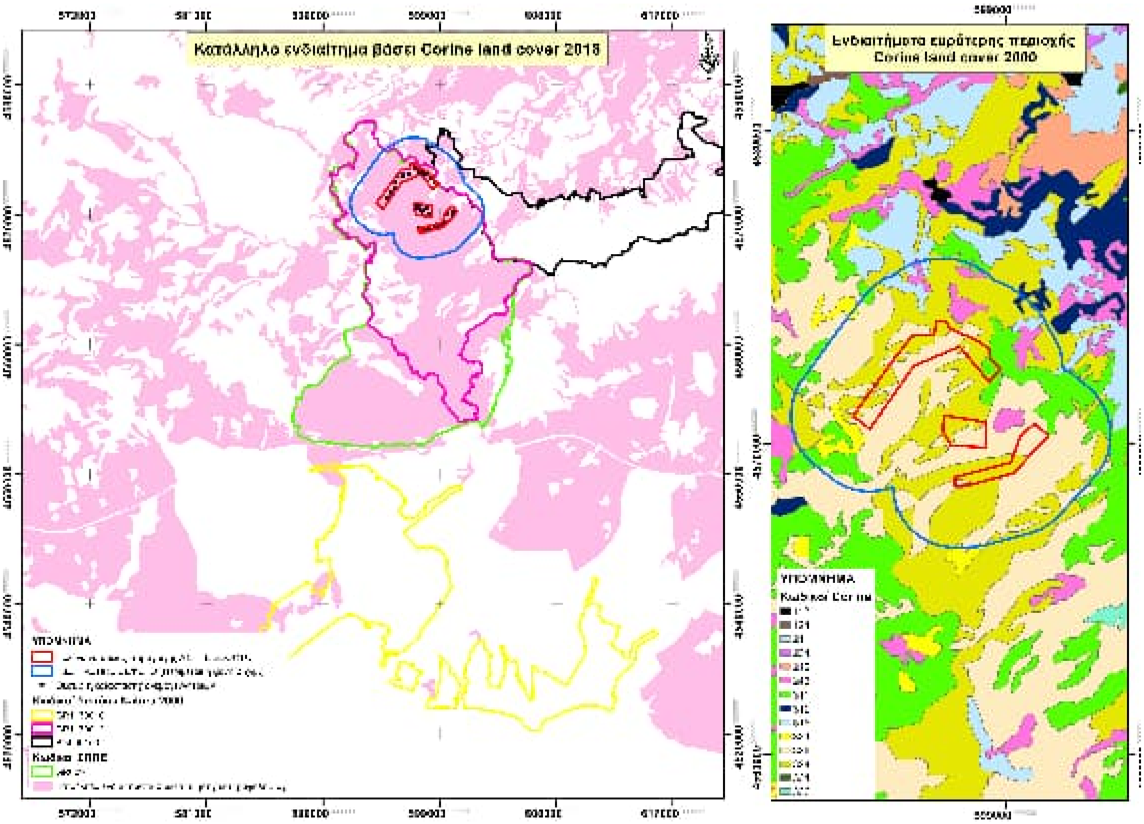
Χάρτης 54: Χάρτης κατανομής του μικροτσικνιά (*Ixobrychus minutus*) στην ευρύτερη περιοχή μελέτης



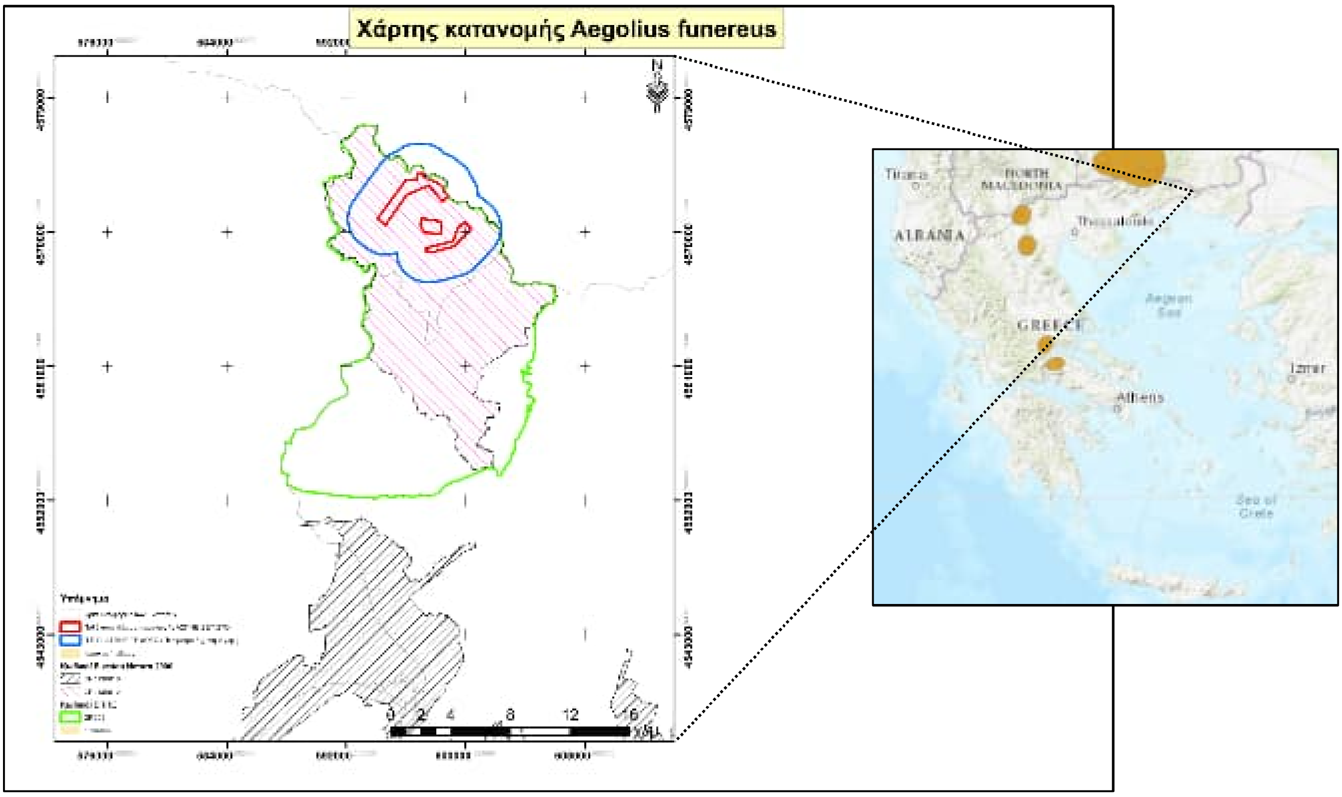
Χάρτης 55: Χάρτης ενδιαιτημάτων του μικροτσικνιά (*Ixobrychus minutus*) στην ευρύτερη περιοχή μελέτης



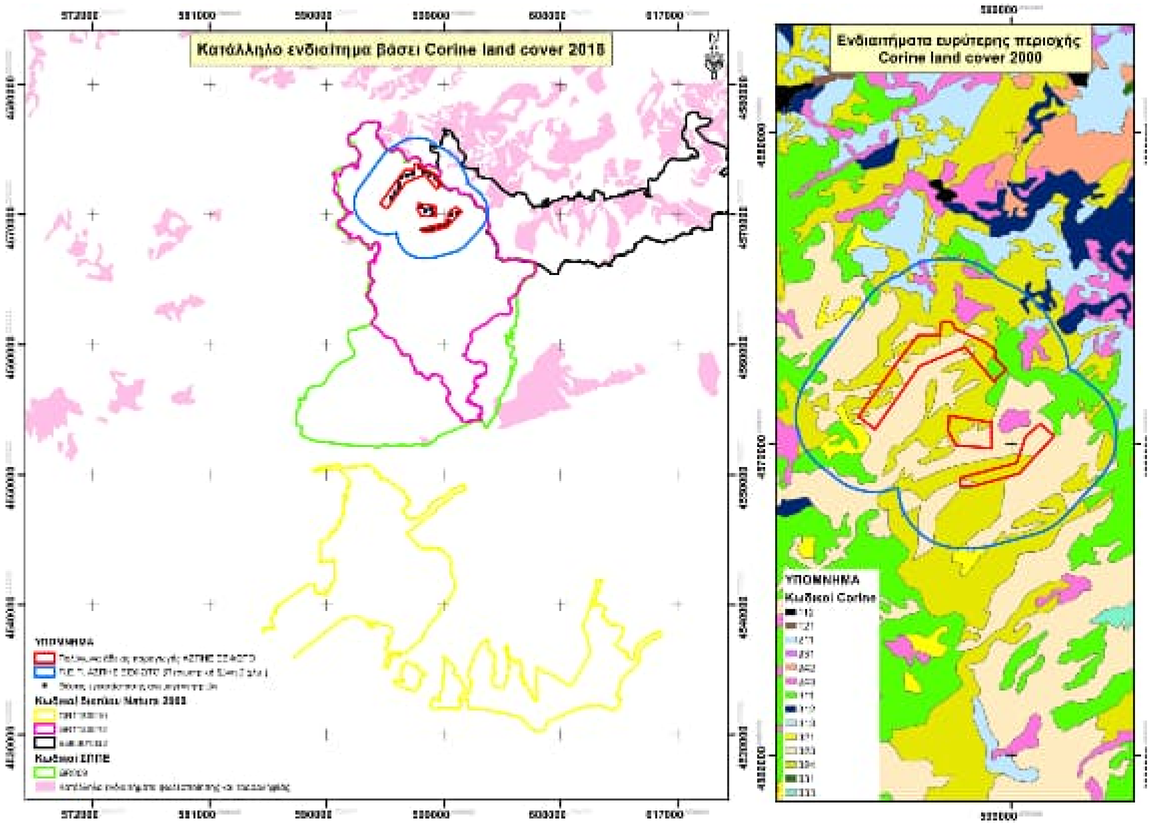
Χάρτης 56: Χάρτης κατανομής του σταχτοκεφαλά (*Lanius minor)* στην ευρύτερη περιοχή μελέτης



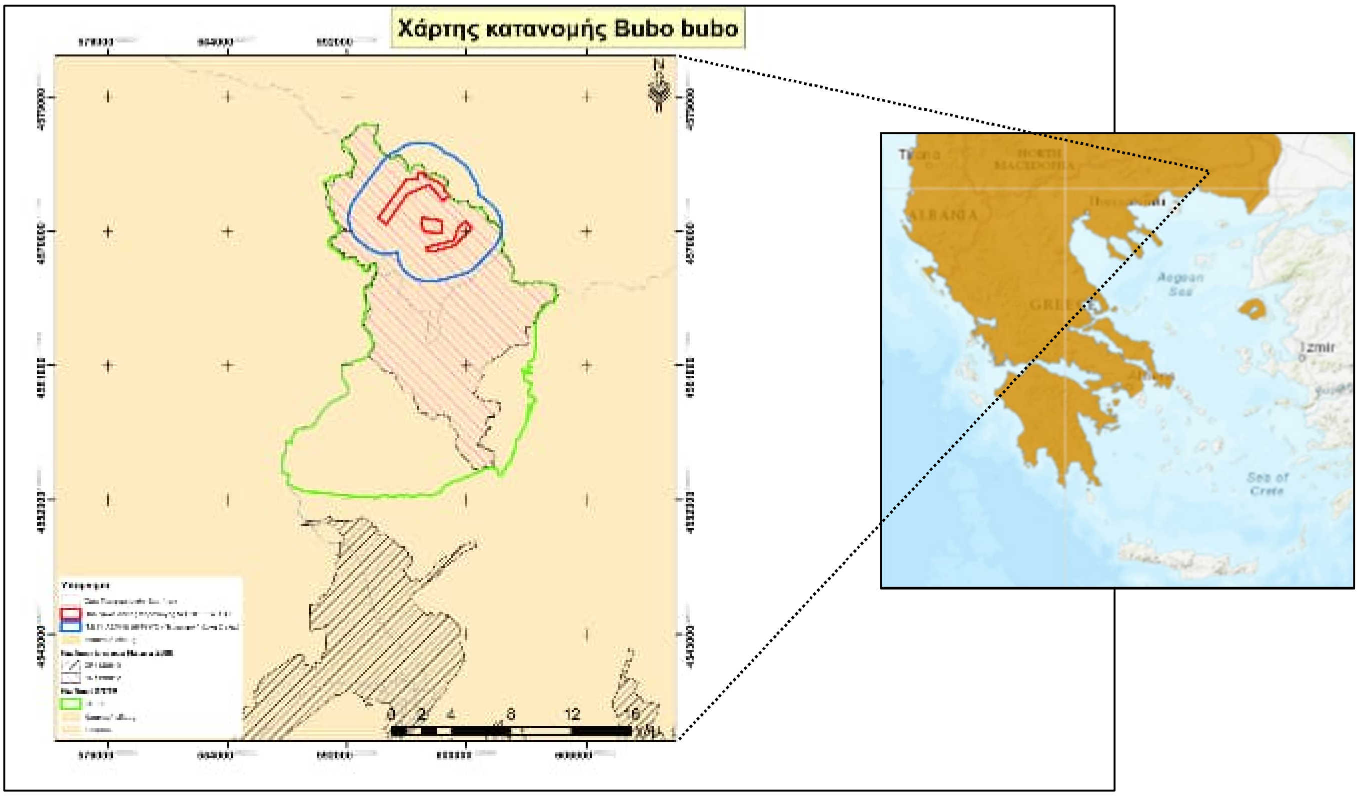
Χάρτης 57: Χάρτης ενδιαιτημάτων του σταχτοκεφαλά (*Lanius minor)* στην ευρύτερη περιοχή μελέτης



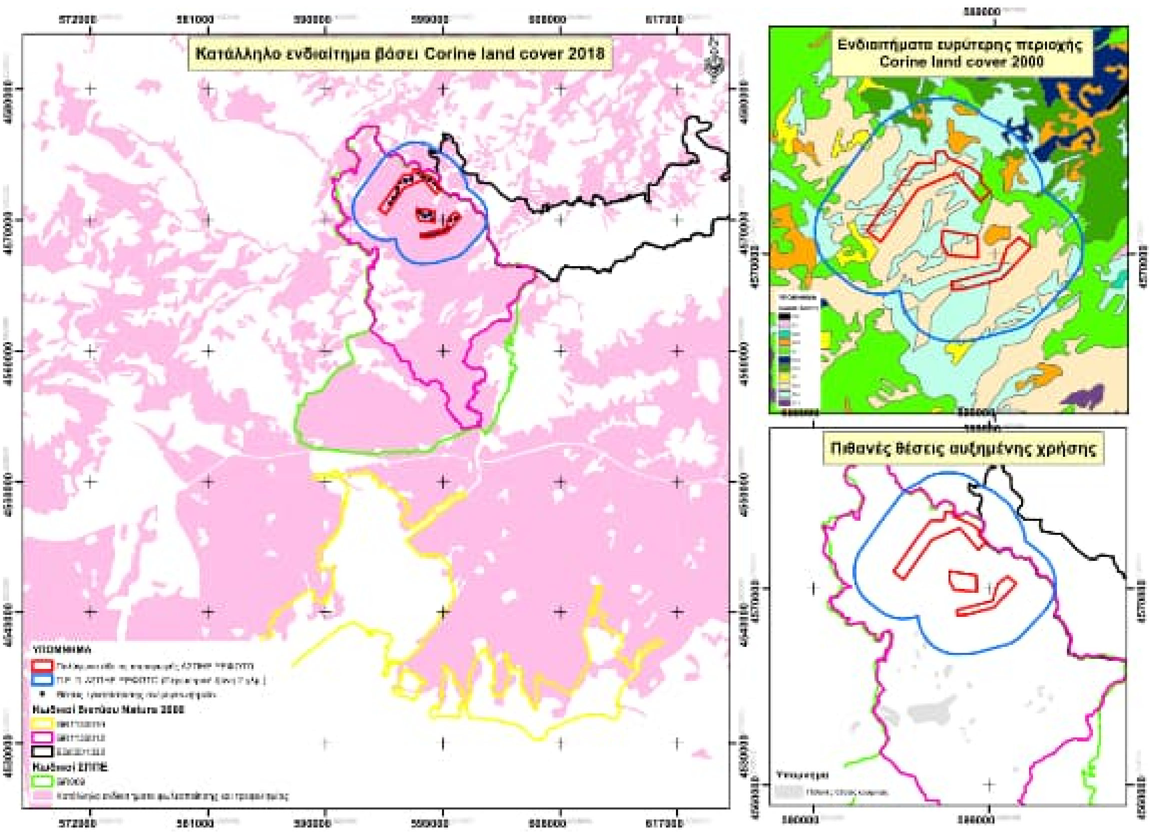
Χάρτης 58: Χάρτης κατανομής του αιγολιού (*Aegolius funereus)* στην ευρύτερη περιοχή μελέτης



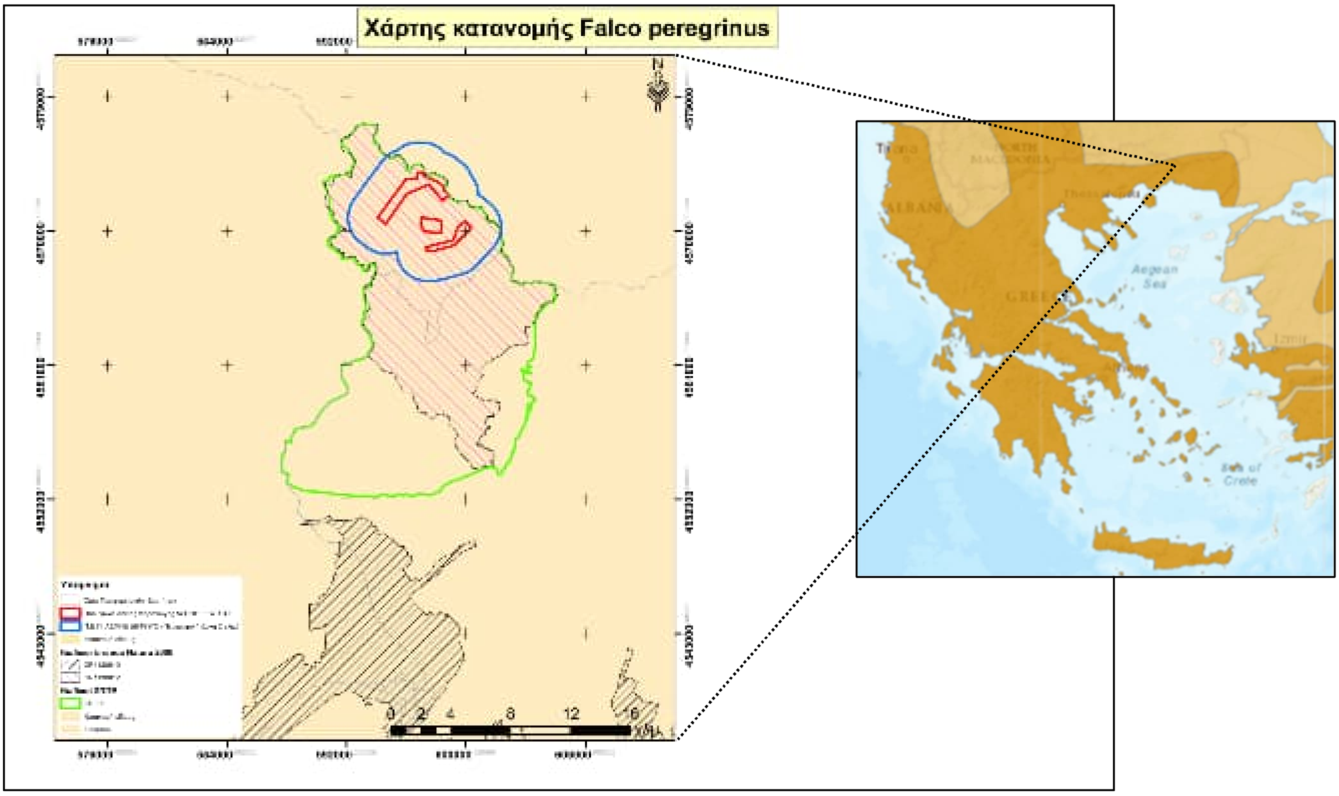
Χάρτης 59: Χάρτης ενδιαιτημάτων του αιγολιού (*Aegolius funereus)* στην ευρύτερη περιοχή μελέτης



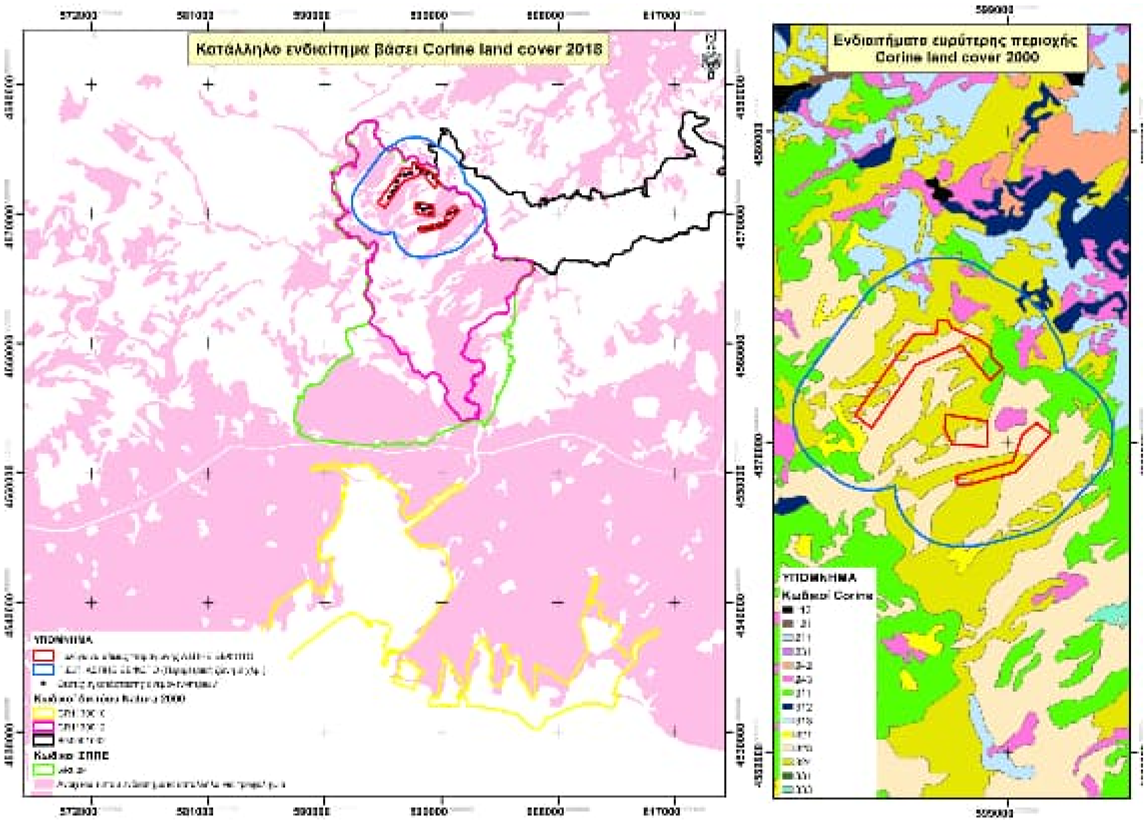
Χάρτης 60: Χάρτης κατανομής του μπούφου (*Bubo bubo)* στην ευρύτερη περιοχή μελέτης



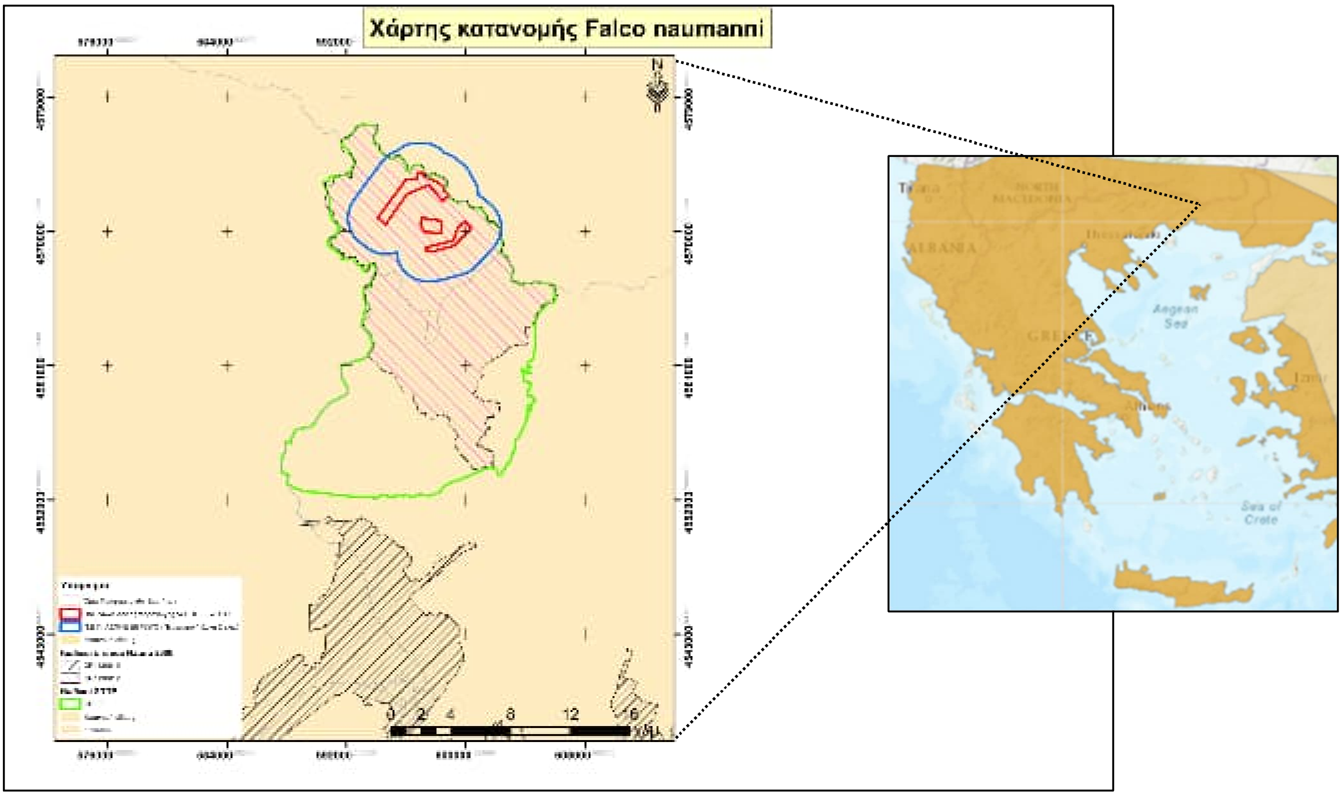
Χάρτης 61: Χάρτης ενδιαιτημάτων του μπούφου (*Bubo bubo)* στην ευρύτερη περιοχή μελέτης



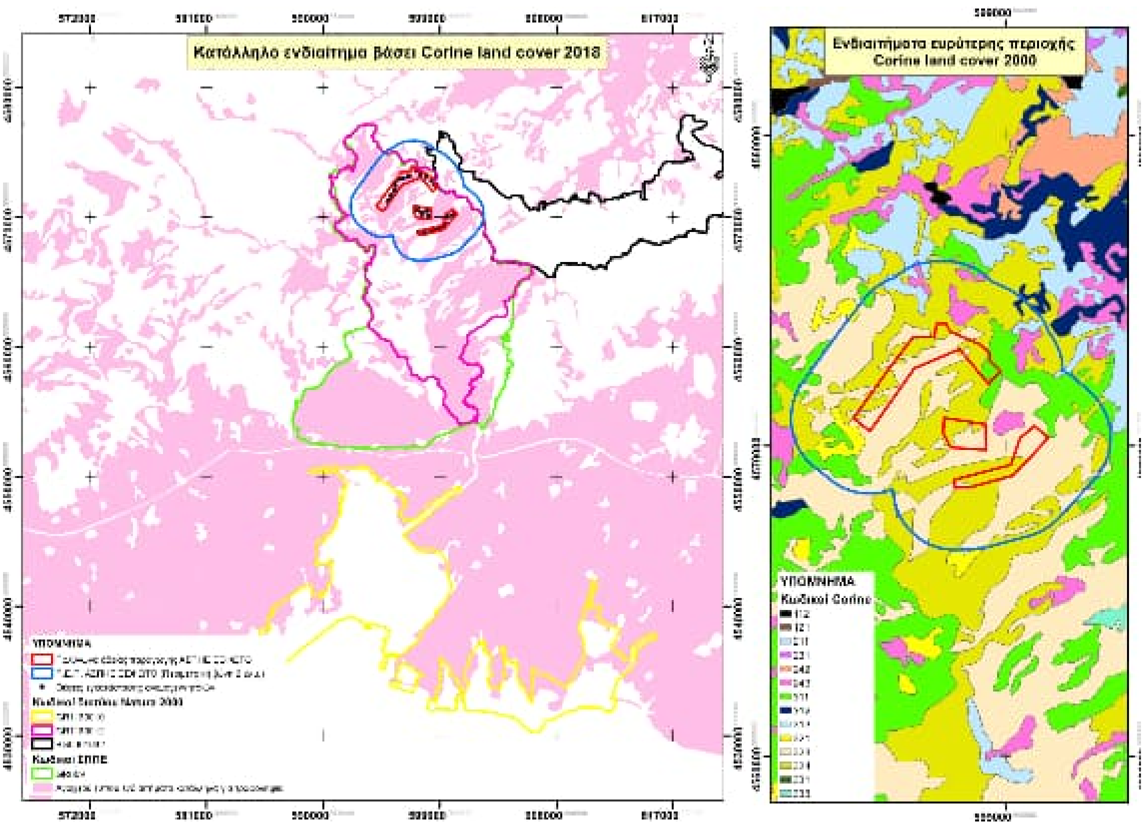
Χάρτης 62: Χάρτης κατανομής του πετρίτη (*Falco peregrinus*) στην ευρύτερη περιοχή μελέτης



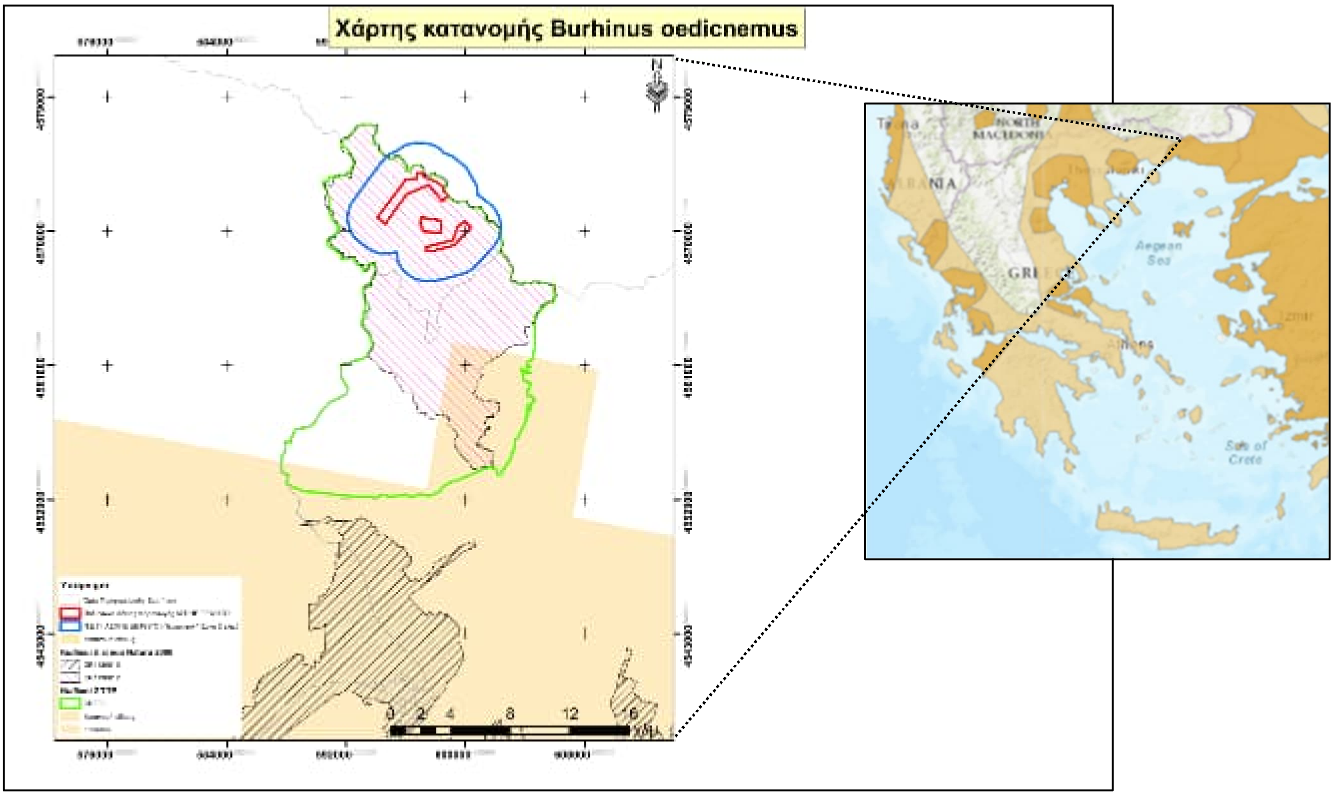
Χάρτης 63: Χάρτης ενδιαιτημάτων του πετρίτη (*Falco peregrinus*) στην ευρύτερη περιοχή μελέτης



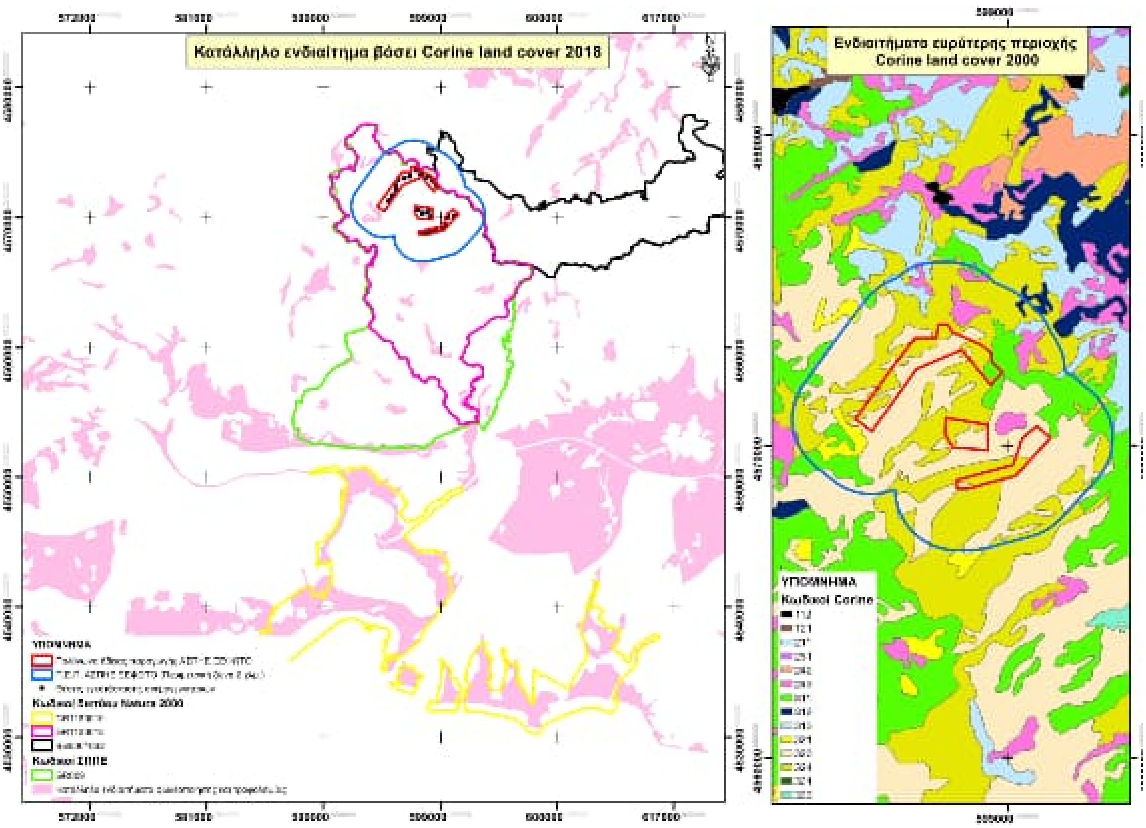
Χάρτης 64: Χάρτης κατανομής του κιρκινεζιού (*Falco naumanni*) στην ευρύτερη περιοχή μελέτης



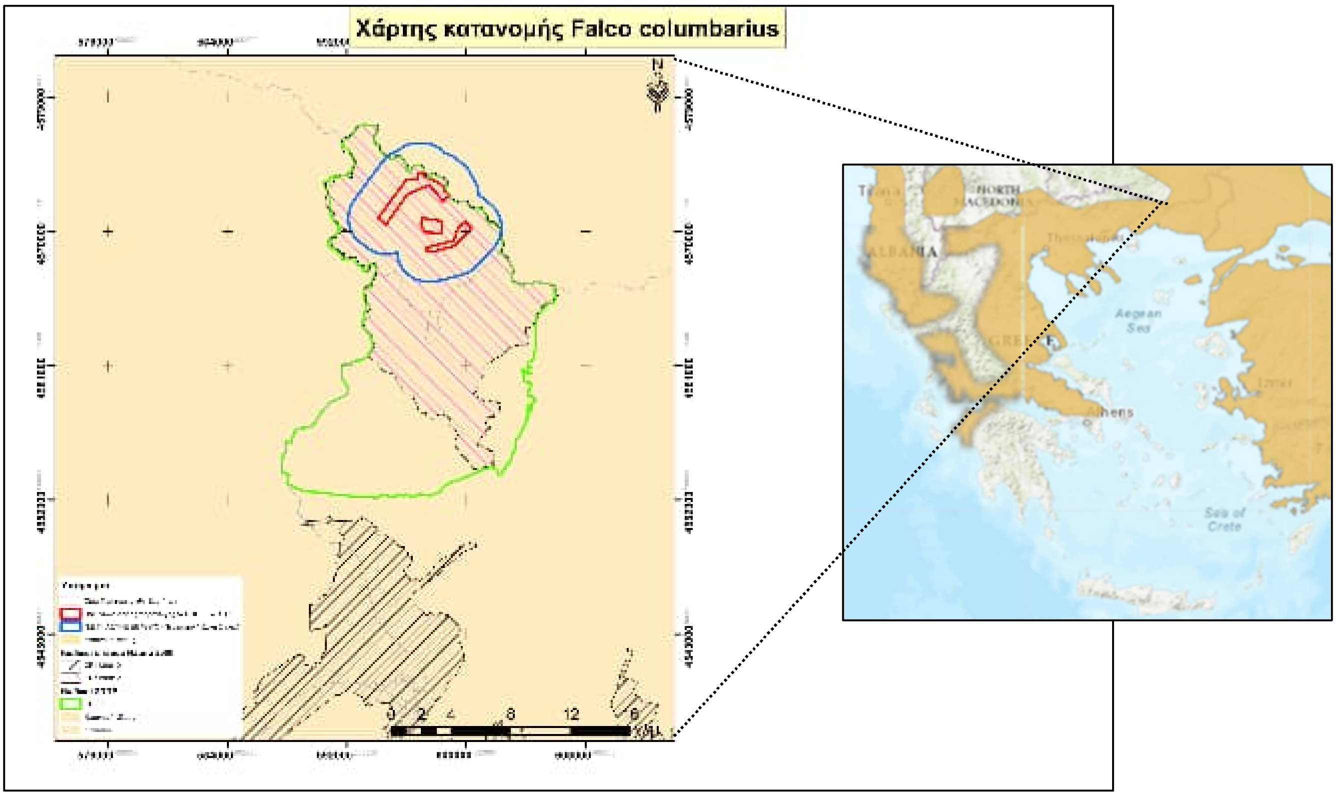
Χάρτης 65: Χάρτης ενδιαιτημάτων του κιρκινεζιού (*Falco naumanni*) στην ευρύτερη περιοχή μελέτης



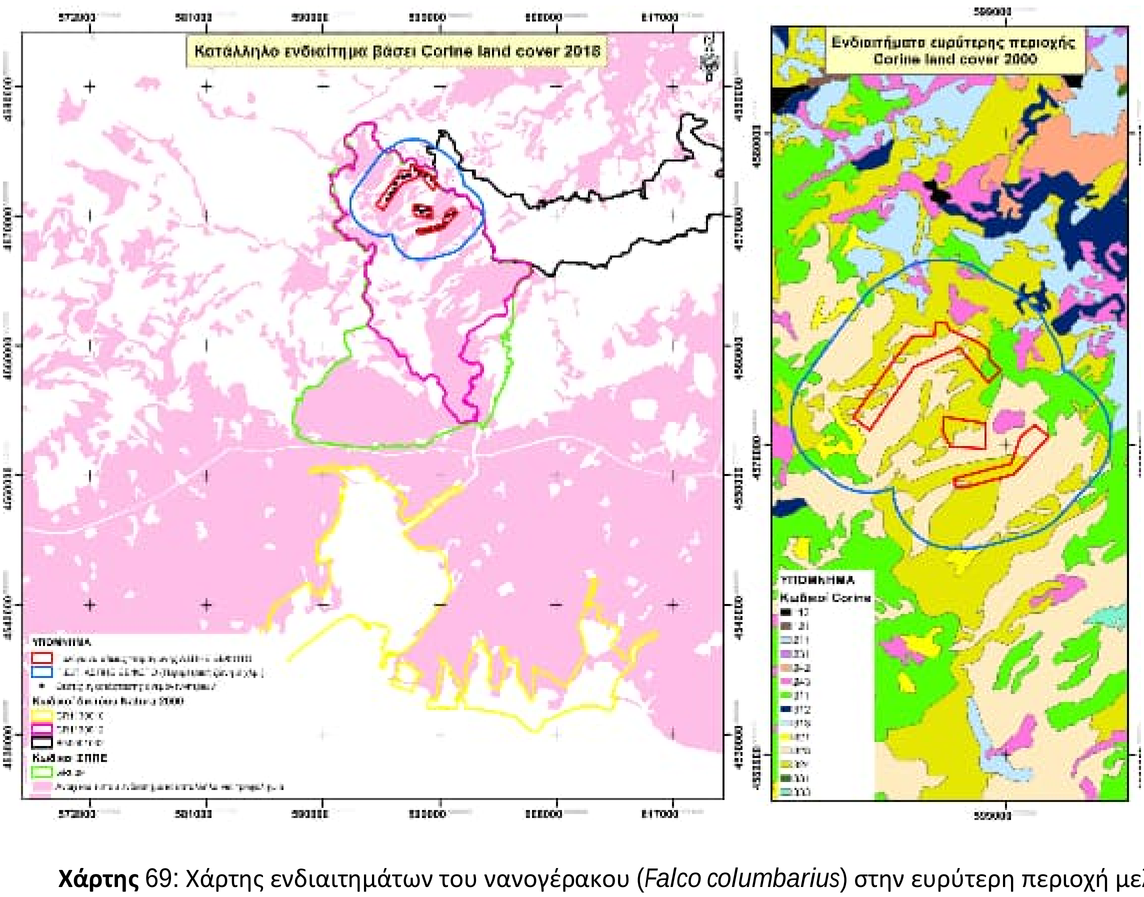
Χάρτης 66: Χάρτης κατανομής της πετροτουρλίδας (*Burhinus oedicnemus*) στην ευρύτερη περιοχή μελέτης



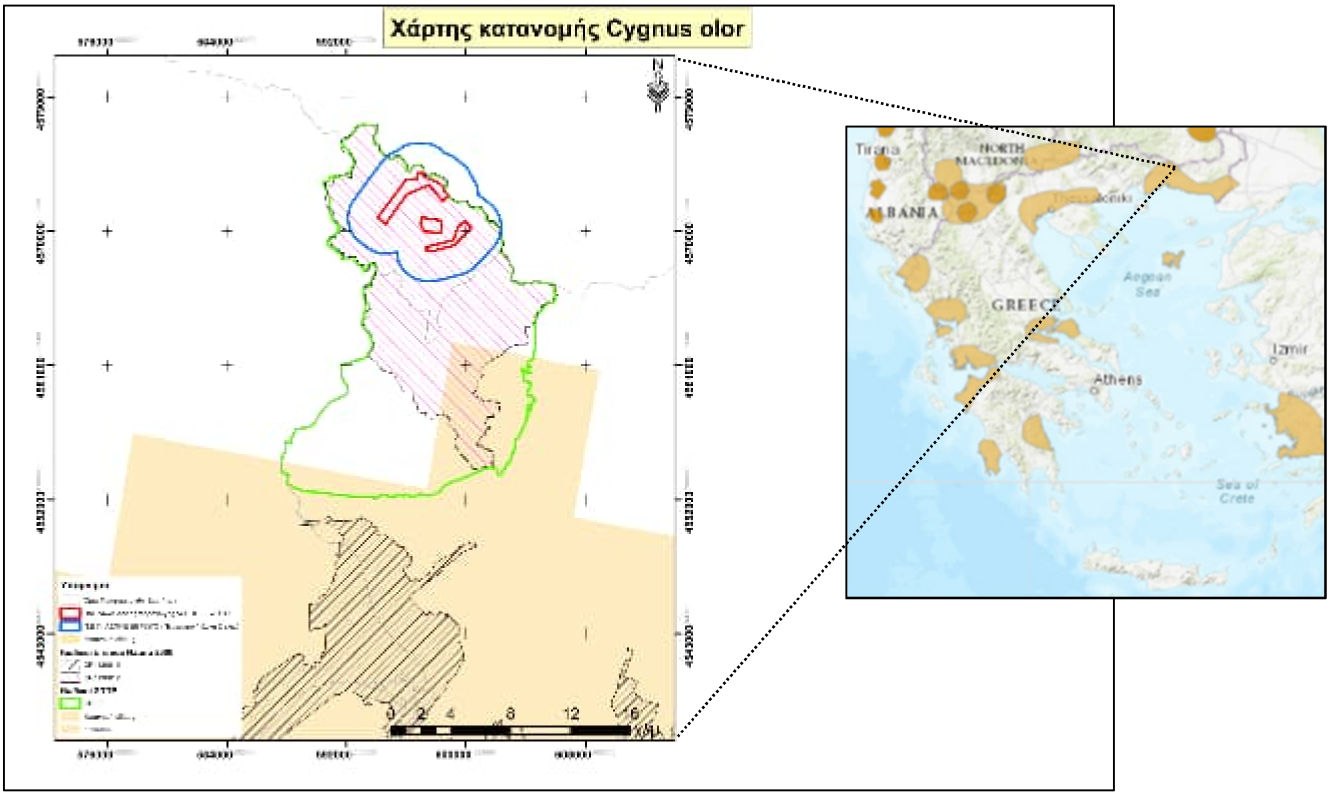
Χάρτης 67: Χάρτης ενδιαιτημάτων της πετροτουρλίδας (*Burhinus oedicnemus*) στην ευρύτερη περιοχή μελέτης



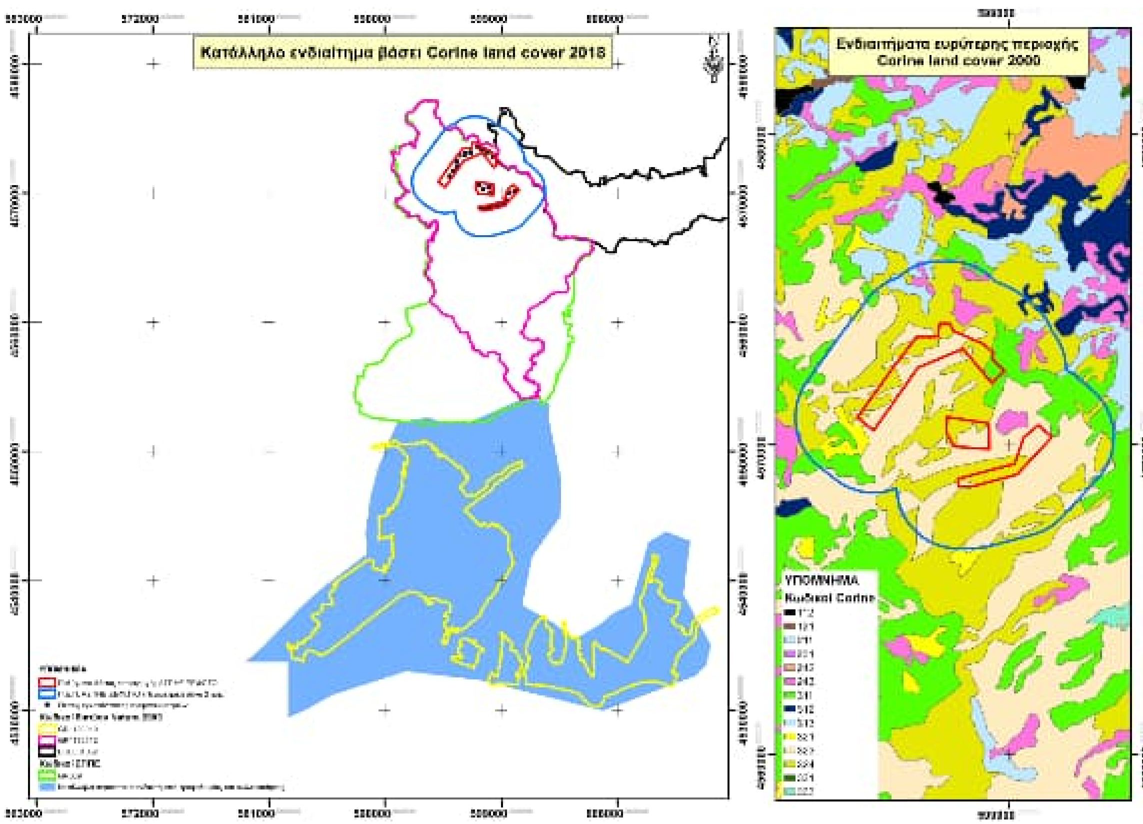
Χάρτης 68: Χάρτης κατανομής του νανογέρακου (*Falco columbarius*) στην ευρύτερη περιοχή μελέτης



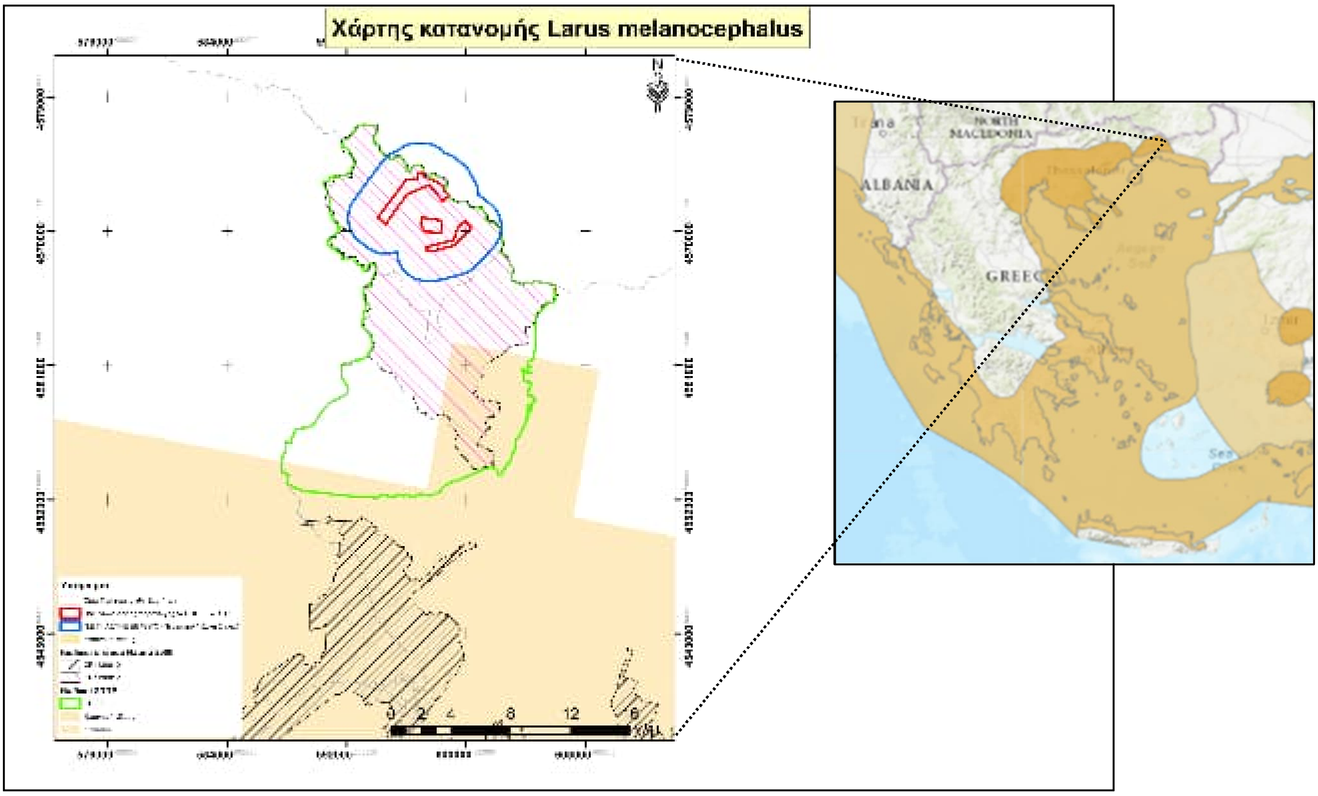
Χάρτης 69: Χάρτης ενδιαιτημάτων του νανογέρακου (*Falco columbarius*) στην ευρύτερη περιοχή μελέτης



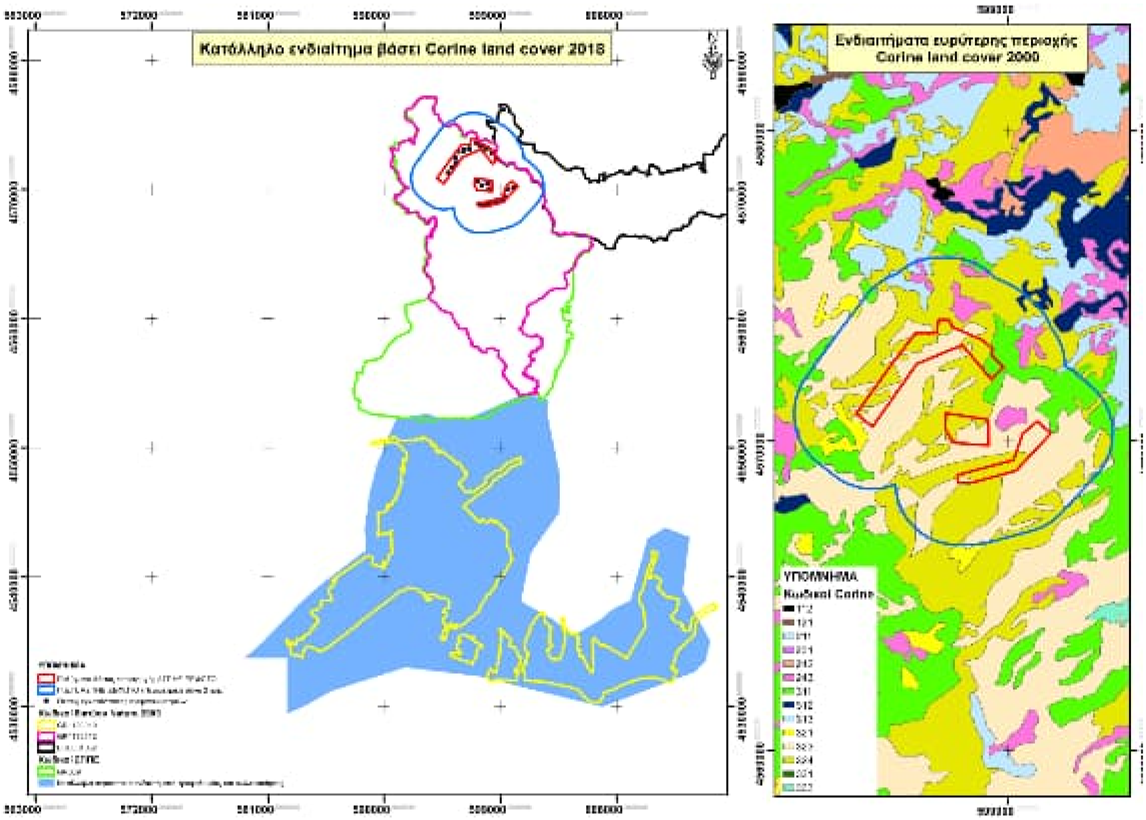
Χάρτης 70: Χάρτης κατανομής του κύκνου (*Cygnus olor*) στην ευρύτερη περιοχή μελέτης



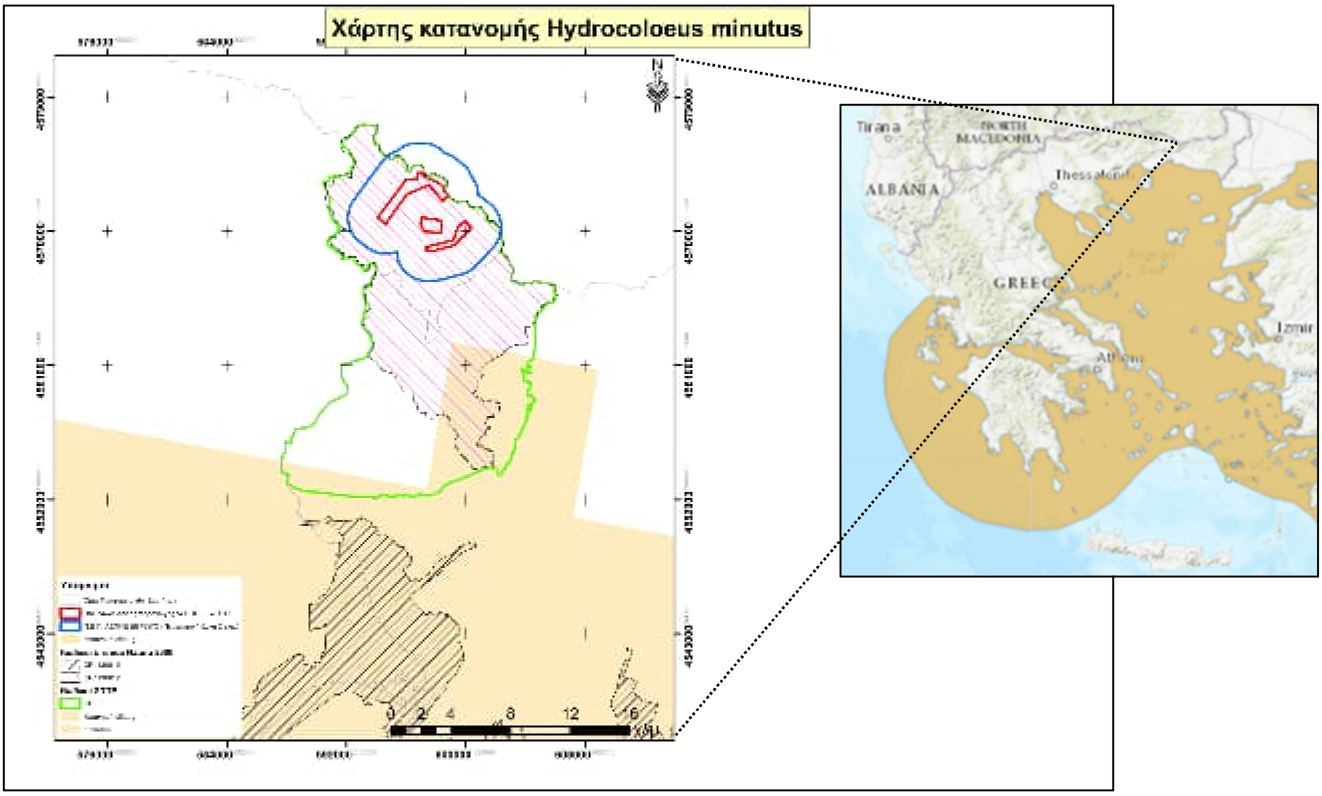
Χάρτης 71: Χάρτης ενδιαιτημάτων του κύκνου (*Cygnus olor*) στην ευρύτερη περιοχή μελέτης



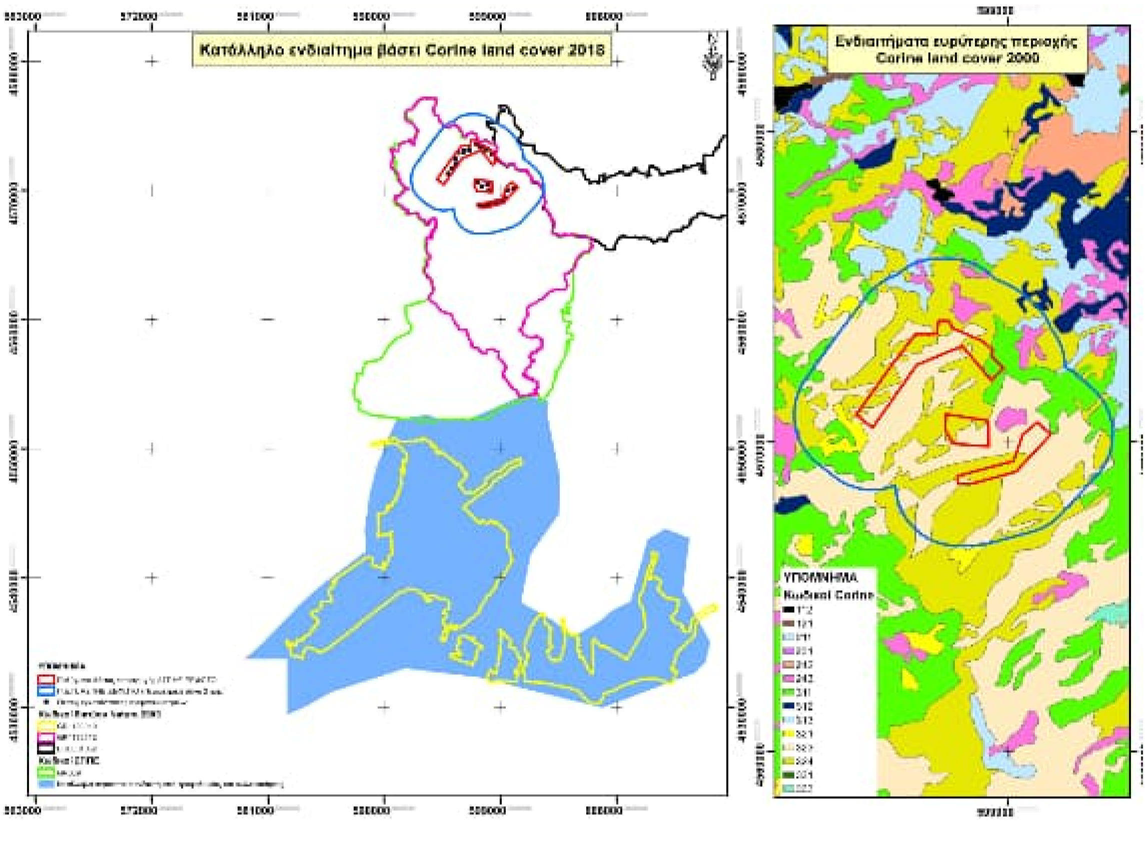
Χάρτης 72: Χάρτης κατανομής του μαυροκέφαλου γλάρου (*Larus melanocephalus*) στην ευρύτερη περιοχή μελέτης



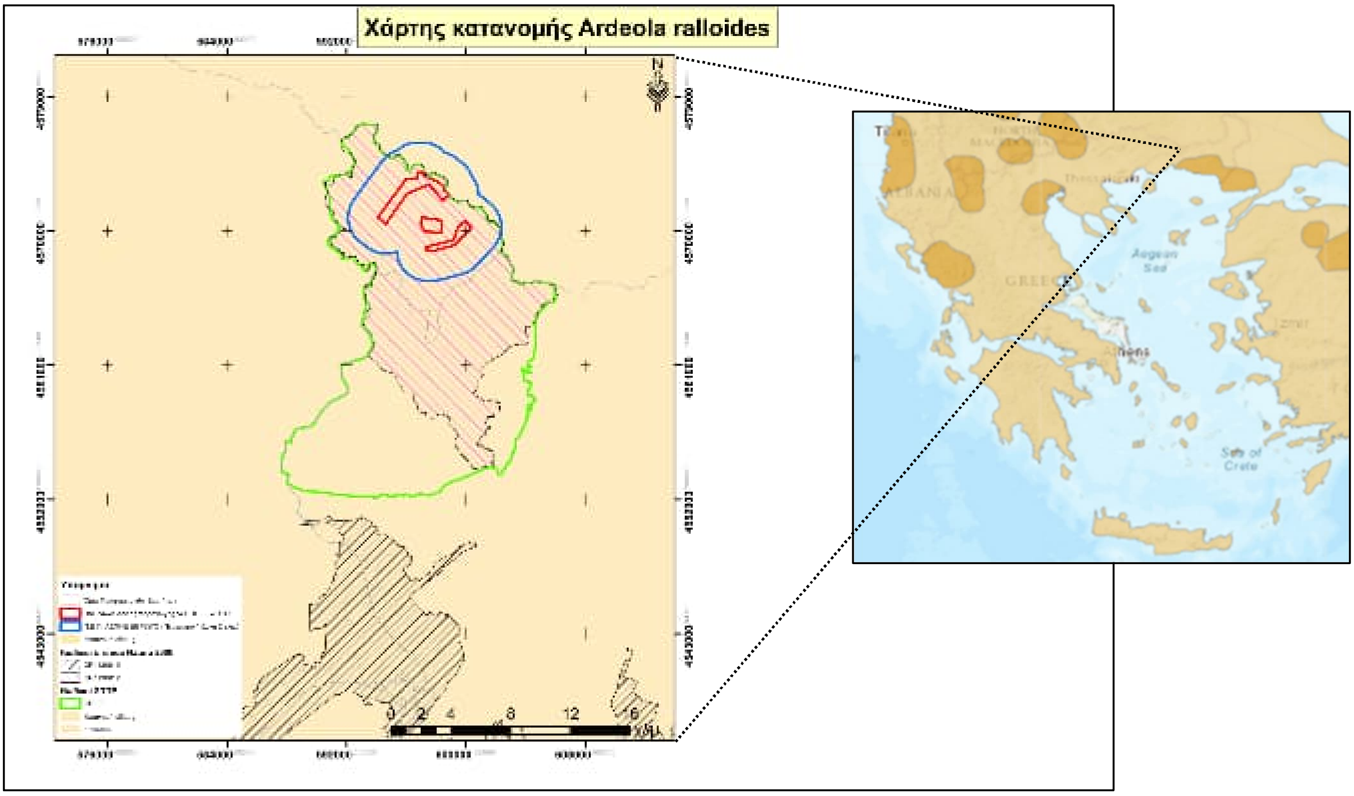
Χάρτης 73: Χάρτης ενδιαιτημάτων του μαυροκέφαλου γλάρου (*Larus melanocephalus*) στην ευρύτερη περιοχή μελέτης



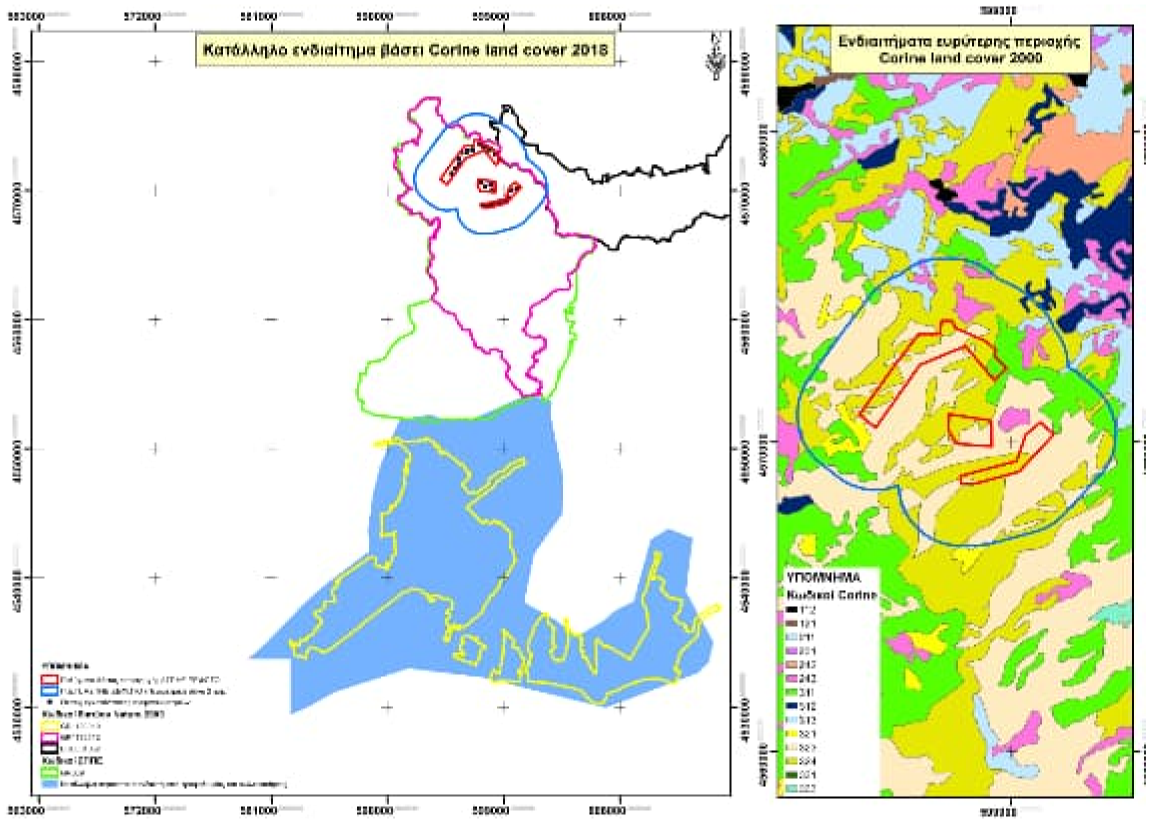
Χάρτης 74: Χάρτης κατανομής του νανόγλαρου (*Hydrocoloeus minutus*) στην ευρύτερη περιοχή μελέτης



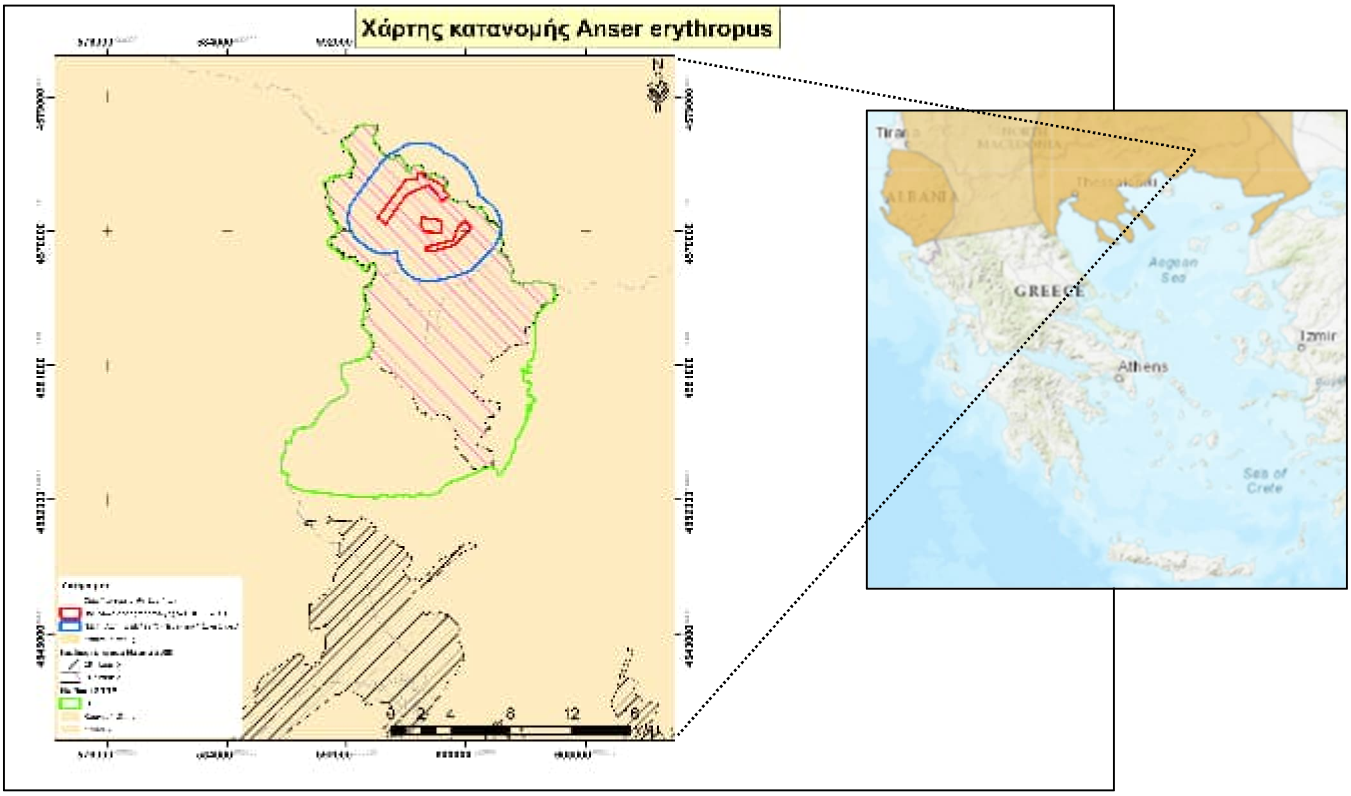
Χάρτης 75: Χάρτης ενδιαιτημάτων του νανόγλαρου (*Hydrocoloeus minutus*) στην ευρύτερη περιοχή μελέτης



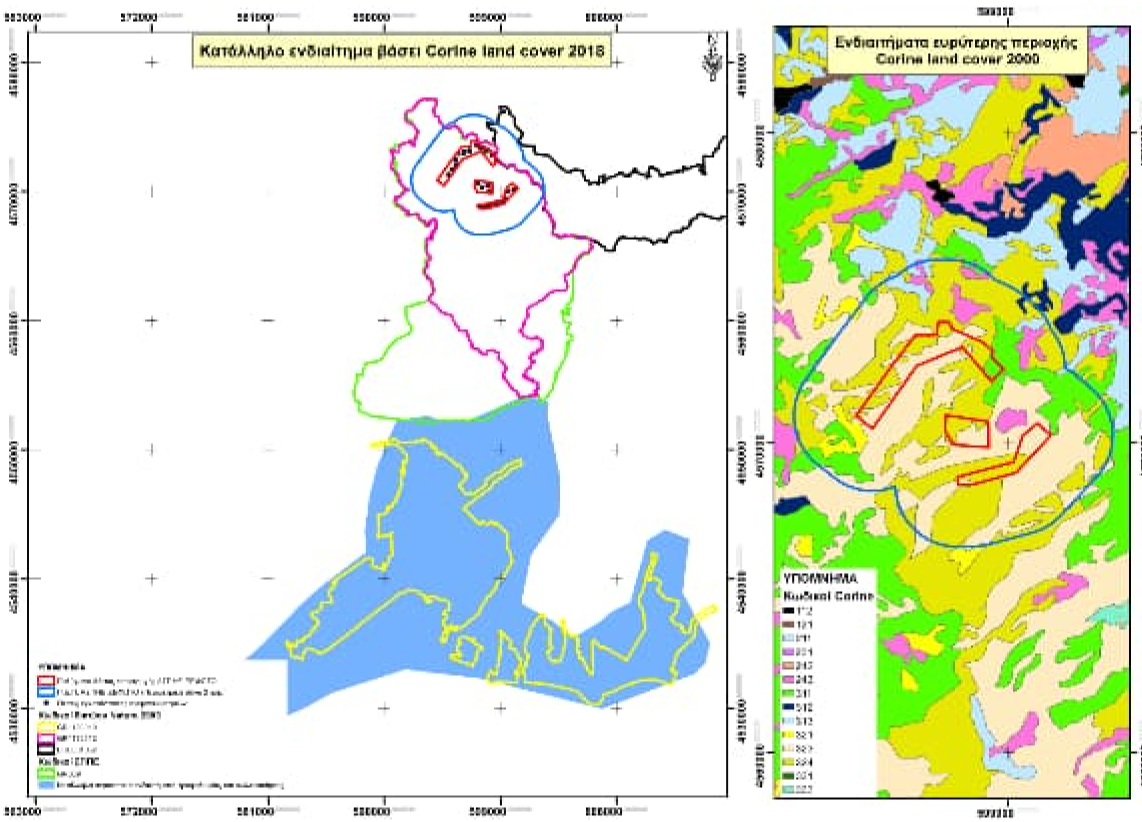
Χάρτης 76: Χάρτης κατανομής του κρυπτοτσικνιά (*Ardeola ralloides*) στην ευρύτερη περιοχή μελέτης



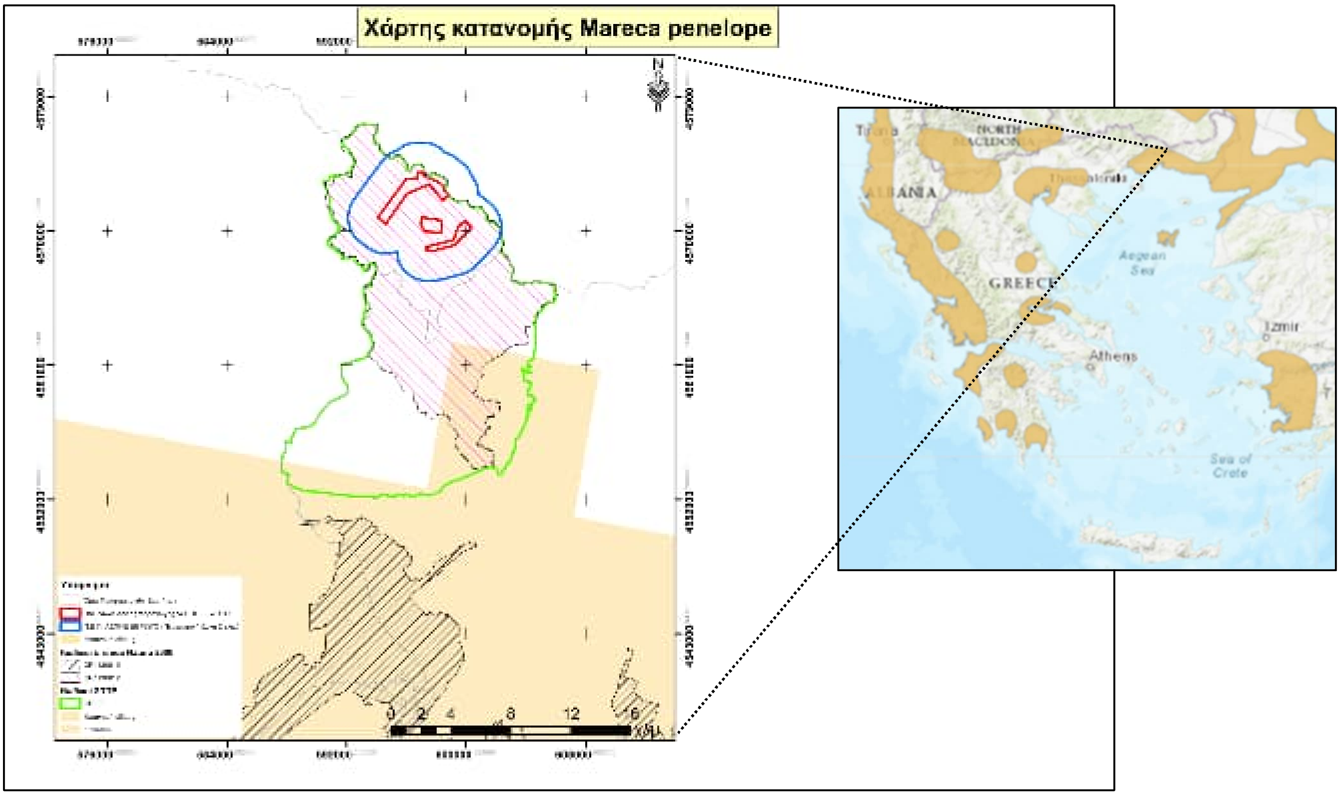
Χάρτης 77: Χάρτης ενδιαιτημάτων του κρυπτοτσικνιά (*Ardeola ralloides*) στην ευρύτερη περιοχή μελέτης



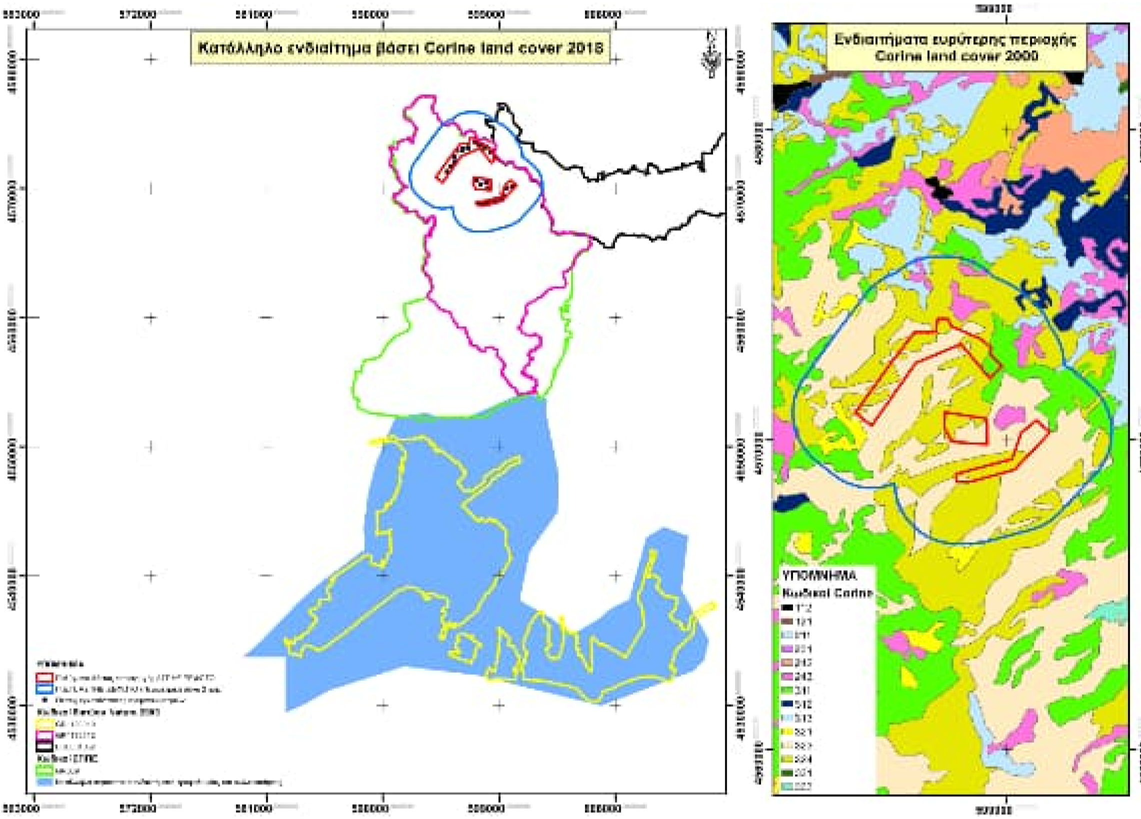
Χάρτης 78: Χάρτης κατανομής της νανόχηνας (*Anser erythropus*) στην ευρύτερη περιοχή μελέτης



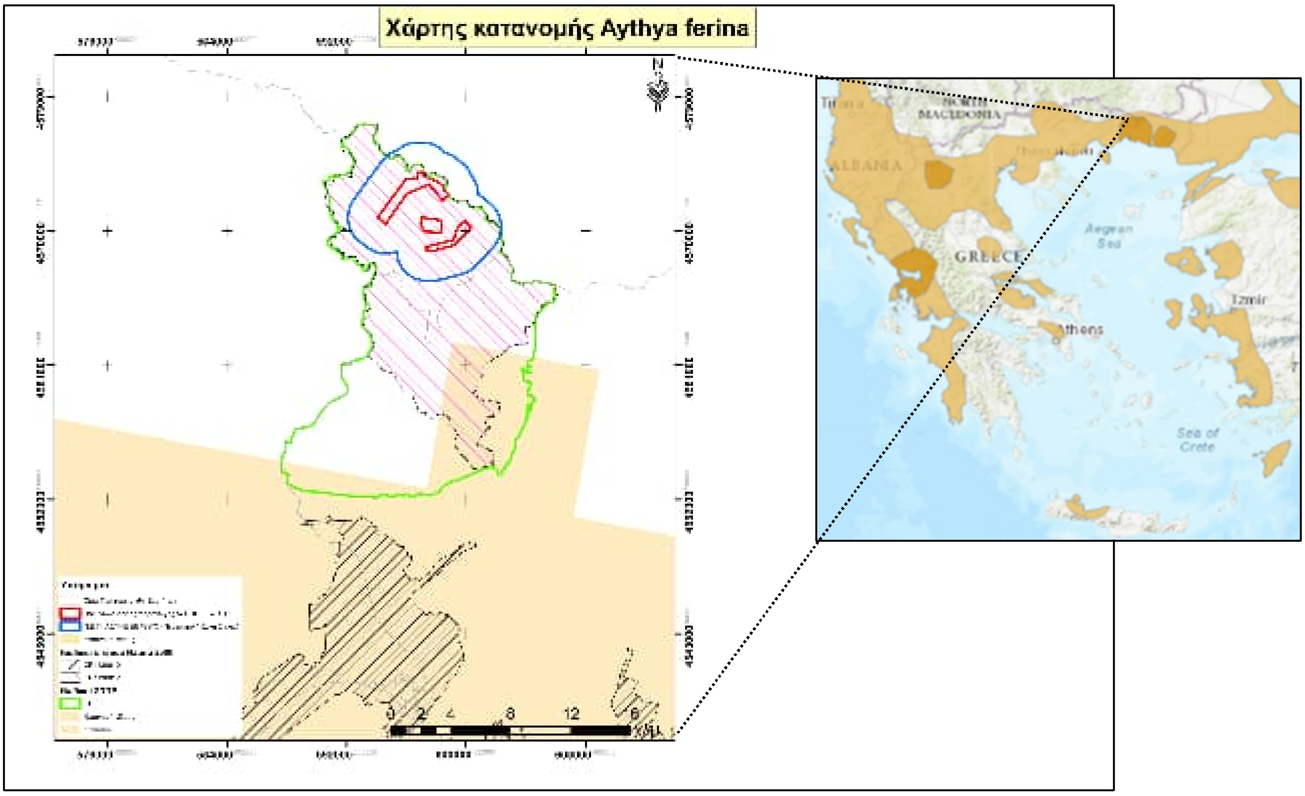
Χάρτης 79: Χάρτης ενδιαιτημάτων της νανόχηνας (*Anser erythropus*) στην ευρύτερη περιοχή μελέτης



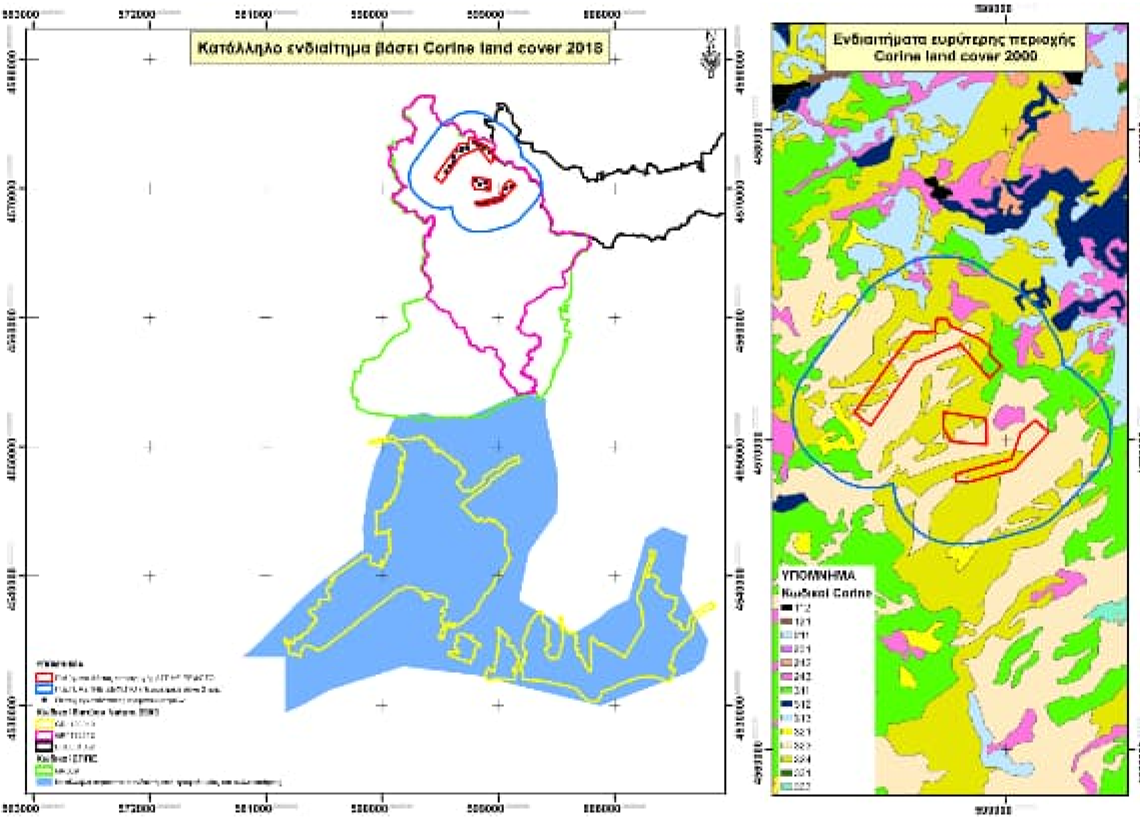
Χάρτης 80: Χάρτης κατανομής του σφυριχταριού (*Mareca penelope*) στην ευρύτερη περιοχή μελέτης



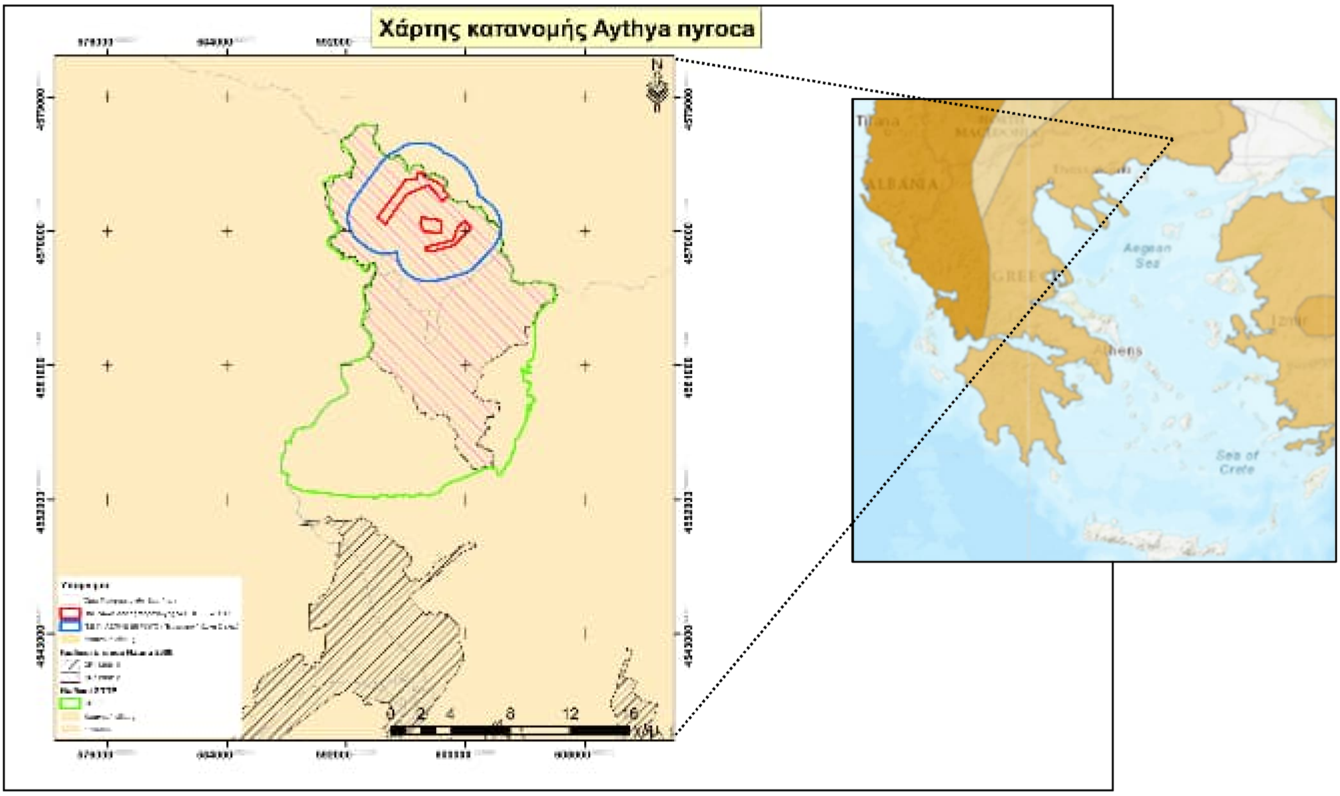
Χάρτης 81: Χάρτης ενδιαιτημάτων του σφυριχταριού (*Mareca penelope*) στην ευρύτερη περιοχή μελέτης



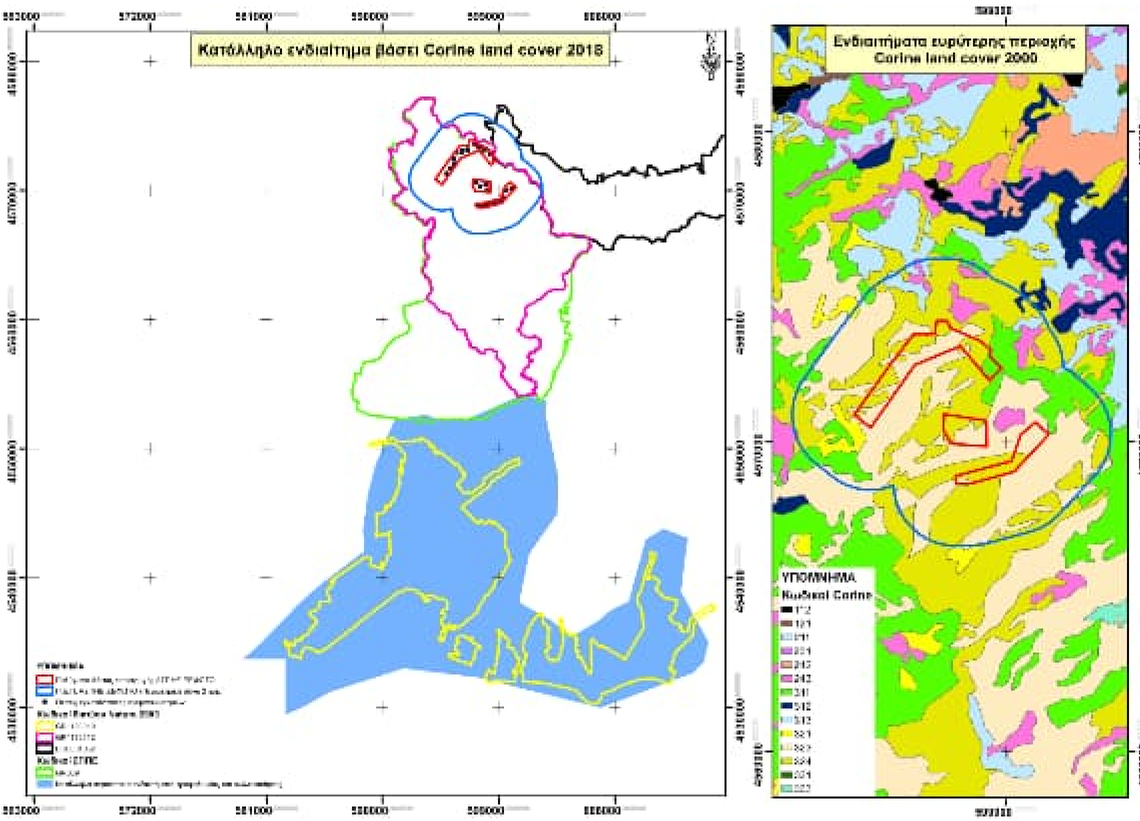
Χάρτης 82: Χάρτης κατανομής του γκισαριού (*Aythya ferina*) στην ευρύτερη περιοχή μελέτης



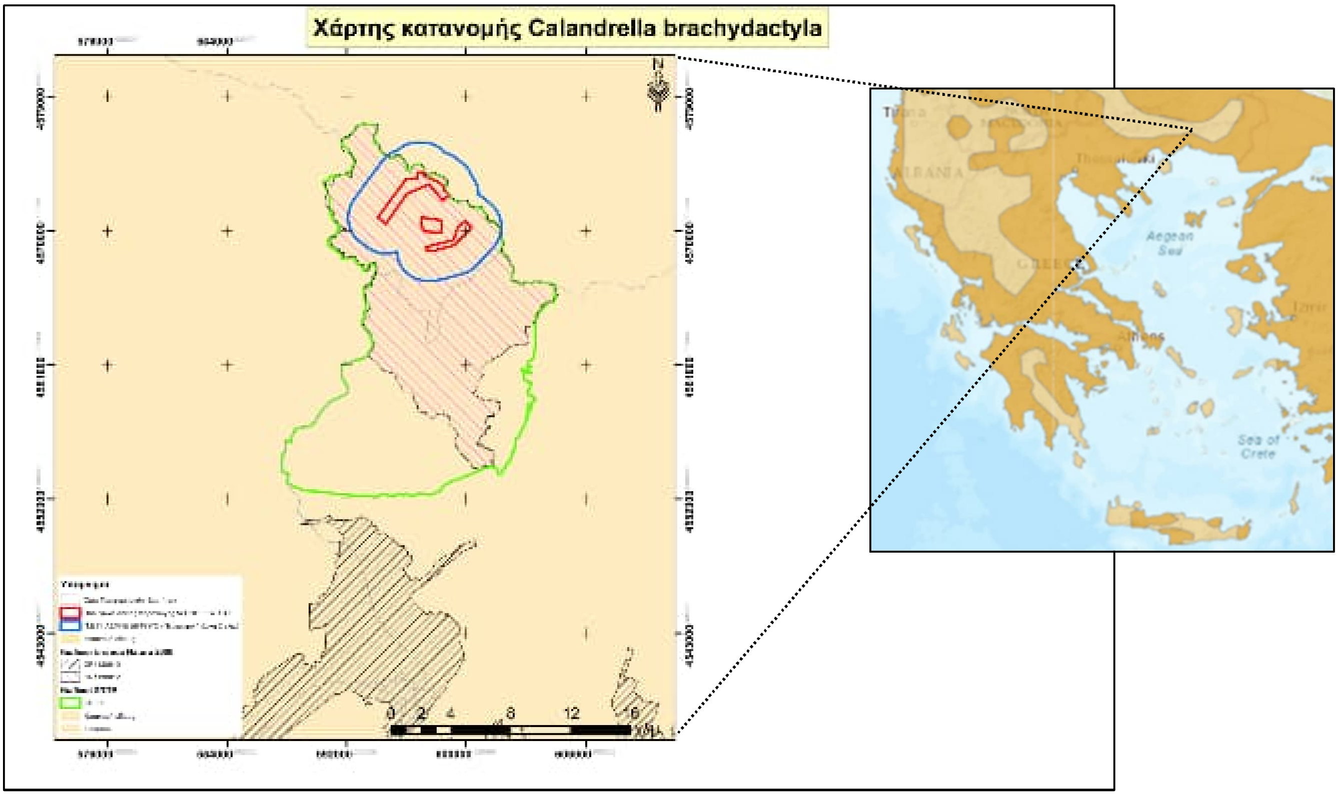
Χάρτης 83: Χάρτης ενδιαιτημάτων του γκισαριού (*Aythya ferina*) στην ευρύτερη περιοχή μελέτης



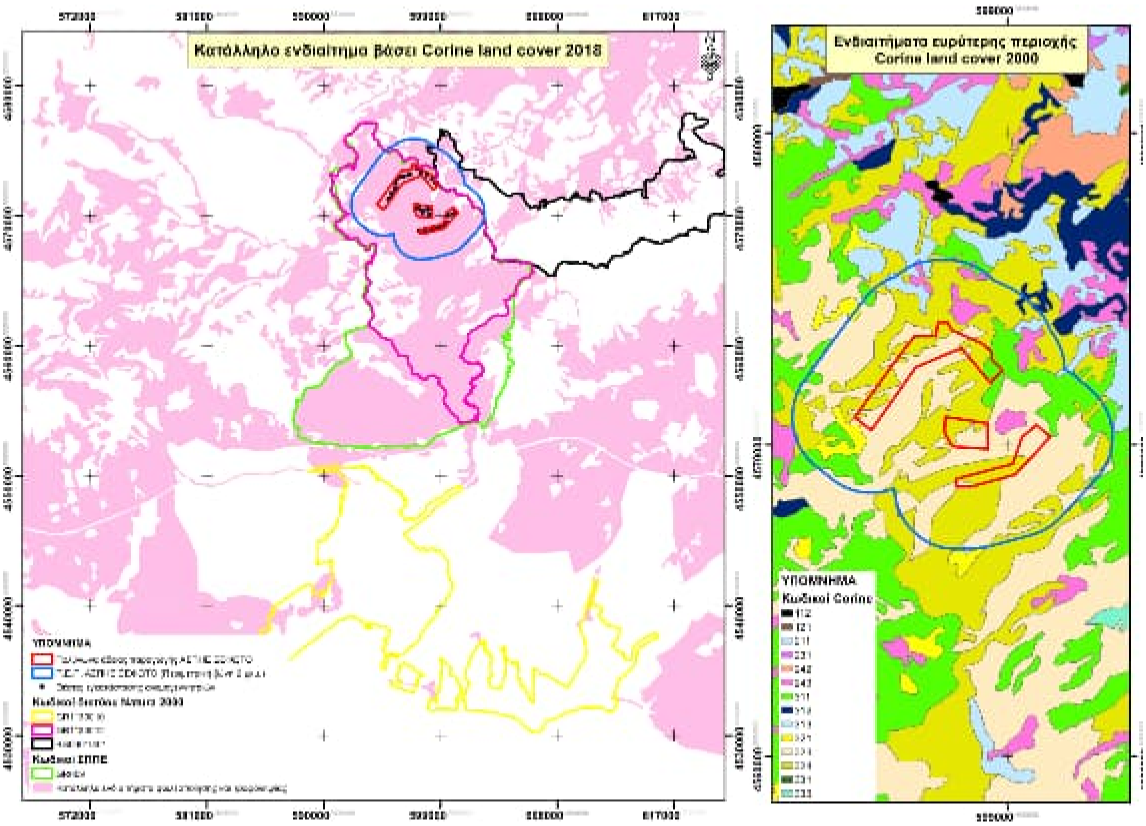
Χάρτης 84: Χάρτης κατανομής της βαλτόπαπιας (*Aythya nyroca*) στην ευρύτερη περιοχή μελέτης



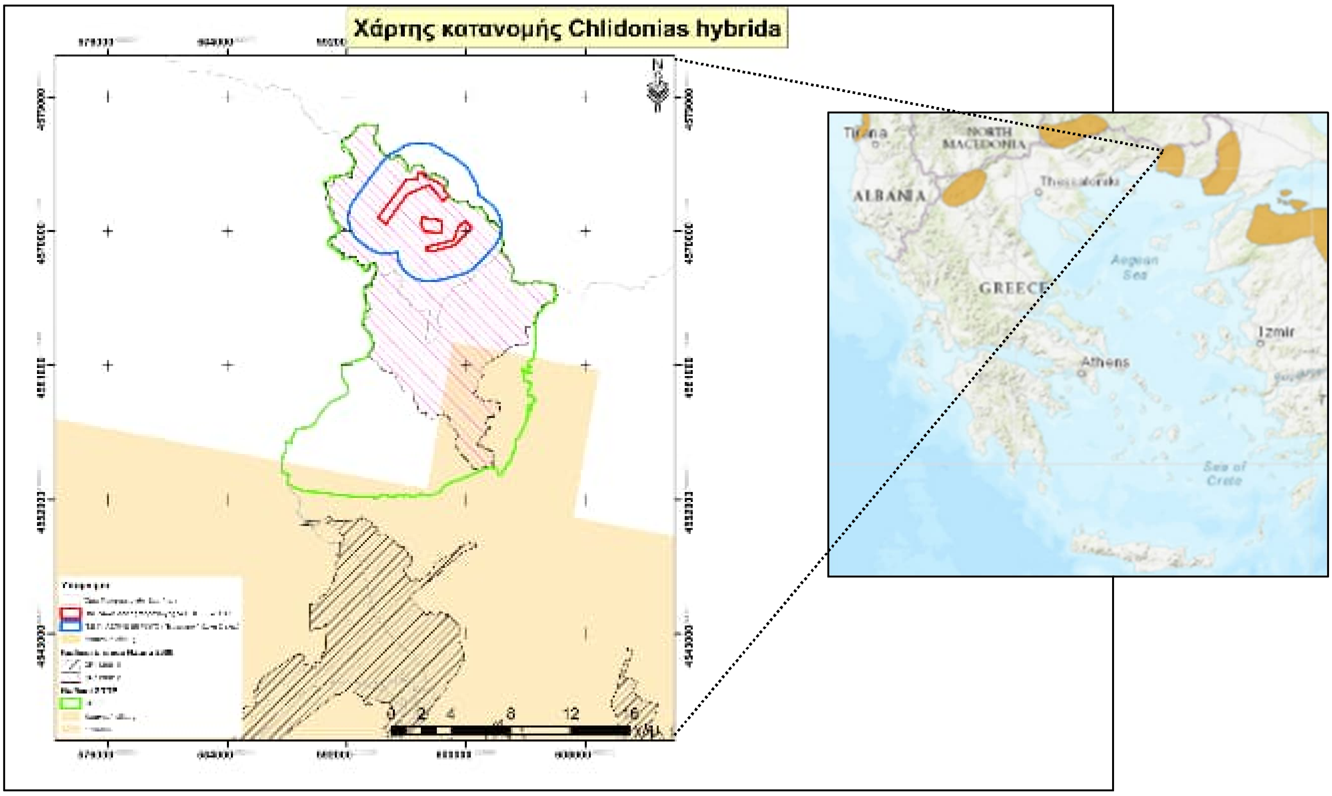
Χάρτης 85: Χάρτης ενδιαιτημάτων της βαλτόπαπιας (*Aythya nyroca*) στην ευρύτερη περιοχή μελέτης



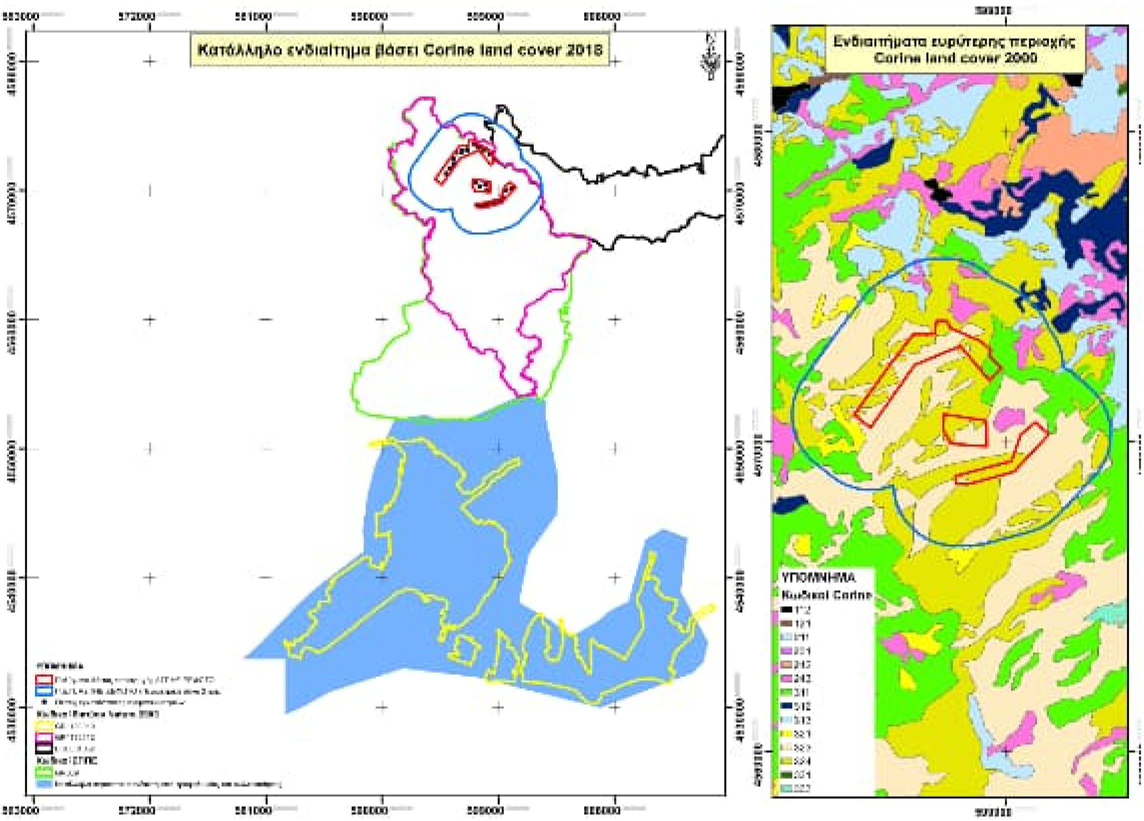
Χάρτης 86: Χάρτης κατανομής της μικρογαλιάντρας (*Calandrella brachydactyla*) στην ευρύτερη περιοχή μελέτης



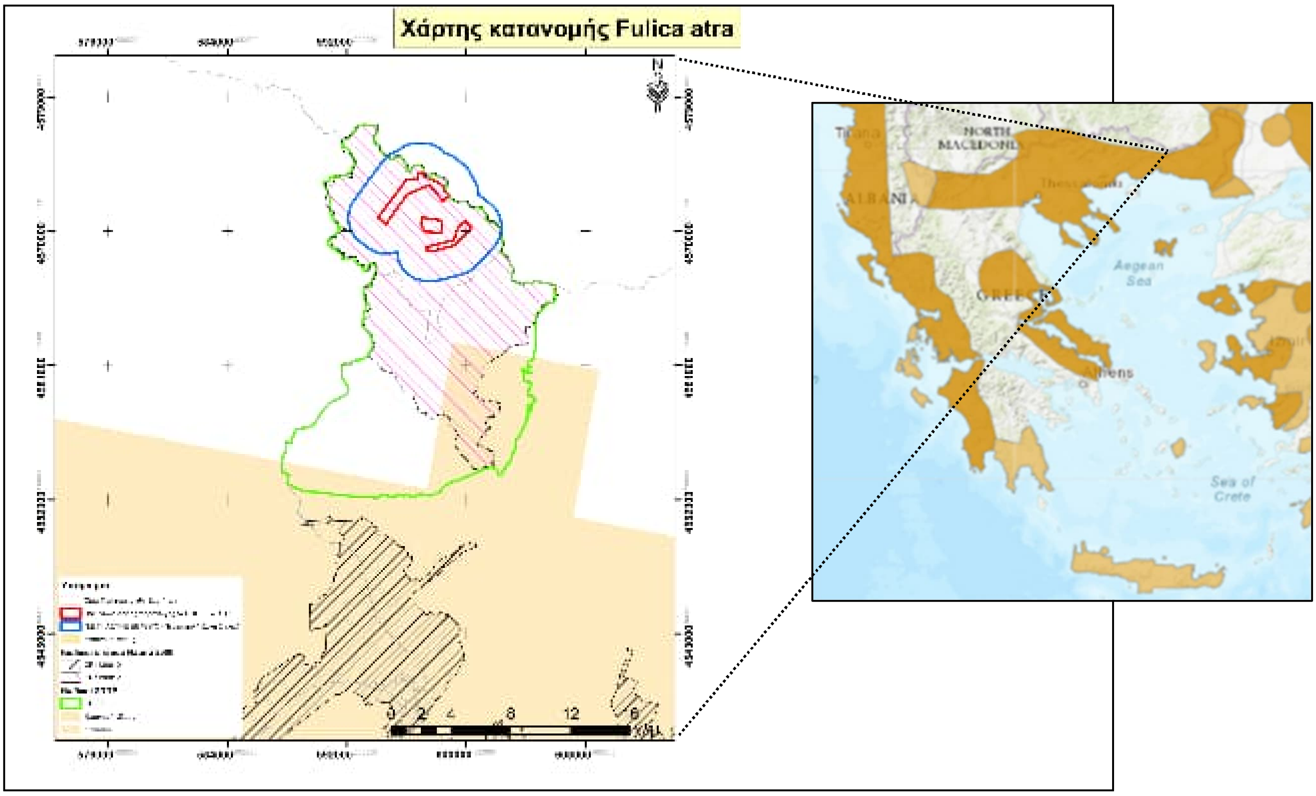
Χάρτης 87: Χάρτης ενδιαιτημάτων της μικρογαλιάντρας (*Calandrella brachydactyla*) στην ευρύτερη περιοχή μελέτης



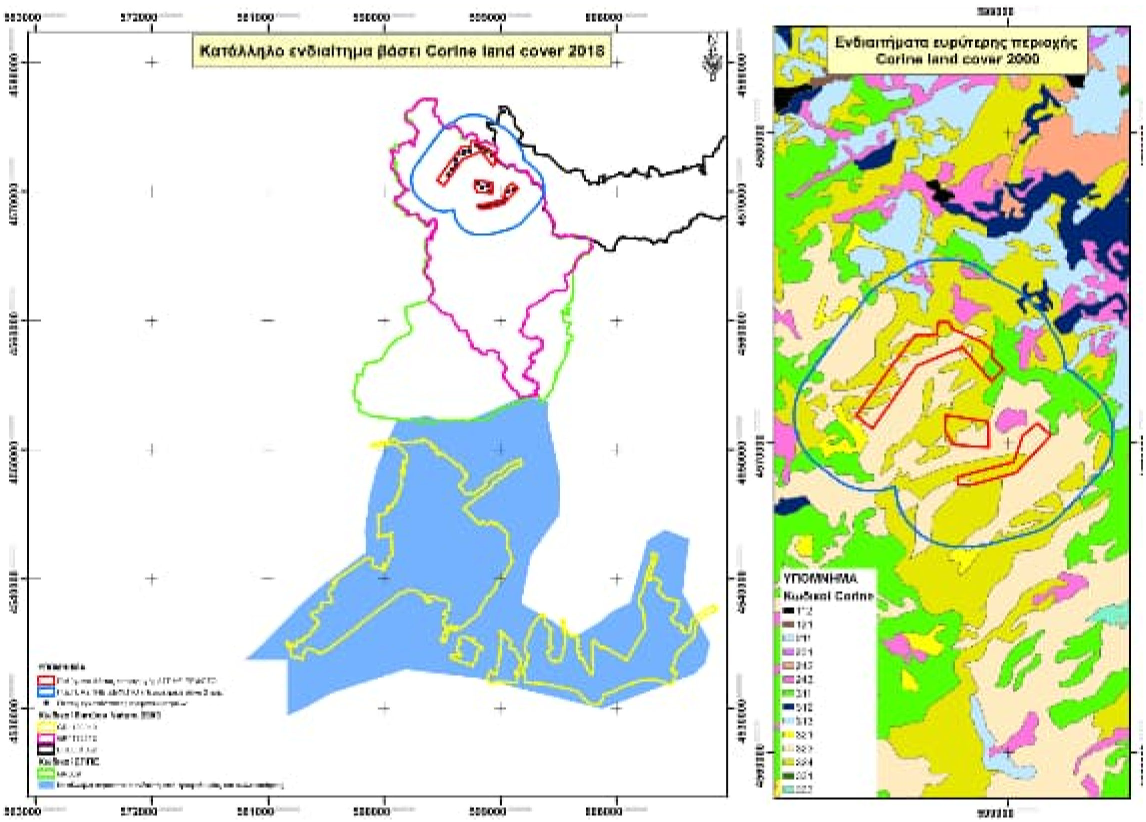
Χάρτης 88: Χάρτης κατανομής του μουστακογλάρονου (*Chlidonias hybrida*) στην ευρύτερη περιοχή μελέτης



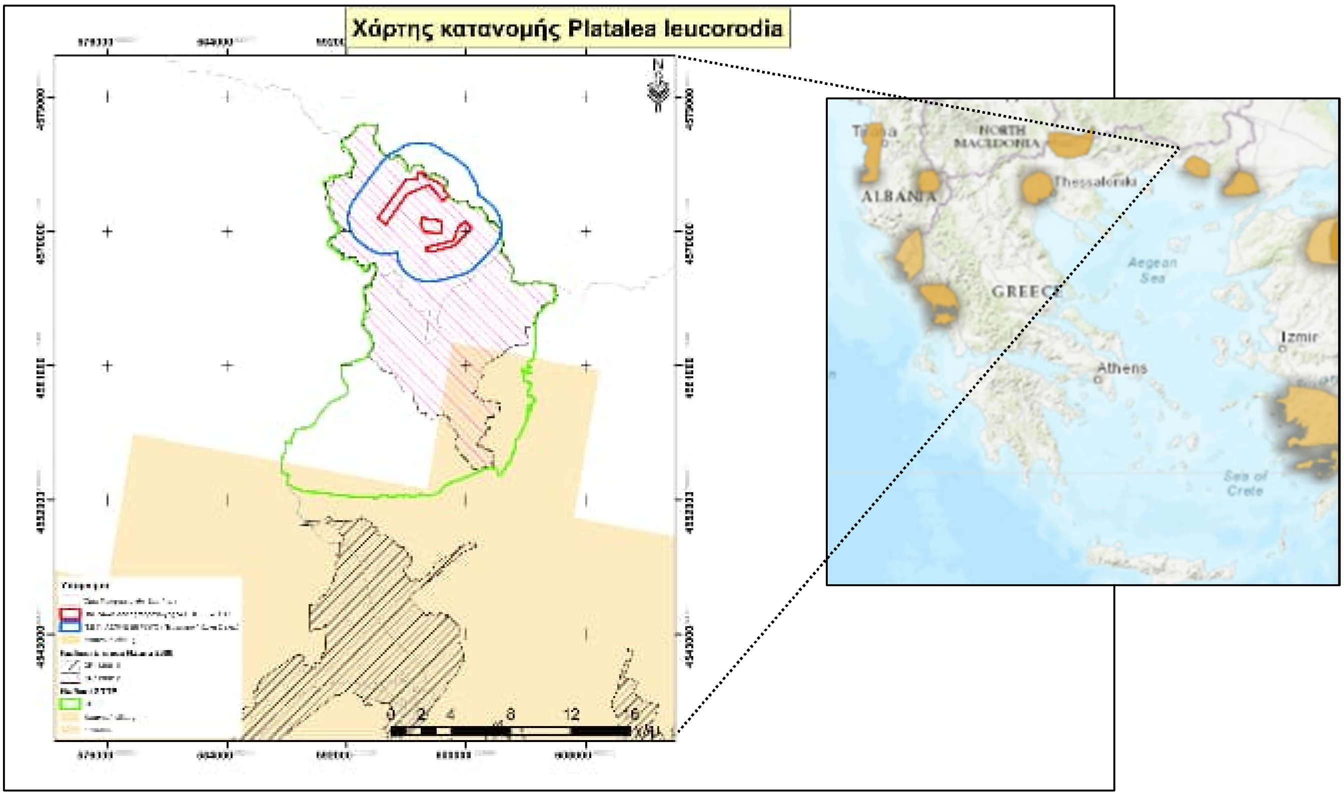
Χάρτης 89: Χάρτης ενδιαιτημάτων του μουστακογλάρονου (*Chlidonias hybrida*) στην ευρύτερη περιοχή μελέτης



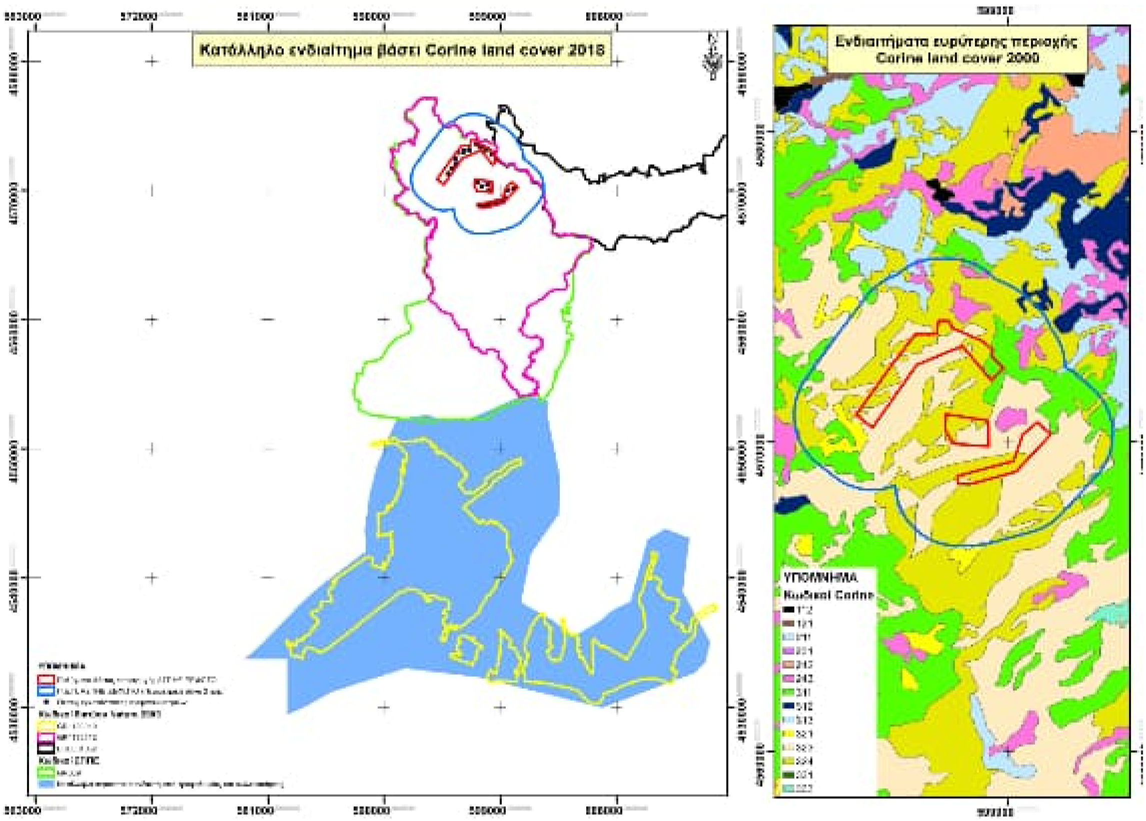
Χάρτης 90: Χάρτης κατανομής της φαλαρίδας (*Fulica atra*) στην ευρύτερη περιοχή μελέτης



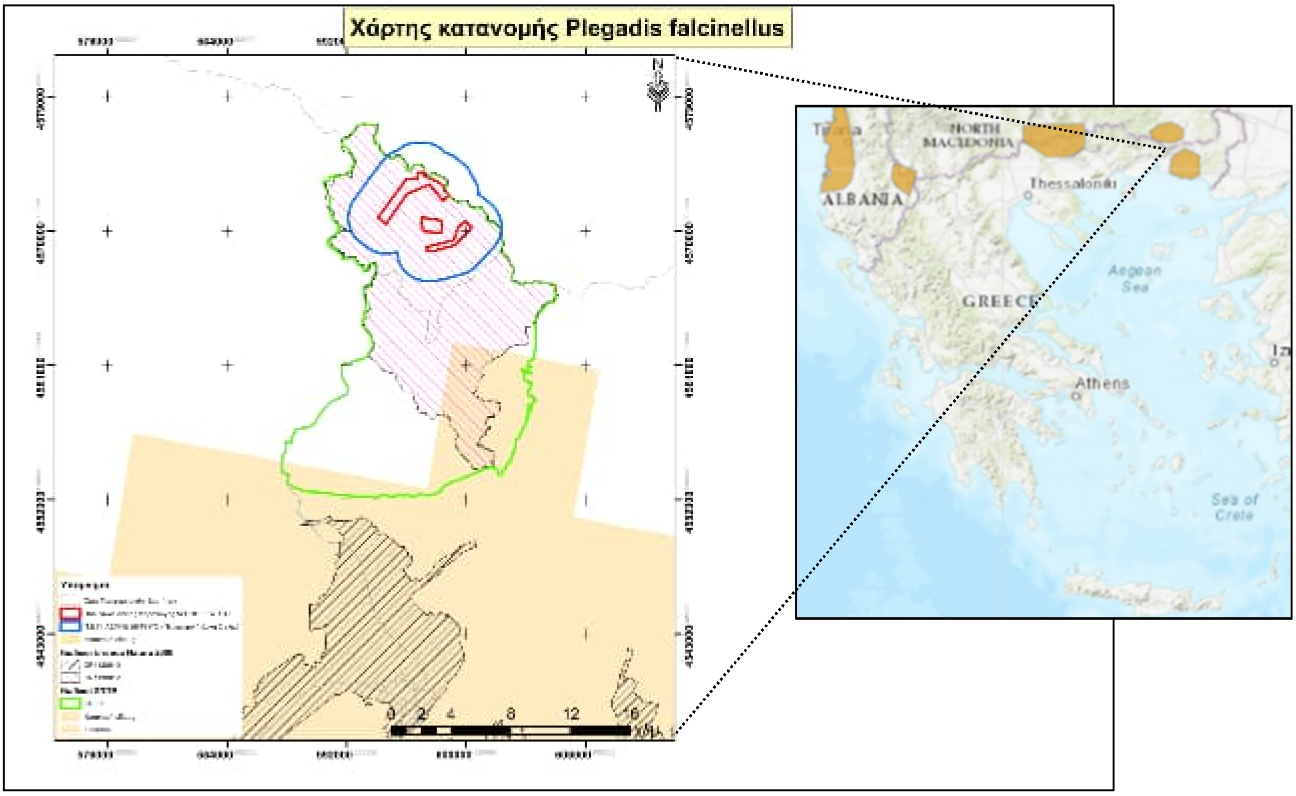
Χάρτης 91: Χάρτης ενδιαιτημάτων της φαλαρίδας (*Fulica atra*) στην ευρύτερη περιοχή μελέτης



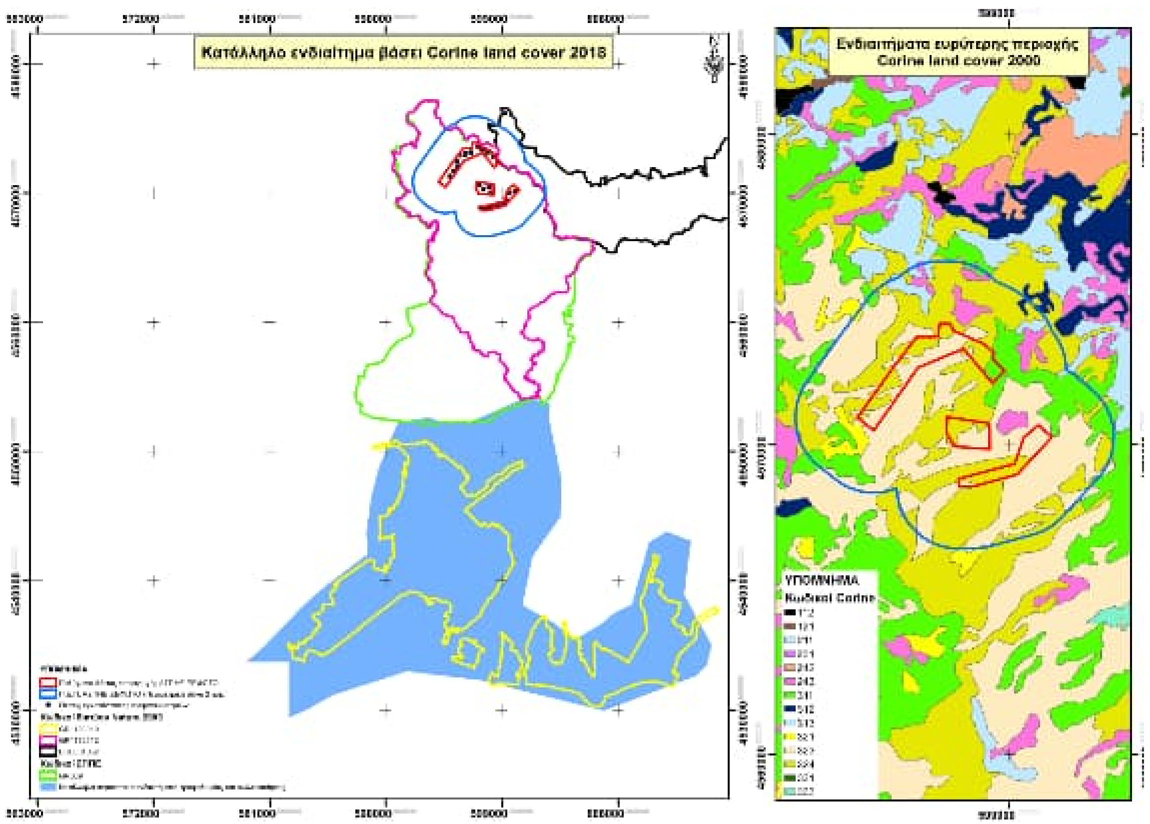
Χάρτης 92: Χάρτης κατανομής της χουλιαρομύτας (*Platalea leucorodia*) στην ευρύτερη περιοχή μελέτης



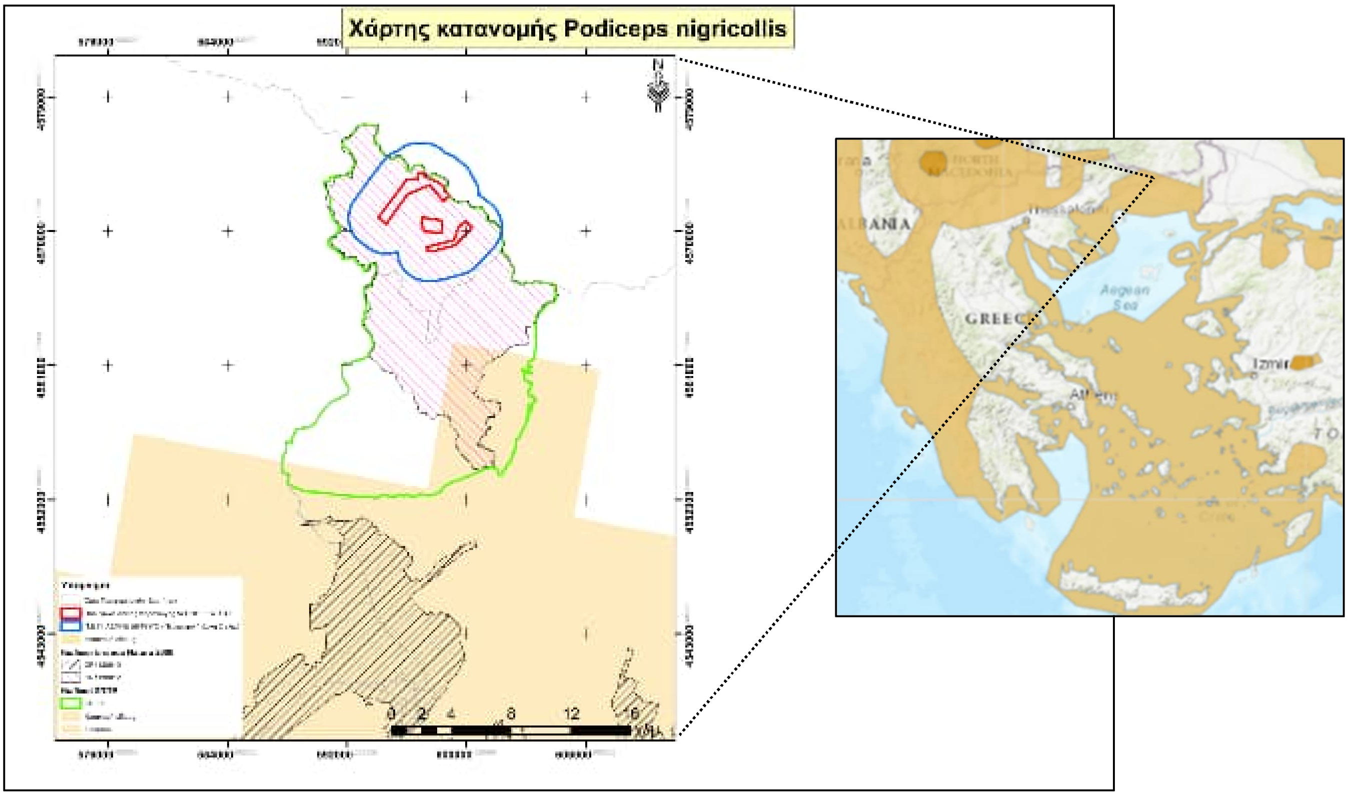
Χάρτης 93: Χάρτης ενδιαιτημάτων της χουλιαρομύτας (*Platalea leucorodia*) στην ευρύτερη περιοχή μελέτης



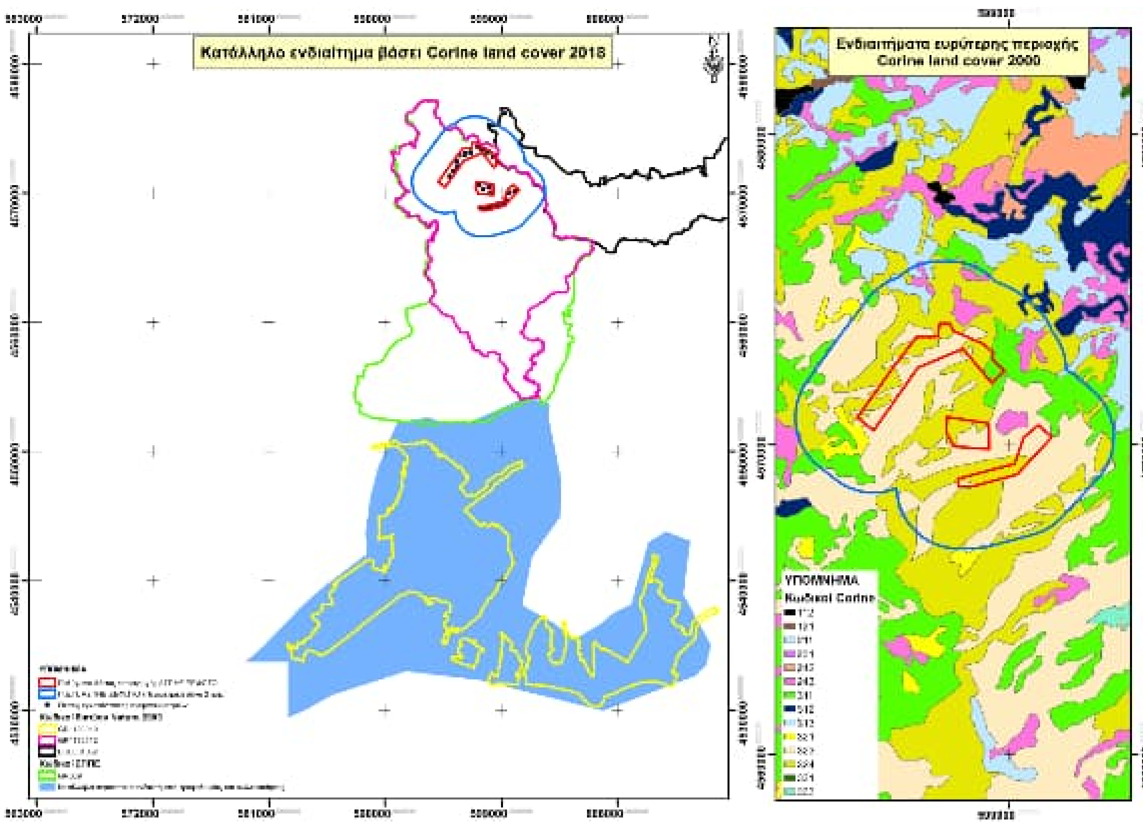
Χάρτης 94: Χάρτης κατανομής της χαλκόκοτας (*Plegadis falcinellus*) στην ευρύτερη περιοχή μελέτης



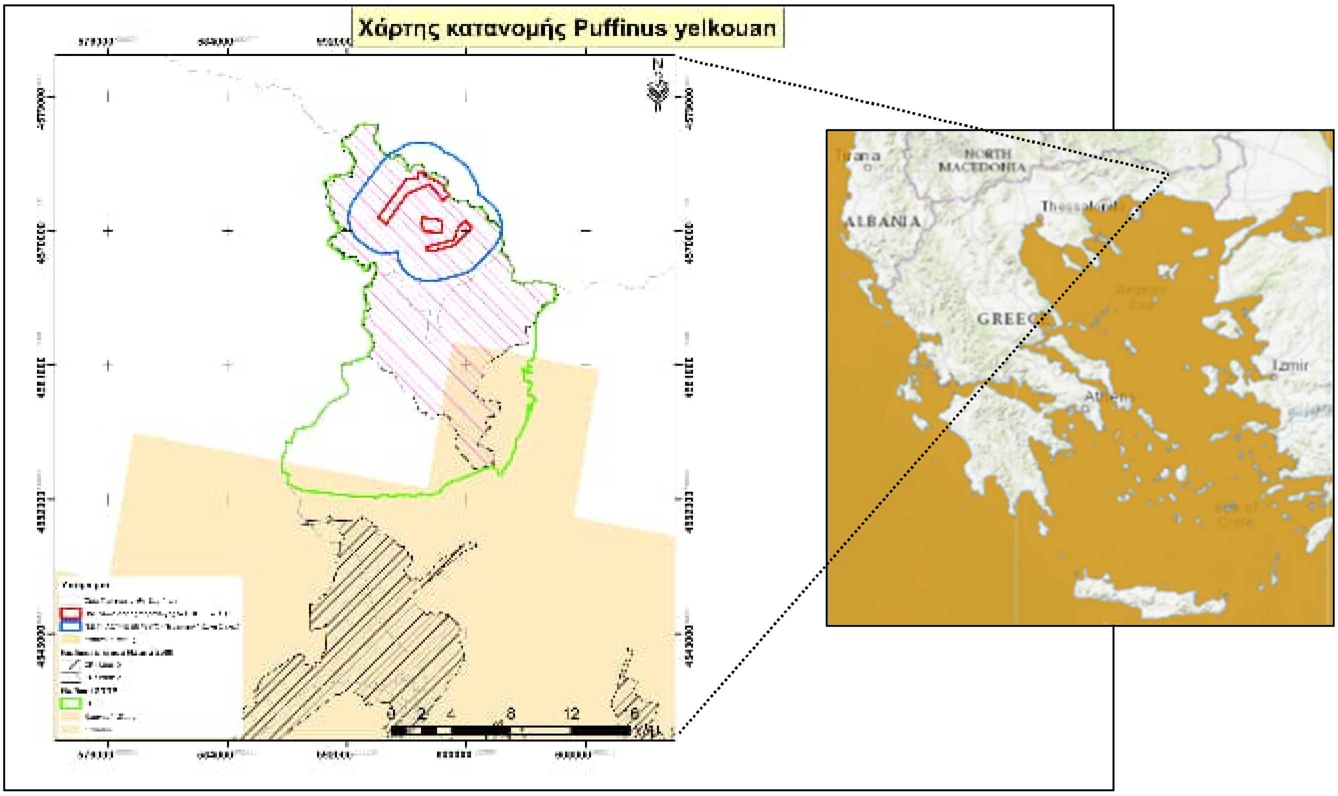
Χάρτης 95: Χάρτης ενδιαιτημάτων της χαλκόκοτας (*Plegadis falcinellus*) στην ευρύτερη περιοχή μελέτης



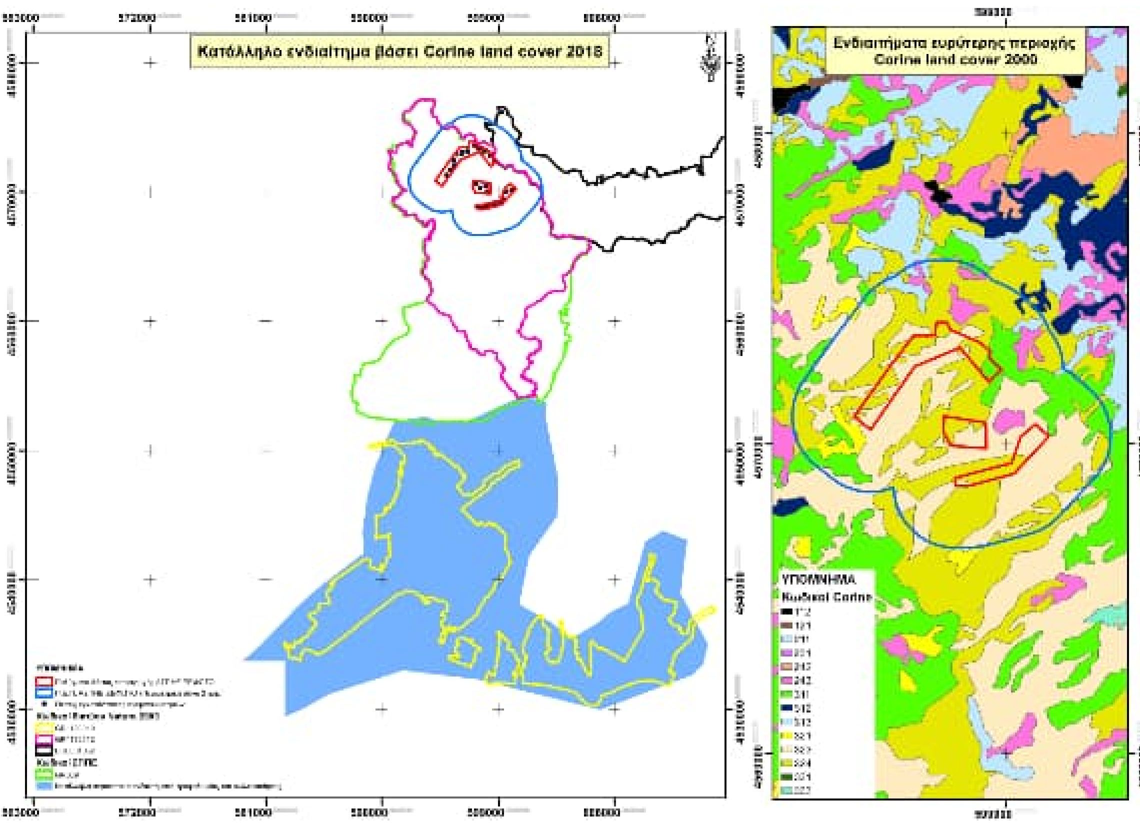
Χάρτης 96: Χάρτης κατανομής του μαυροβουτηχταριού (*Podiceps nigricollis*) στην ευρύτερη περιοχή μελέτης



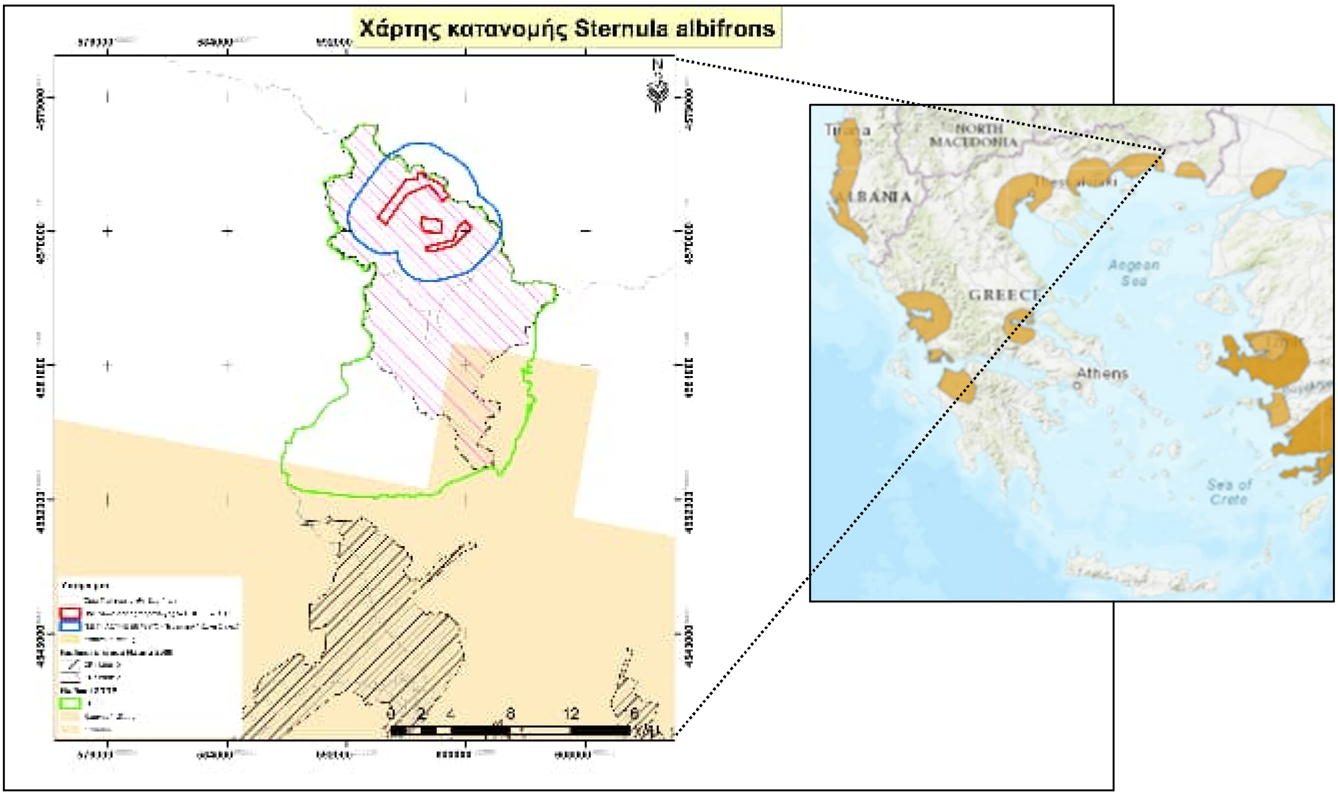
Χάρτης 97: Χάρτης ενδιαιτημάτων του μαυροβουτηχταριού (*Podiceps nigricollis*) στην ευρύτερη περιοχή μελέτης



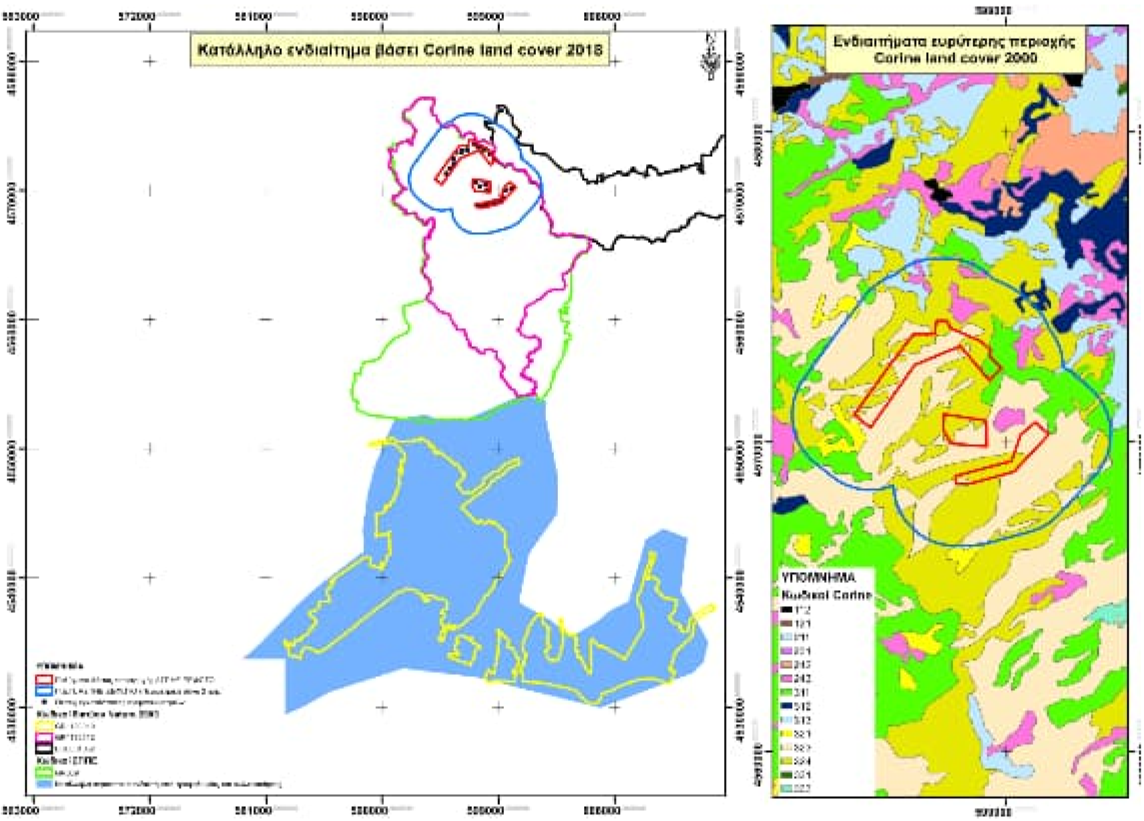
Χάρτης 98: Χάρτης κατανομής του μίχου (*Puffinus yelkouan*) στην ευρύτερη περιοχή μελέτης



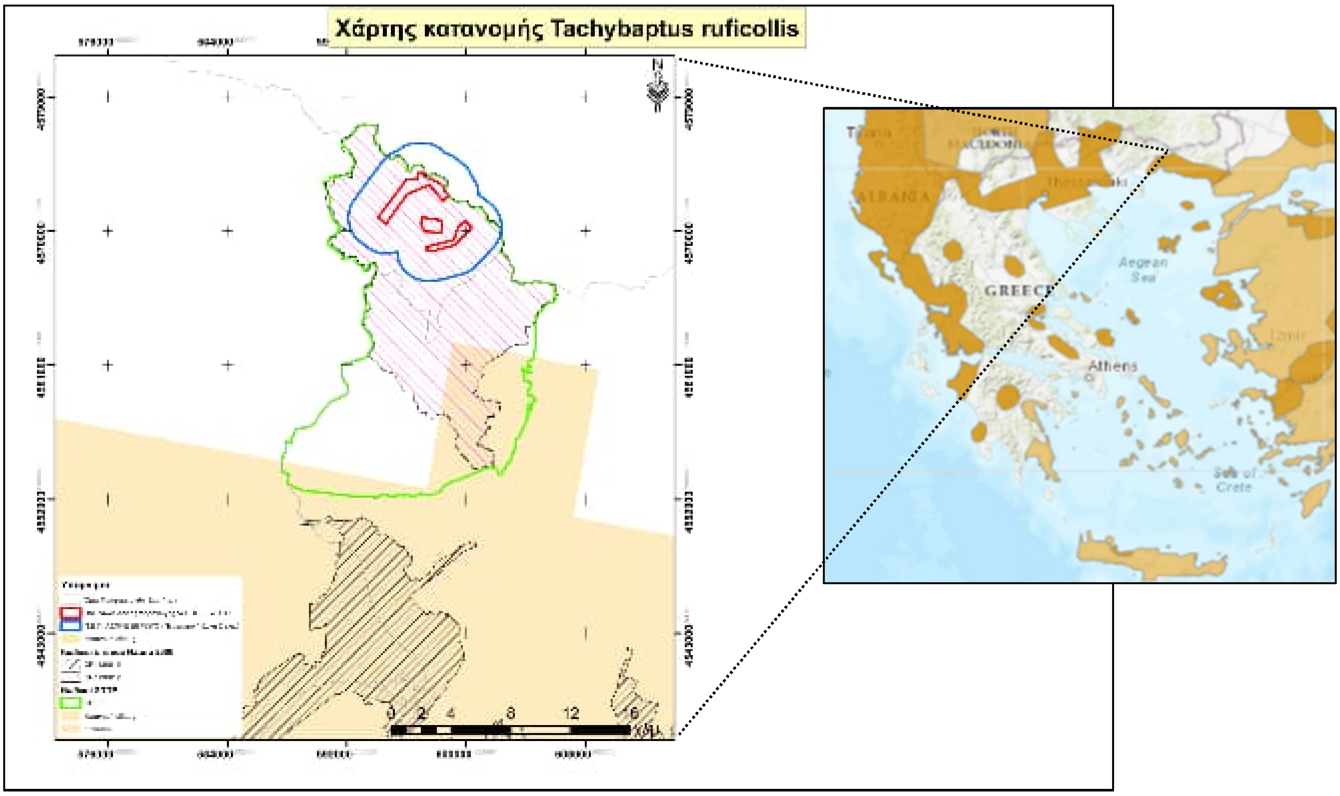
Χάρτης 99: Χάρτης ενδιαιτημάτων του μίχου (*Puffinus yelkouan*) στην ευρύτερη περιοχή μελέτης



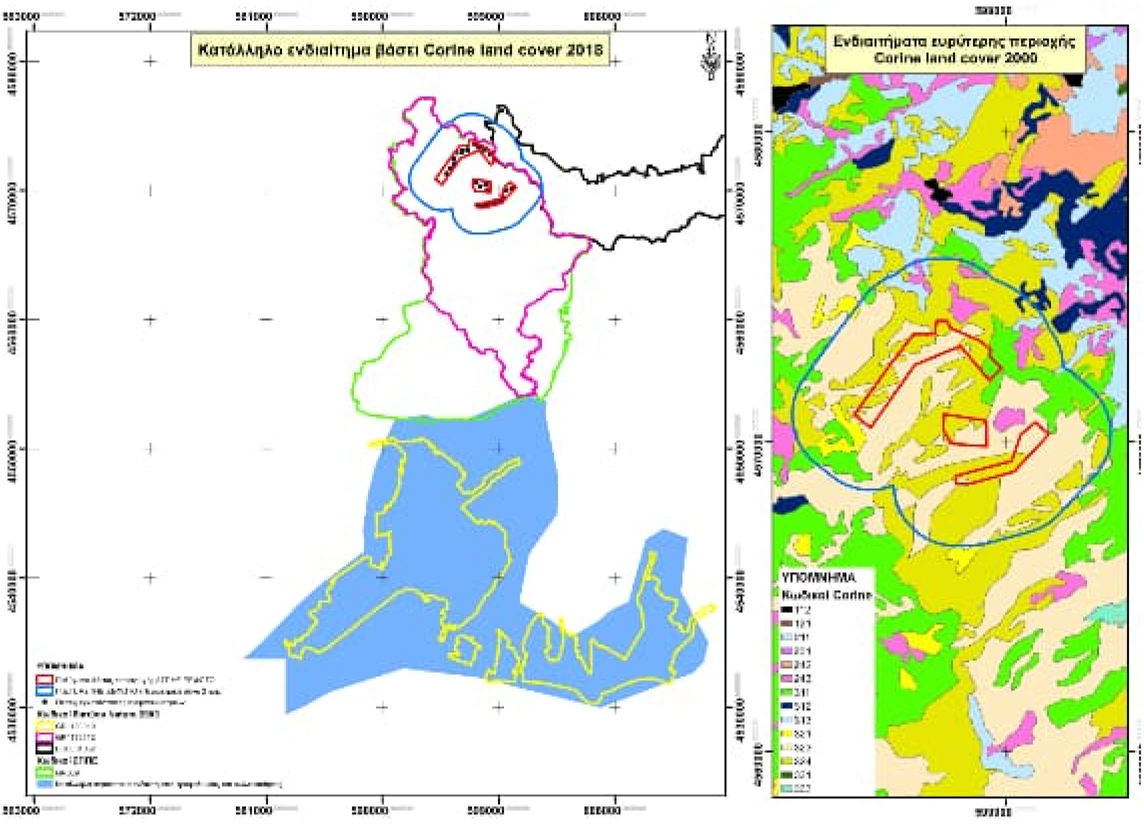
Χάρτης 100: Χάρτης κατανομής του νανογλάρονου (*Sternula albifrons*) στην ευρύτερη περιοχή μελέτης



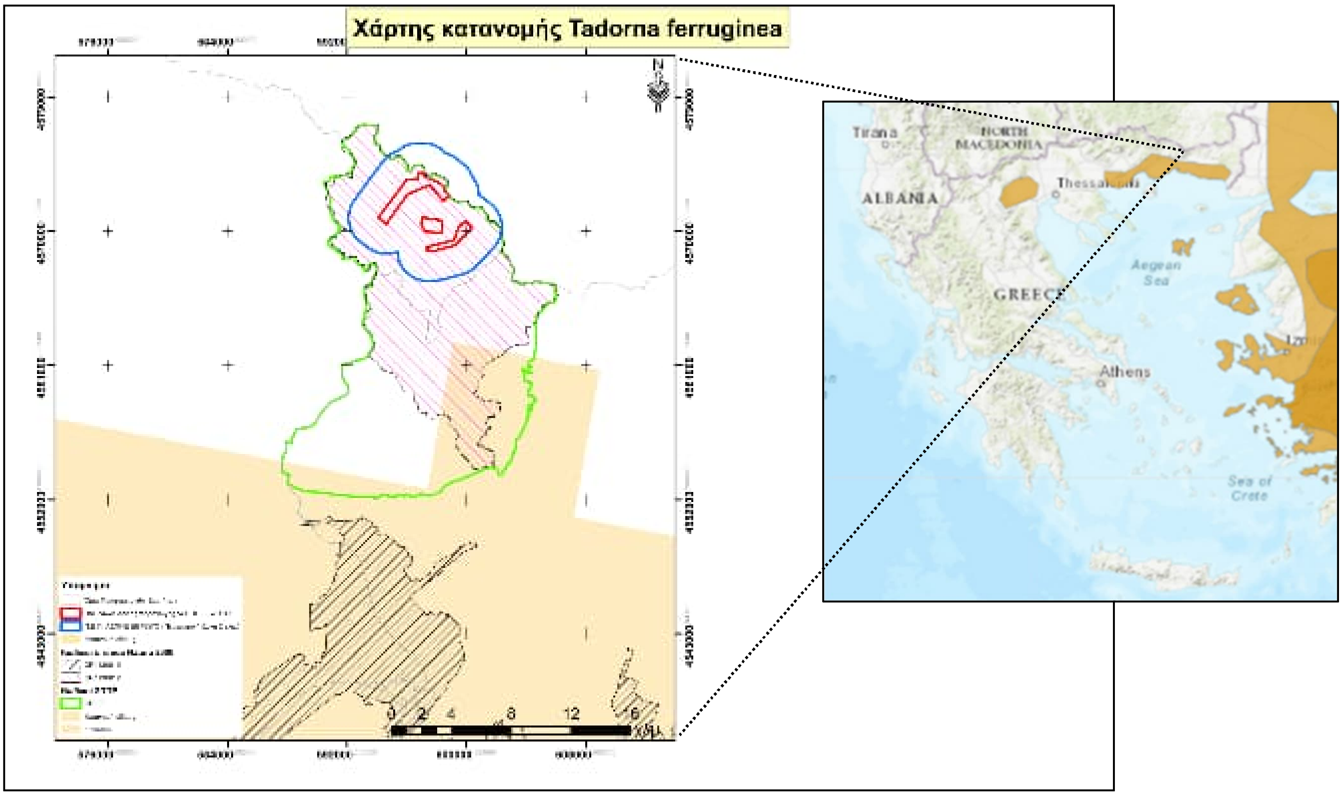
Χάρτης 101: Χάρτης ενδιαιτημάτων του νανογλάρονου (*Sternula albifrons*) στην ευρύτερη περιοχή μελέτης



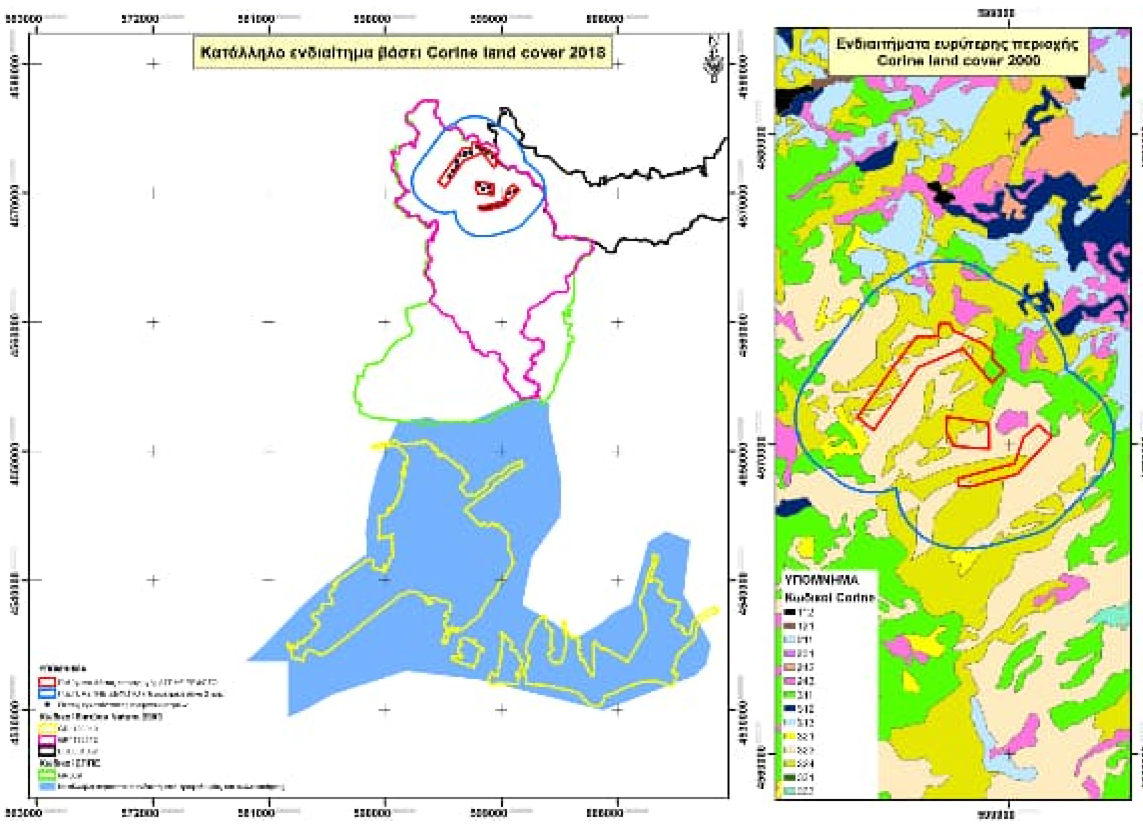
Χάρτης 102: Χάρτης κατανομής του νανοβουτηχταριού (*Tachybaptus ruficollis*) στην ευρύτερη περιοχή μελέτης



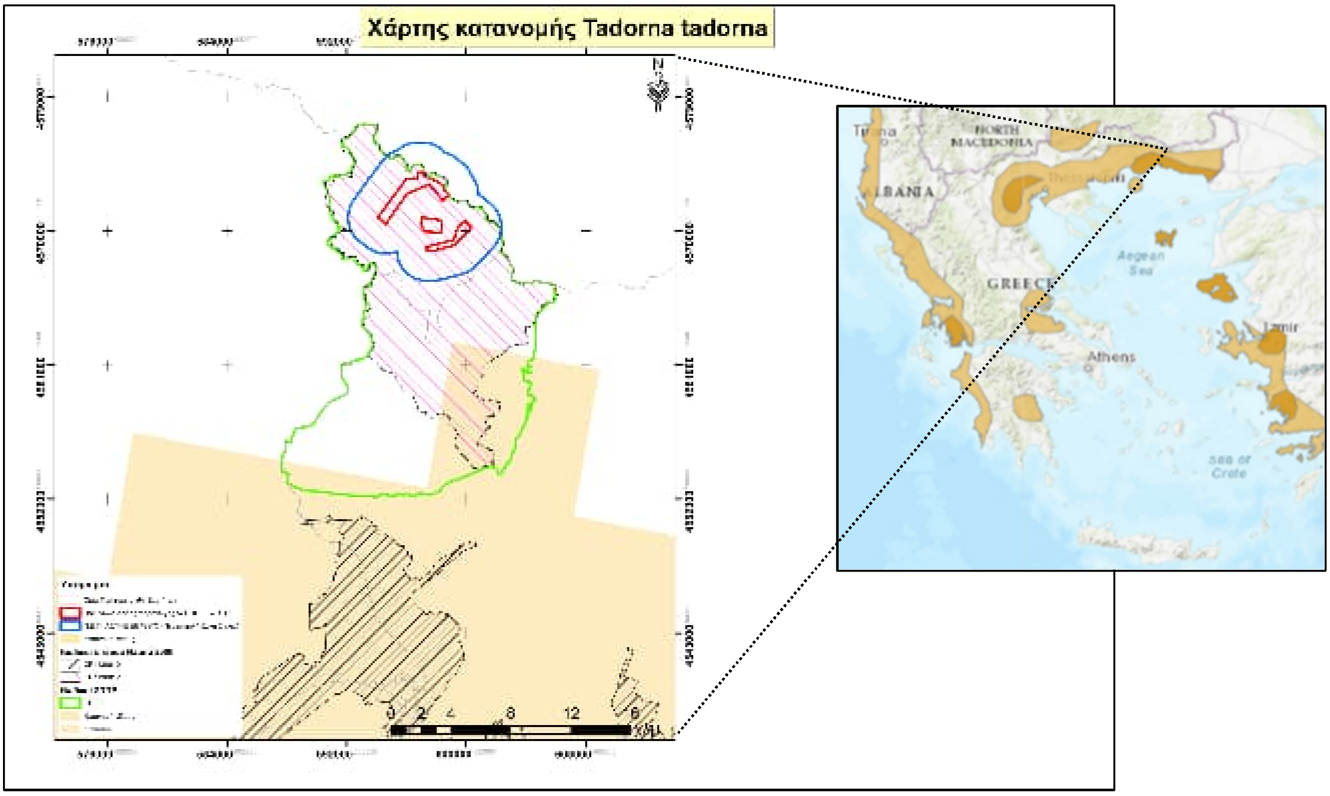
Χάρτης 103: Χάρτης ενδιαιτημάτων του νανοβουτηχταριού (*Tachybaptus ruficollis*) στην ευρύτερη περιοχή μελέτης



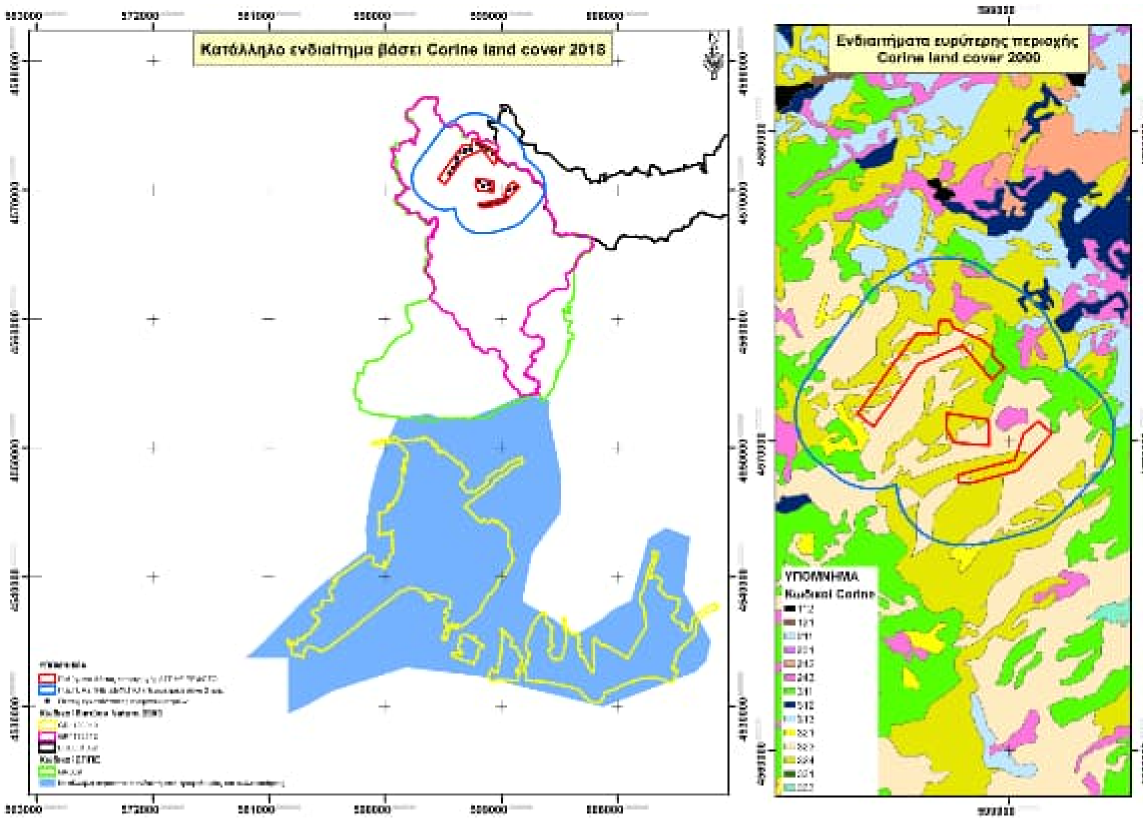
Χάρτης 104: Χάρτης κατανομής της καστανόπαπιας (*Tadorna ferruginea*) στην ευρύτερη περιοχή μελέτης



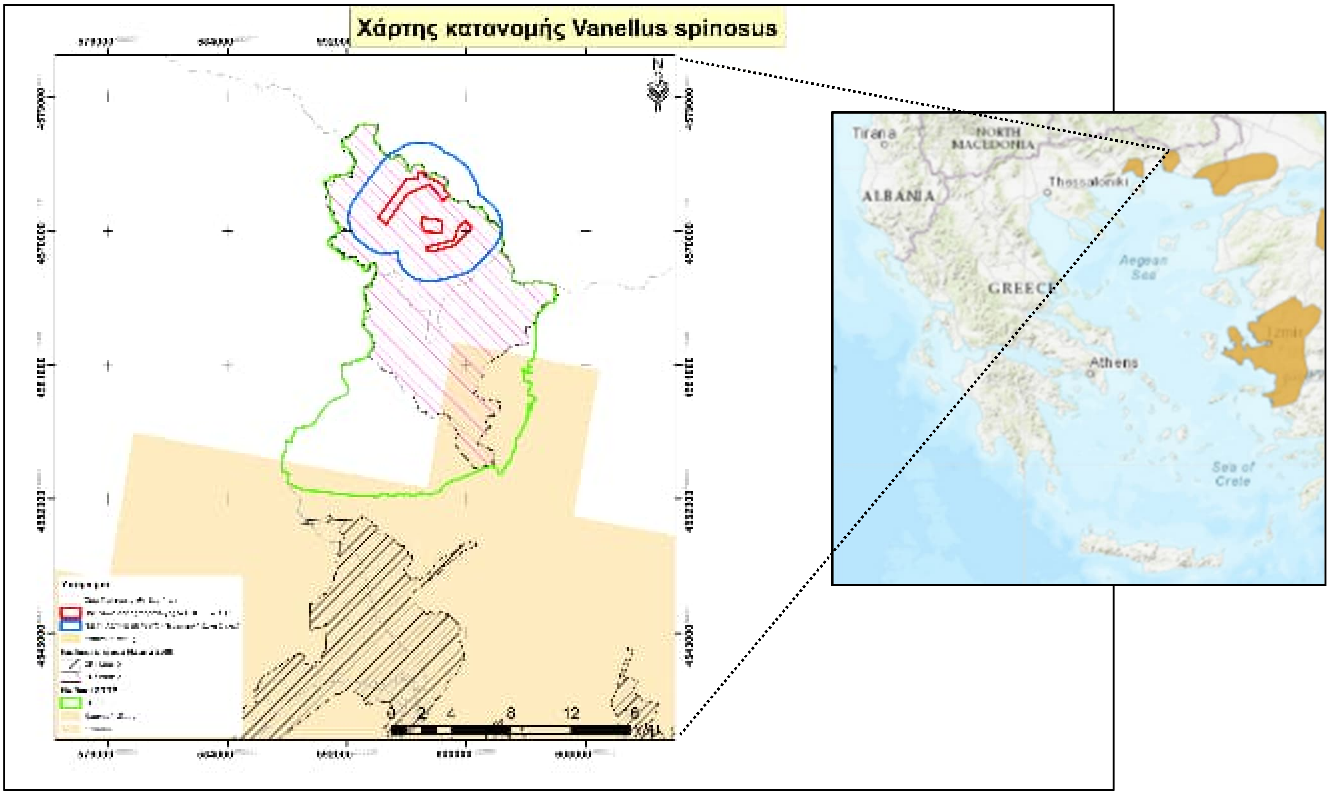
Χάρτης 105: Χάρτης ενδιαιτημάτων της καστανόπαπιας (*Tadorna ferruginea*) στην ευρύτερη περιοχή μελέτης



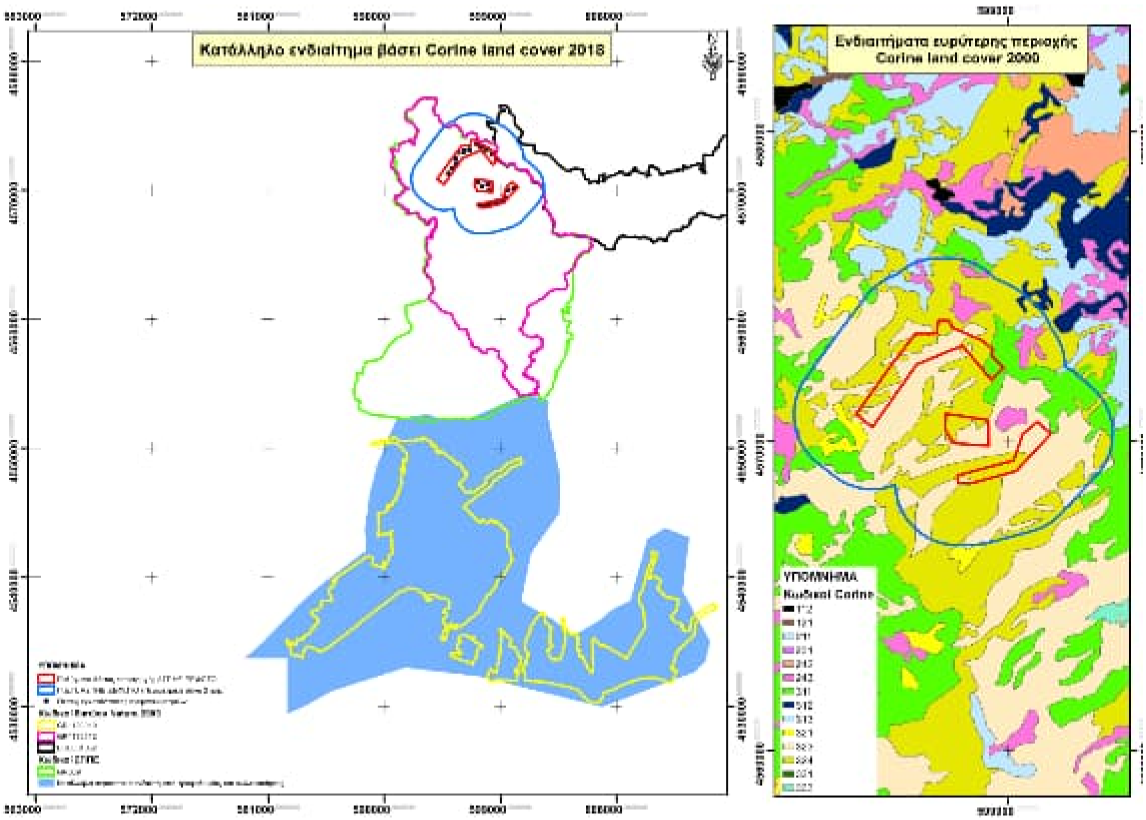
Χάρτης 106: Χάρτης κατανομής της βαρβάρας (*Tadorna tadorna*) στην ευρύτερη περιοχή μελέτης



Χάρτης 107: Χάρτης ενδιαιτημάτων της βαρβάρας (*Tadorna tadorna*) στην ευρύτερη περιοχή μελέτης



Χάρτης 108: Χάρτης κατανομής της αγκαθοκαλημάνας (*Vanellus spinosus*) στην ευρύτερη περιοχή μελέτης



Χάρτης 109: Χάρτης ενδιαιτημάτων της αγκαθοκαλημάνας (*Vanellus spinosus*) στην ευρύτερη περιοχή μελέτης

Distribution maps of the important species of Annex II of Directive 92/43/EEC of the wider study area_source: IUCN Red list of Threatened Species (https://www.iucnredlist.org/, available online on 15/10/2022, 3rd and 4th National Report on the implementation of Directive 92/43/EEC

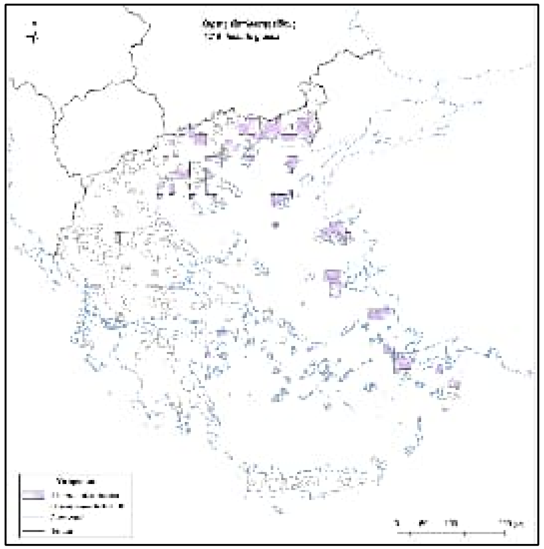
Miniopterus schreibersii

Myotis Myotis

Canis lupus

Spermophilus citellus

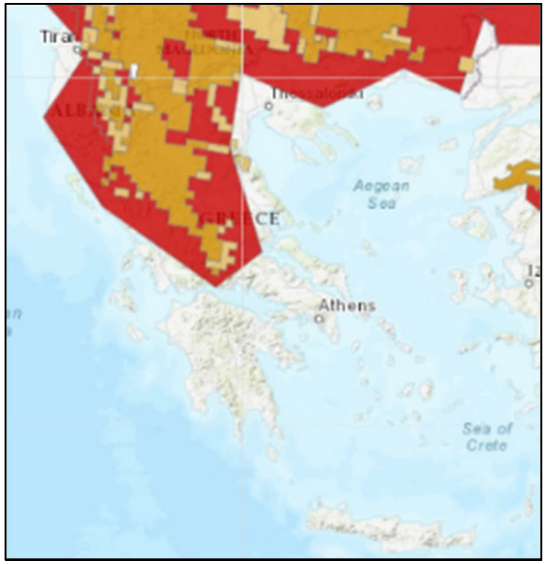
Testudo hermanni



Testudo graeca

Myomimus roachi

Vormela peregusna



Ursus arctos

Elaphe sauromates

Barbastella barbastellus

Myotis bechsteinii

Myotis blythii

Myotis capaccinii

Myotis emarginatus

Rhinolophus euryale

Rhinolophus ferrumequinum

Rhinolophus hipposideros

Rhinolophus mehelyi

Rhinolophus blasii

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

The multi-container production license of the project under study is located within a protected area of the Natura 2000 network of the wider region, as well as within an Important Bird Area of Greece. In addition, the study project's permit blocks are located in an area that has high wind potential. Due to the high 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 R.A.E., available on 25/09/2022) showing wind farms with installation permits, operating permits, production permits, applications under review, and some denials. It is judged that the most worthy of reference and consideration are the wind farms that have received an operating license, installation license and production license within a 10 km radius of the project under study.

There are no licensed wind power plants in the wider area of the project site and within a 10 km radius. The nearest licensed wind farm is located at an average distance (in a straight line) of more than 16 km (outside the protected areas under study), south-west of the production licence blocks of the project under study.

Also, there are no wind farms with a license in the wider project area and within a radius of 10 km. The nearest licensed wind farm is located at an average distance (in a straight line) of more than 200 km.

Finally, in the wider project area and within a radius of 10 km, the licensed wind farms are listed in Table 12 and shown on Map 110.

Πίνακας 12. Αιολικά Πάρκα με άδεια παραγωγής στην ευρύτερη περιοχή του υπό μελέτη έργου

Θέση	**Αριθμός Α/Γ**	**Ισχύς** (MW)	**Απόσταση (χλμ.)**	**Σταδιο αδειοδότησης**
ΧΑΡΑΔΡΙΤΣΑ	10	60,0	4,06	Άδεια Παραγωγής
ΜΩΣΣΗΣ	33	198,0	5,51	Άδεια Παραγωγής
ΑΣΠΡΟ	13	26,0	4,20	Άδεια Παραγωγής
ΚΡΑΝΙΑ - ΔΟΚΟΣ	4	14,4	7,70	Άδεια Παραγωγής
ΚΙΑΡΑ	1	3,0	9,82	Άδεια Παραγωγής
ΘΡΟΝΟΣ	1	3,0	8,42	Άδεια Παραγωγής
ΜΟΝΟΔΕΝΤΡΙ	1	3,0	9,71	Άδεια Παραγωγής
ΑΜΜΟΡΡΕΜΑ - ΓΛΥΦΑΔΑ	1	3,0	9,54	Άδεια Παραγωγής
ΑΓΓΕΛΙΚΟΥΛΑ	7	35	9,80	Άδεια Παραγωγής

Specifically, in the wider area of the project under study, and in an area of 10 km radius, there are nine NPPs that have received a production license (Source: P.A.E. available on 20/10/2022), which have a total capacity of 345.4 MW, occupy a total area of 2,880.73 ha (total area of the nine NPPs' production license blocks) and consist of 71 wind turbines. It is worth noting here, as shown in Map 110, that the MOSSIS, KIARA, AMOREMA - GLYFADA and ANGELIKOULA wind farms are partially located within the 10 km radius area.

In more detail:

- Of the MOSSIS wind farm, which covers an area of 1 774,31 ha, which as shown in Table 12 above, has a total capacity of 198 MW and consists of 33 wind turbines (individual capacity of each wind turbine of this wind farm is 6 MW), only 577,33 ha are located within the 10 km radius area and only 11 wind turbines are located within the 10 km radius area.

- Of the wind farm ANGELIKOULA, with an area of 192,53 ha, which has a total capacity of 35 MW and consists of 7 wind turbines (each wind turbine of this wind farm has an individual capacity of 5 MW), only 3,95 ha are located within the 10 km radius area, while none of the 7 wind turbines of this wind farm are located within the 10 km radius area.

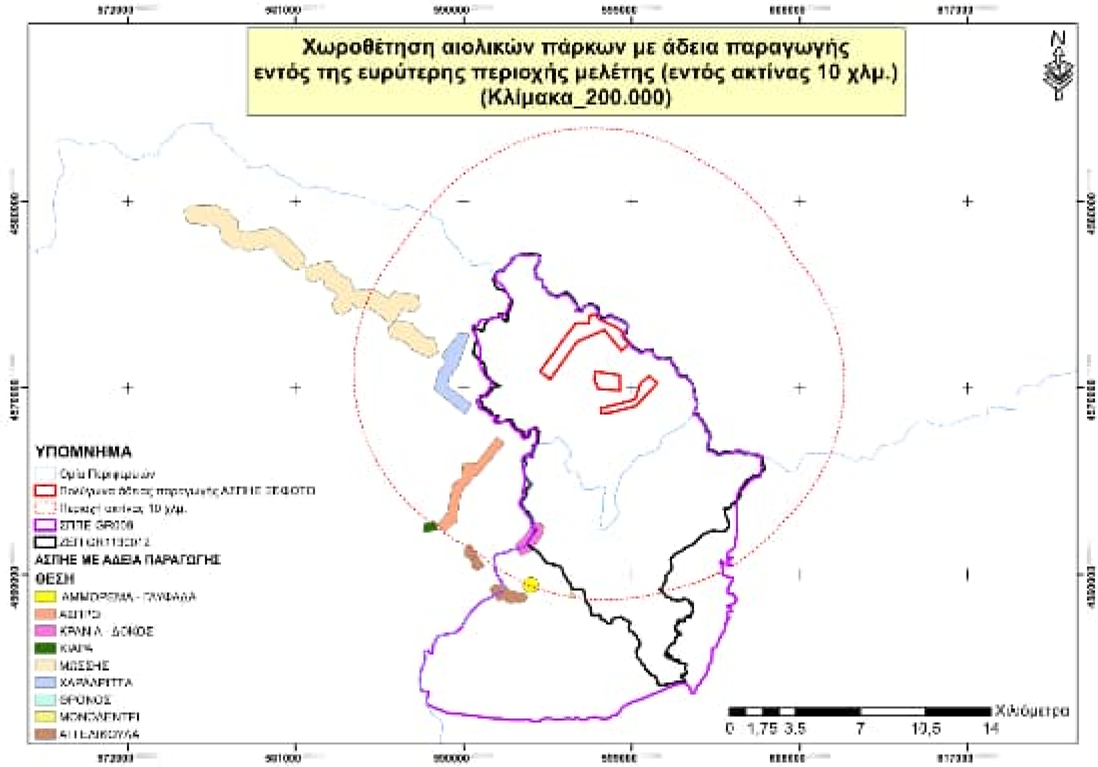
- Of the 54.33 ha of the AMOREMA-GLYFADA wind farm, which has a total capacity of 3 MW and consists of one wind turbine, only 30.21 ha are located within the 10 km radius.

- Of the 32,36 ha of the KIAARA wind farm, which has a total capacity of 3 MW and consists of one wind turbine, only 5,59 ha are located within the 10 km radius, while the only wind turbine of this wind farm is located outside the 10 km radius.

Therefore, the total area of the production licence blocks of the nine GISPs located within the 10 km radius area is 1 632,87 ha, while the total number of wind turbines of the nine GISPs located within the 10 km radius area is 41 wind turbines, resulting in a total MW within the 10 km radius area of 175,4 MW. Furthermore, of the nine wind turbines located within the 10 km radius area, four are located outside the protected areas under study (GR1130012 and GR009), while two are partially located within the protected areas.

Despite the fact that, as shown in Table 12 above, there are two wind farms in the wider area that have been granted a production licence and are located less than 5 km from the project under study, while seven others are located between 5 and 10 km away, the above reference as to their synergistic effects should not be taken into particular consideration, as many of the above wind farms may receive a negative opinion by the time the operating licence is obtained and therefore it is not possible to judge a wind farm for synergistic effects.

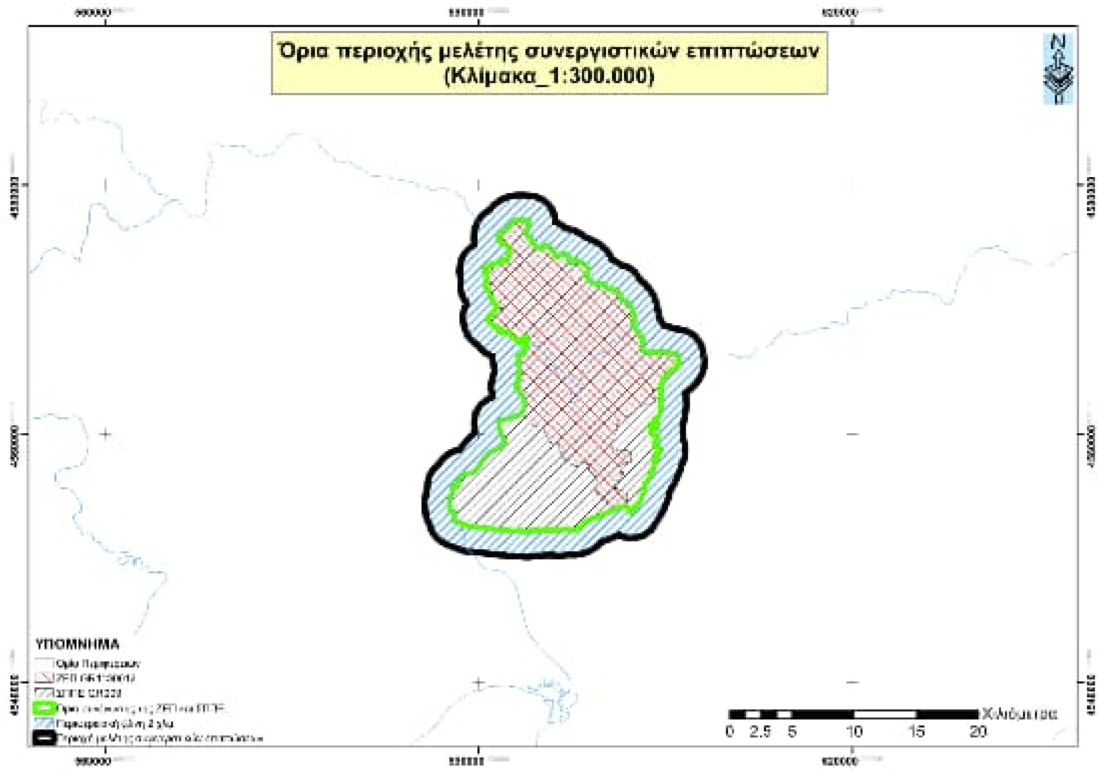
The synergistic effects of the installation of a project in an area result from the cumulative effect of all types of impacts of these projects and are almost exclusively related to the avifauna of the area. According to the international literature and the Guidelines, synergistic effects can be considered 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 there may be many other small or larger projects and in total there may be impacts on species, and in the second case, regardless of the assessment of the project in question, there may be numerous projects within a larger radius, regardless of the size of the impact, which multiply the impact of the project under consideration.



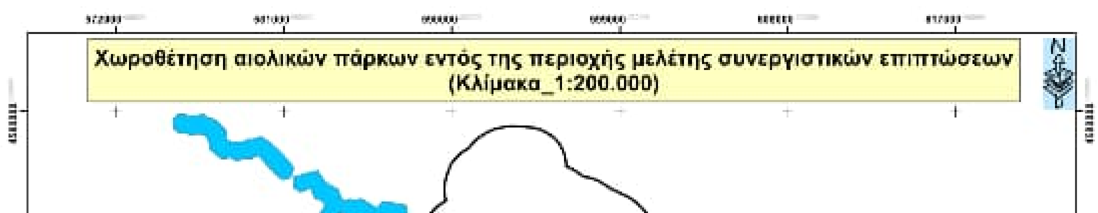
Χάρτης 110: Χάρτης αιολικών σταθμών της ευρύτερης περιοχή με άδεια παραγωγής.

With regard to the main protected areas under study, within which the project is located, ZEP GR1130012 and SPA GR009, given the differentiation of their boundaries and the location of some EIAs only within one of the above protected areas, in order to better address the synergistic impacts of the project under study, the study team of this Special Ecological Assessment chose to take into account the wider boundaries of the entire area enclosed within the two areas. Furthermore, given the ecological importance of the above areas and given the location of some of the ESIAs outside the boundaries of the entire area enclosed within the two areas under study, but within a very short distance around the perimeter of these areas, it was also chosen by the study team of this SEA to take into account, in order to better control the synergistic effects on the protected areas concerned, a peripheral zone of 2 km around the perimeter of the entire area enclosed within these areas. Therefore, the area resulting from the combination of the boundaries of the two above-mentioned areas together with the 2 km peripheral zone will henceforth be referred to as the 'synergistic impact study area' (PIA) (Map 111).

Therefore, within the P.M.S.E., there are 21 NPPs (including the one under study) in the process of being licensed for production (production license) (Map 112). At this point it is worth noting, due to the fact that of all the above NPPs, some of them are partially located within or on the boundaries of the synergistic impact study area, both the area of the production license blocks of the above NPPs located within the PPA will be counted in the analysis and assessment of synergistic impacts, and the total number of wind turbines located within it. Thus, out of the total of 4,705.65 ha, an area which constitutes the total of the production licence blocks of the 21 wind turbines (including the one under study) placed either within, or partially within, or within the boundaries of the synergistic impact study area, only 2. 464,48 ha are located within the study area, while out of the total of 136 wind turbines, which make up the above mentioned wind turbines (together with the 24 wind turbines of the project under study), only 85 are located within the study area.



Map 111: Map of the boundaries of the protected areas under study ZEP GR1130012 and SPA GR009, the boundaries of their confluence and the boundaries of the synergistic impact study area (total area of the confluence of protected areas and a peripheral zone of 2 km).



Map 112: Map of wind farm siting within, partially within and on the boundary of the "synergistic impact study area" (licensing stage under production - no installed wind farms within it).

Other relevant information concerning the Study Area

In this section, in accordance with the specifications of the EIA, as defined in the 170225/20-01-2014 KYA (Government Gazette 135/B/27-01-2014), the designer should, at his/her discretion, provide general information about the study area related to works, studies, etc. that are a source of information about the study area and are available and were used during the preparation of the EIA, as well as any problems and difficulties that arose during its preparation and any assumptions and methods that were resolved.

With regard to the statutory Z.E.P. GR1130012, which is the main study area within which the project under study is located, according to the publication: 'Identification of compatible activities in relation to the species designation of Special Protection Areas for avifauna, Supplementary deliverable: National List of Species Designation of Special Protection Areas" with the contracting authority being the Ministry of Environment and Natural Resources - Environmental Planning Directorate, Department of Natural Environment Management (Demaleksis 2010)", and in accordance with the decision no. H.P.8353/276/E103 (Government Gazette 415/B/23-02-2012), the species classified are Dendrocopos syriacus, Ficedula semitorquata, Emberiza hortulana and Microcarbo pygmaeus.

With regard to the nearest Natura network site, SPA GR1130010, which is more than 18 km away, according to the publication 'Identification of compatible activities in relation to the species designation of the Special Protection Areas for Birds, Supplementary deliverable: 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)", as well as in accordance with the decision no. H.P.8353 /276/E103 (Government Gazette 415/B/23-02-2012), the types of classification are: Anas penelope (Mareca penelope), Anser erythropus, Ardeola ralloides, Aythya ferina, Aythya nyroca, Burhinus oedicnemus, Calandrella brachydactyla, Casmerodius albus (Ardea alba), Chlidonias hybrida, Ciconia ciconia, Cygnus olor, Fulica atra, Ixobrychus minutus, Lanius minor, Larus melanocephalus, Larus minutus (Hydrocoloeus minutus), Numenius tenuirostris, Oxyura leucocephala, Pelecanus crispus, Phalacrocorax carbo, Phalacrocorax pygmeus (Microcarbo pygmaeus), Phoenicopterus roseus, Platalea leucorodia, Plegadis falcinellus, Podiceps nigricollis, Puffinus yelkouan, Recurvirostra avosetta, Sterna albifrons (Sternula albifrons), Tachybaptus ruficollis, Tadorna ferruginea, Tadorna tadorna and Vanellus spinosus. The above mentioned Z.E.P., in addition to supporting important predatory - scavenging species, which according to their ecology are active over a large radius capable of covering the distance to the study area of the specific project, it also supports important populations of waterfowl and wading birds, as it is one of the most important wetland complexes, both at national and European level. Many of the important aquatic and wading bird species maintained by this Natura 2000 protected area use the area either for breeding, wintering, aggregating or using the area as a migratory stopover, and therefore the study team of this SEA considered that it should be examined whether the project under consideration (despite being located more than 18 km away) could affect their movements, especially during the migration period.

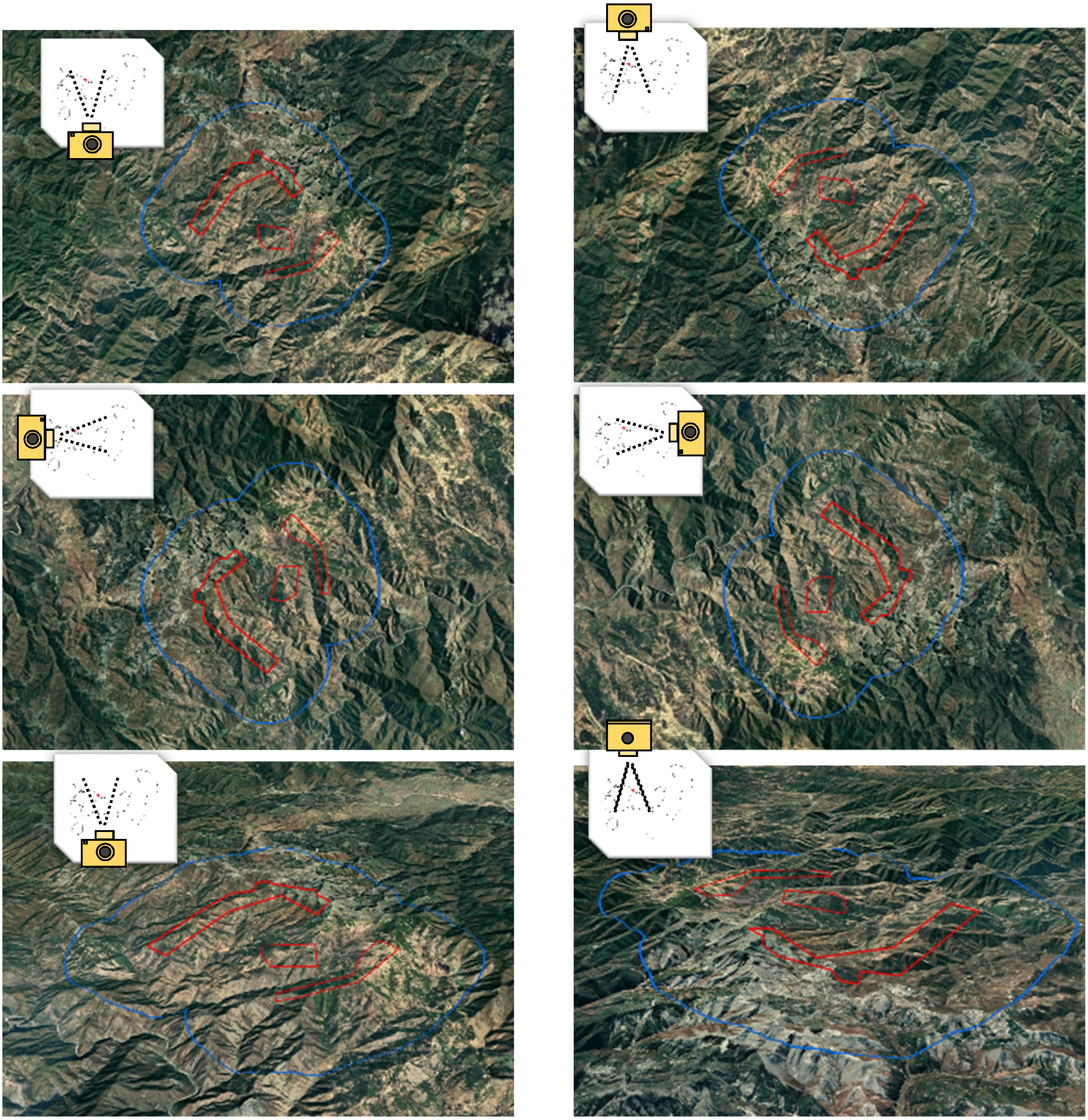
Furthermore, with regard to the main Natura 2000 network study area within which the project under study is located, it was chosen by the drafting team of this Special Ecological Assessment to present the most important species of hornbill of the GR1130012 SPA, as described in the 2019 edition of its 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 chosen by the drafting team of this Special Ecological Assessment not to take into account the revised version of the TEDs consists both in the fact that the latter is included in full, without the slightest difference, in the 2019 version 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-scavengers (e.g. Aquila chrysaetos, Clanga pomarina, Hieraaetus pennatus, Gyps fulvus, Neophron percnopterus) for which the area, as mentioned in previous subsections of this ERA, is very important, are not included in the latest version of the TENs for the GR1130012 SPA area. Also, important species of Annex I of Directive 2009/147/EC, such as e.g. Ciconia nigra, are not mentioned. The same applies to the nearest SPA GR1130010, within the revised TAP of which no important waterbirds, wading birds and birds of prey are mentioned (e.g. Ardeola ralloides, Ardea purpurea, Buteo rufinus, Circus aeruginosus, Circus pygargus, Gyps fulvus, Haliaeetus albicilla, Hieraaetus pennatus, Neophron percnopterus, Pelecanus crispus, Pelecanus onocrotalus, Platalea leucorodia, Recurvirostra avosetta, Tadorna ferruginea, Tadorna tadorna etc.) for which the area is very important both at national and European level, while many of them are also species of characterization (e.g. Platalea leucorodia, Recurvirostra avorsetta, Tadorna ferruginea, Ardeola ralloides, Tadorna tadorna, Pelecanus crispus) Also, important species of Annex I of Directive 2009/147/EC are not mentioned, e.g. Coracias garrulus, Ciconia nigra, Ciconia ciconia (the latter is also a designation species of the area).

With regard to the neighbouring Bulgarian Natura 2000 network site EEZ BG0001032, it was decided by the study team of this project, as mentioned in the above sections of this document, to take into account the significant presence of Annex II mammal species of Annex II of Directive 92/43/EEC, which according to their ecology are active over a large radius, sufficient to cover the distance to the site of the project, and the significant presence of mammal species (other than mammal species) of Annex II of the above Directive, with a range of up to 10 km from the site of the project.

Finally, the production licence blocks of the project under study are located in an area of 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.

Photo documentation

In order to better visualize the location of the project from characteristic points of the immediate and wider area and to create a complete picture of the surrounding area of the polygons of the project under study, it was chosen to render the imaging 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 of natural environment data (field survey area) (see ωσ 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 associated shooting orientation indication in the orientation map insert within each photograph.



Photos 1 to 6: Photographs (satellite image sections) with georeferenced polygons of the wind farm production licence (red) and the field survey area (blue), taken from various directions of the horizon in vertical projection (top and middle), and taken from the south and north directions at an angle of view (bottom left and bottom right respectively)
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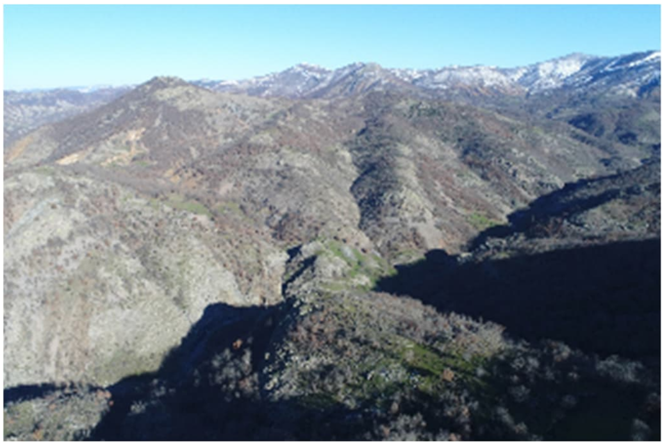
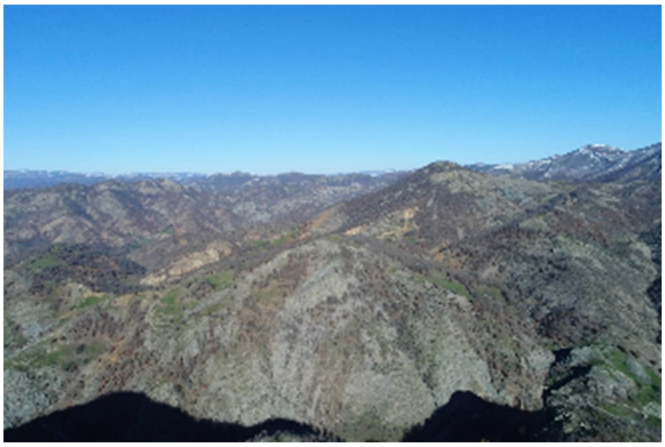
Aerial photographs of the site of the project and the surrounding area





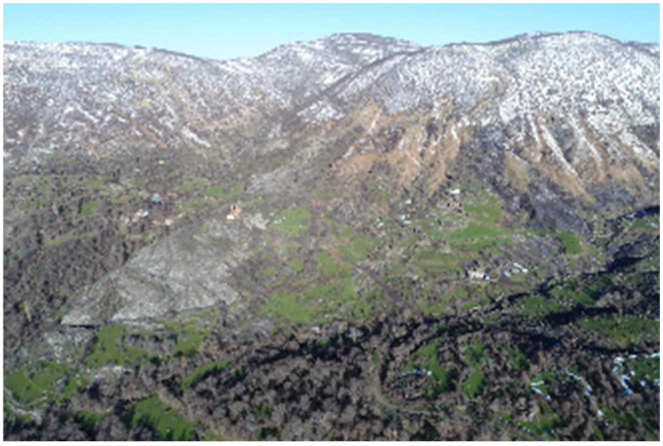










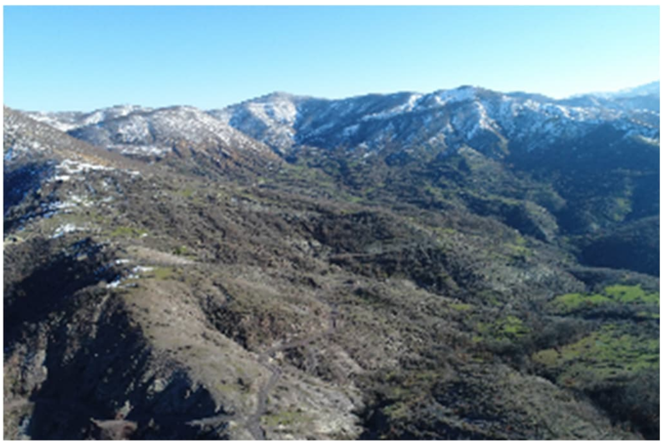


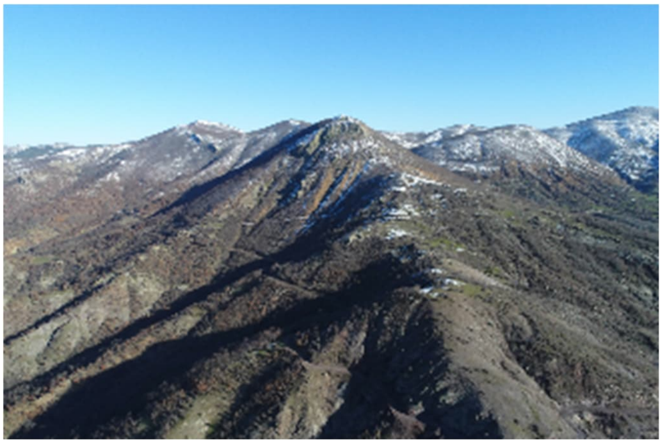
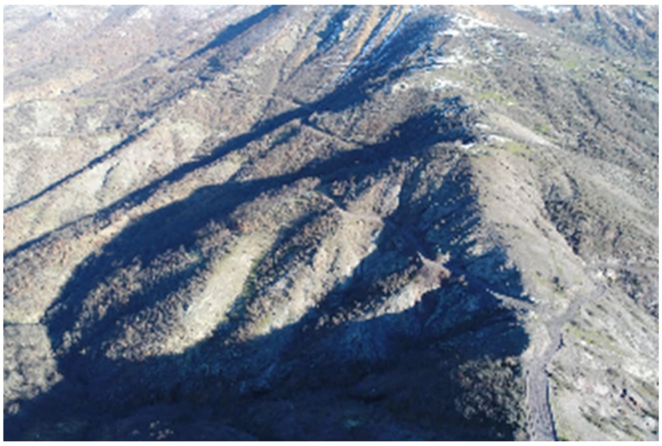


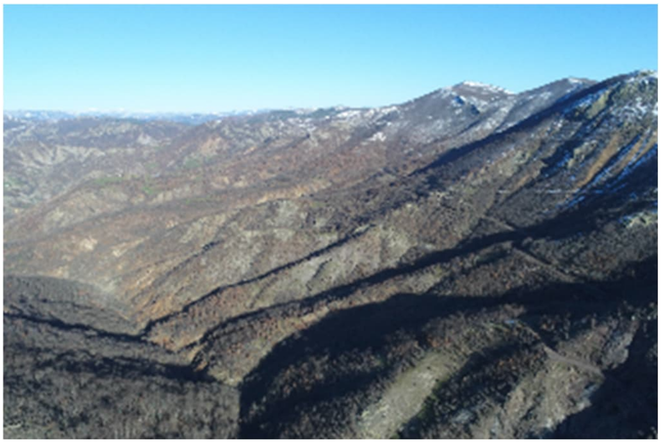




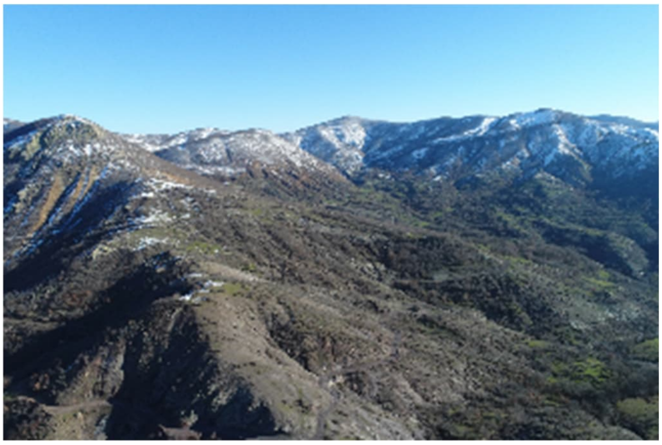




















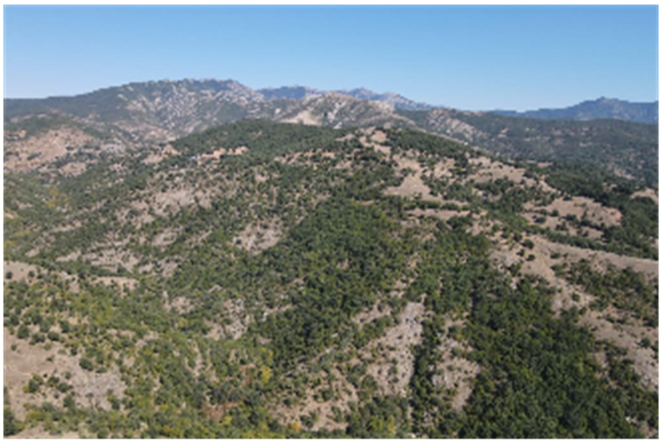













Photos 7 to 92: Aerial photographs of the project area and the wider area, taken from different altitudes and from different horizon directions to better capture the wider study area.

Preparation of a Preliminary Check (screening)

At this point, after collecting and providing the necessary information for the Study Area and before analyzing the necessary data for the Field Survey Area, the section of the preliminary screening was selected, which essentially provides a preliminary assessment of the likelihood that the project installation will result in adverse impacts to the Z.E.P. study areas. GR1130012 and SPA GR009, as well as on the nearest SPA GR1130010 and the adjacent SPA BG0001032, whose protected object is the avifauna (as regards the SPA and SPA), and the habitat types of Annex I of Directive 92/43/EEC and the flora and fauna species of Annex II of the above Directive (in relation to the SPA) in order to determine the need for further investigation of the impacts through the necessary due assessment.

From all the above data provided (literature data, documentation maps, etc.) in the most detailed way, the types of classification of the main study area GR1130012, within which the site of the project under study is located, were selected for further evaluation, which are *Emperiza hortulana, Microcarbo Pygmaeus, Ficedula semitorquata* and *Dendrocopos syriacus*, and the characterisation species of the GR009 SPA (the four characterisation species of the GR009 SPA coincide with the four characterisation species of the GR1130012 SPA). In addition, all the large and non-predatory species (as well as the black-backed starling and the goatbird) of Annex I of Directive 2009/147/EC, included in the TADs of the above mentioned SPA, were selected. In addition, the characterisation species of the nearest SPA GR1130010, which is one of the most important wetland complexes both at national and European level, were selected. Many of the important aquatic and wading species that this Natura 2000 protected area supports use the area either for breeding, wintering, aggregating or using the area as a migratory stopover, and therefore this SEA will consider whether the project under study (despite being located more than 18 km away) will affect their movements, especially during the migratory period. Species *of* conservation concern in the GR1130010 SPA are *Mareca penelope, Anser erythropus, Ardeola ralloides, Aythya ferina, Aythya nyroca, Burhinus oedicnemus, Calandrella brachydactyla, Ardea alba, Chlidonias hybrida, Ciconia ciconia, Cygnus olor, Fulica atra, Ixobrychus minutus, Lanius minor, Larus melanocephalus, Hydrocoloeus minutus, Numenius tenuirostris, Oxyura leucocephala, Pelecanus crispus, Phalacrocorax carbo, Microcarbo pygmaeus, Phoenicopterus roseus, Platalea leucorodia, Plegadis* *falcinellus, Podiceps nigricollis, Puffinus yelkouan, Recurvirostra avosetta, Sternula albifrons, Tachybaptus ruficollis, Tadorna ferruginea, Tadorna tadorna* and *Vanellus spinosus.*

Finally, regarding the neighbouring Bulgarian Natura 2000 network site BG0001032, 12 species of cephalopods (*Barbastellus barbastellus, Mioniopterus schreibersii, Myotis Bechsteinii, Myotis blythii, Myotis capaccinii, Myotis emarginatus, Myotis myotis, Rhinolophus blasii, Rhinolophus Euryale, Rhinolophus ferrumequinum, Rhinolophus hipposideros, Rhinolophus mehelyi*), because of the distances they can travel to meet their daily needs, five species of mammals (other than carnivores) (*Canis lupus, Ursus arctos, Myomimus roachi, Spermophilus citellus, Vormela peregusna*), and three species of reptiles (*Canis lupus, Ursus arctos, Myomimus roachi, Spermophilus citellus, Vormela peregusna, Testudo graeca, Testudo hermanni, Elaphe sauromates*), which are either species with a large endemic area (e.g.e.g. *Canis lupus, Ursus arctos*), or which may be affected by the project under consideration due to the proximity of the site of the project to the boundaries of the EEZ.

Therefore, the total of 71 species selected for further analysis (literature data, documentation maps, etc.), and listed as species of interest, consists of: *Dendrocopos syriacus, Emberiza hortulana, Ficedula semitorquata, Microcarbo pygmaeus, Lanius minor, Mareca penelope, Anser erythropus, Ardeola ralloides, Aythya ferina, Aythya nyroca, Burhinus oedicnemus, Calandrella brachydactylla, Ardea alba, Chlidonias hybrida, Ciconia ciconia, Cygnus olor, Fulica atra, Ixobrychus minutus, Larus melanocephalus, Hydrocoloeus minutus, Numenius tenuirostris, Oxyura leucocephala, Pelecanus crispus, Phalacrocorax carbo, Phoenicopterus roseus, Platalea leucorodia, Plecadis falcinellus, Podiceps nigricollis, Puffinus yelkouan, Sternula albifrons, Tachybaptus ruficollis, Tadorna ferruginea, Tadorna tadorna, Vanellus spinosus, Recurvirostra avosetta, Accipiter brevipes, Buteo rufinus, Clanga pomarina, Ciconia nigra, Circaetus gallicus, Hieraaetus pennatus, Neophron percnopterus, Pernis apivorus, Aquila chrysaetos, Haliaeetus albicilla, Aegolius funereus, Bubo bubo, Falco naumanni, Falco peregrinus, Falco columbarius, Gyps fulvus, Barbastellus barbastellus, Miniopterus schreibersii, Myotis bechsteinii, Myotis blythii, Myotis capaccinii, Myotis emarginatus, Myotis myotis, Rhinolophus Euryale, Rhinolophus ferrumequinum, Rhinolophus hipposideros, Rhinolophus mehelyi, Rhinolophus blasii,* *Canis lupus, Ursus arctos, Myomimus roachi, Spermophylus citellus, Vormela peregusna, Testuda graeca, Testudo hermanni, Elaphe sauromates.*

As it has already been mentioned, the potential impacts of the installation and operation of wind turbines on avifauna populations are divided *into impact mortality, which* concerns the operation phase of the project and for which the magnitude of the impact of the impact on the installed turbines or the energy transmission network is assessed, and *direct habitat loss, which* concerns both the construction and the operation phase of the project and essentially the magnitude of the impact of direct habitat loss is assessed.

According to the above data, and taking into account that the project under study for the installation of the ESDP at the "XEFOTO" site is a project that will be installed within habitat types that are abundant in the area, it is estimated a priori that the most significant potential impact to be investigated relates to impact mortality. No direct habitat loss is not expected to occur as no critical habitat for avifauna has been identified in the area where the ADF is to be installed and the availability of similar habitat to existing habitat in the wider area is high. According to the database and land cover mapping (Corine land cover 2018) reflected on the documentation maps, the area of the W/F XEFOTO production license block is almost entirely within hardwood vegetation and transitional woodland and shrubland, with a small portion of broadleaf forest completing the habitat mosaic of the northernmost production license block of the project under study. (see map documentation section, Map 7). The above habitat types also cover most of the study project field survey area, along with smaller areas of coniferous forest, mixed forest, natural grasslands, and land used primarily for agriculture along with significant portions of natural vegetation. In general, the above habitat types predominate in the area. It is clear from the above that the construction and operation of the project is unlikely to result in significant impacts in relation to the objectives, protected objects, conservation status and integrity of the study area. As noted above, the habitat types occupied by the production permit polygons of the study project abound in the study area and outside the study area, and therefore it cannot be assumed that the study project will cause dispersal, fragmentation, or any form of significant habitat loss.

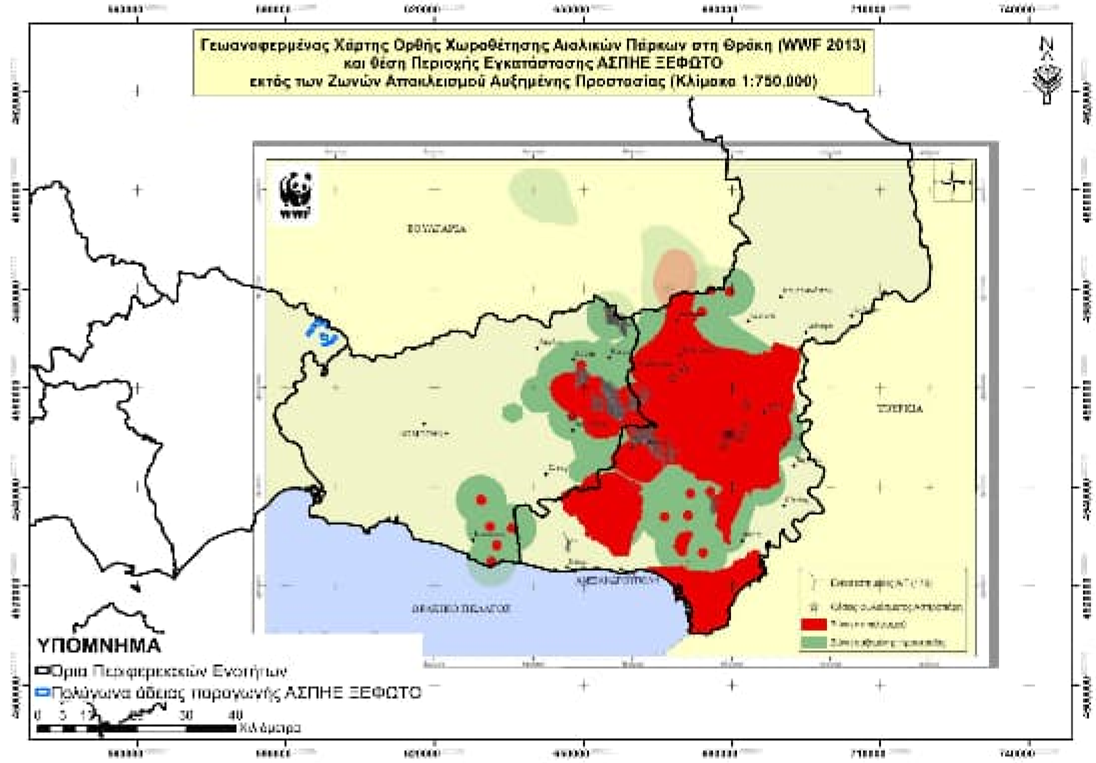
Also, as in any project constructed within forested areas, the horticultural restoration of the intervention areas is foreseen. It is worth noting here that the intervention within the production licence blocks of the studied RES-E project will be much smaller, since it will mainly concern areas within them that will be used for the installation of the wind turbines (foundations of the wind turbines, infrastructure works, etc.), while the opening of access roads will be limited due to the existing existing road network of the wider installation area and will essentially be limited to sections of new openings to connect the existing network to the wind turbine sites. In addition, the impacts on the natural environment from the electrical interconnection works of the W/F (voltage step-up substation and high and medium voltage lines, as well as the transmission lines), are minor and mainly limited to the construction phase, and with regard to the transmission lines in particular, in this EIA it is proposed to be installed underground and up to the substation, so as not to cause any negative impact on the avifauna of the area. Finally, the wider area of the project under consideration is not fenced and the disturbance is of short duration and intensity and ultimately reversible after the completion of the construction works.

Also, to ensure that the significance of disturbance during the construction phase is limited, it is proposed that construction takes place outside the breeding season of the fauna in the area (March - June).

Based on all of the above mentioned, it is proven by the existing studies and scientific publications concerning the wider study area that given the location of the installation area of the ASPEXEFOTO wind farm, there is no risk that the installation and operation of the above wind farm will have negative impacts on the neighbouring protected areas and their protected objects, which are mainly large birds of prey - scavenging birds, as well as other fauna species (with the main ones being

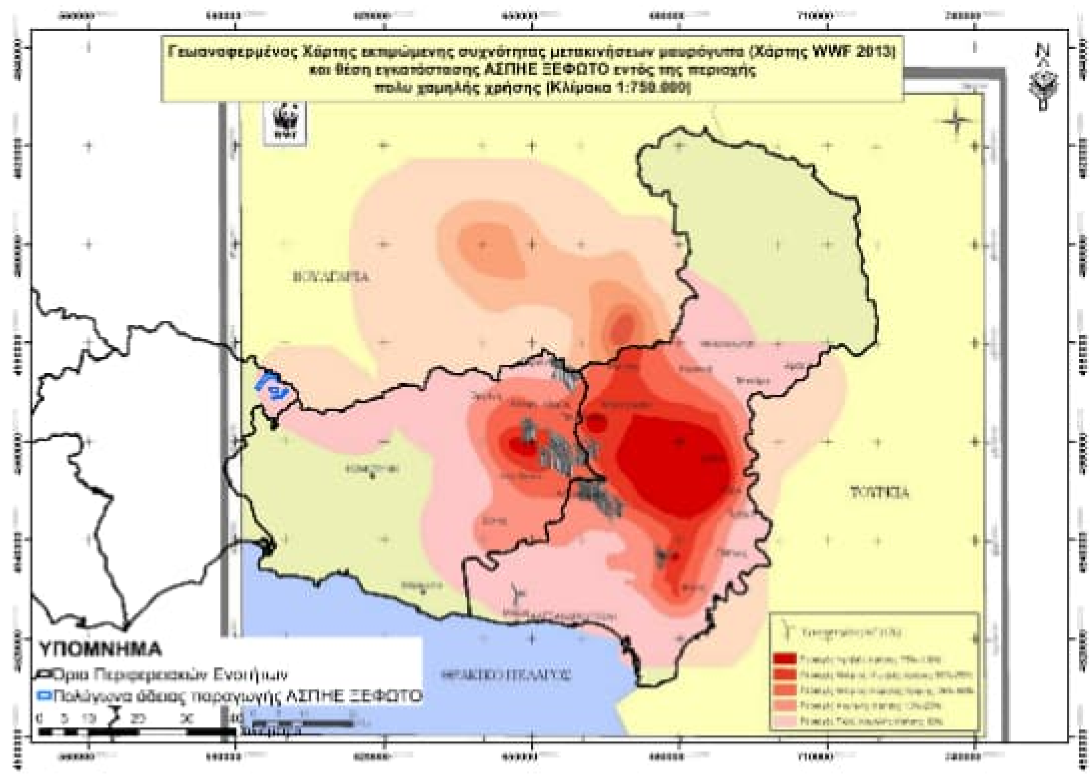
The location of the park, based on the spatial data resulting from in-depth studies carried out mainly for the large birds of prey of the wider area of Dadia (WWF 2013, Vasilakis et al. 2017), is:

- Outside the exclusion zone and outside the zone of increased protection of the black grouse, according to the revised proposal for the proper siting of the A/R in Thrace published by WWF Greece in 2013 (Map 113).



Map 113: Placement of the XEFOTO RES outside the exclusion zone (distance greater than 44 km in a straight line) and outside the enhanced protection zone (distance greater than 35 km in a straight line), according to the revised proposal for the correct placement of RES in Thrace published by WWF Hellas in 2013.

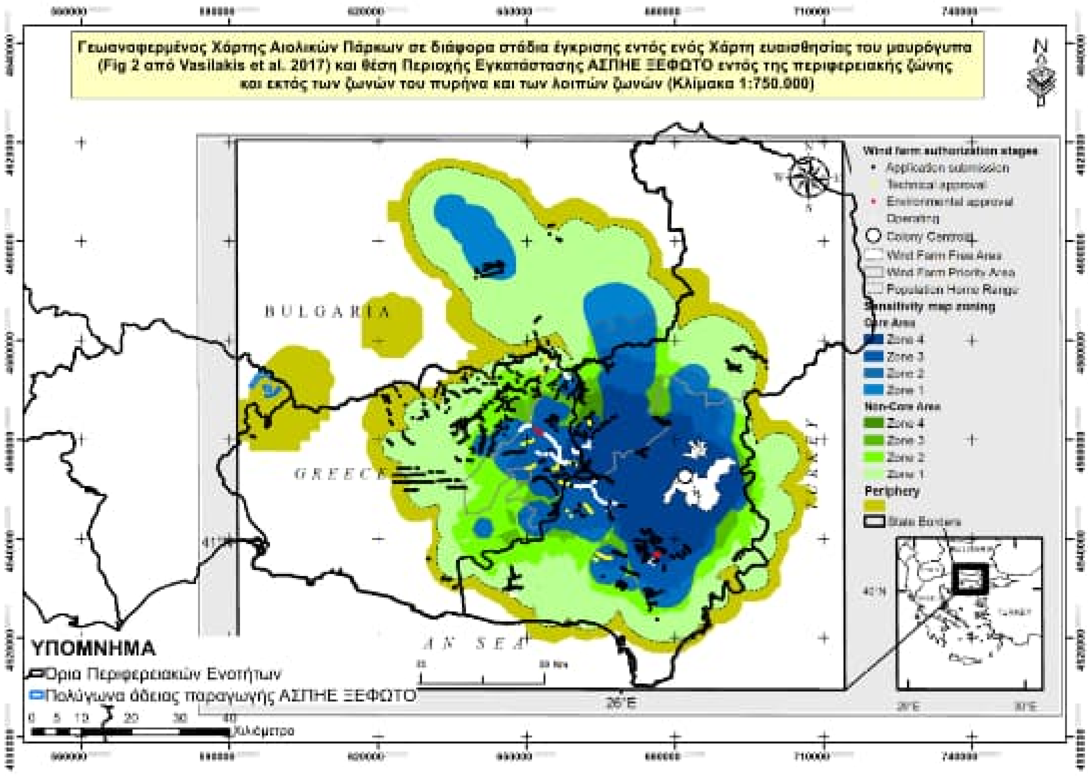
- **Outside** the high use, moderate-high use, moderate-low use and low use zones for the black grouse, in terms of estimated movement frequency, except within the species' very low use zone, which is outside the last boundary of the area within which WWF has recommended that ornithological studies be conducted in areas outside the ZEP (WWF 2013) (Map 114).



Map 114: Location of the XEFOTO ASPIO within the very low use zone of the black-tailed godwit (WWF Hellas 2013)

- Outside the 5 km radius zone around nesting sites and territories of birds of prey and black-backed stork (WWF 2013).

- Within the regional zone that, according to the scientific publication of Vasilakis et al. (2017), the authors propose the installation of wind farms as a solution to the potential problem of blackbird population reduction if all the wind farms planned to operate in the area are operated simultaneously, predicting that if they are installed in this zone, even with the simultaneous operation of all those under licensing within it (Map 115), the population mortality rate will not exceed 1 %, which, compared to the other scenarios, is the ideal solution.



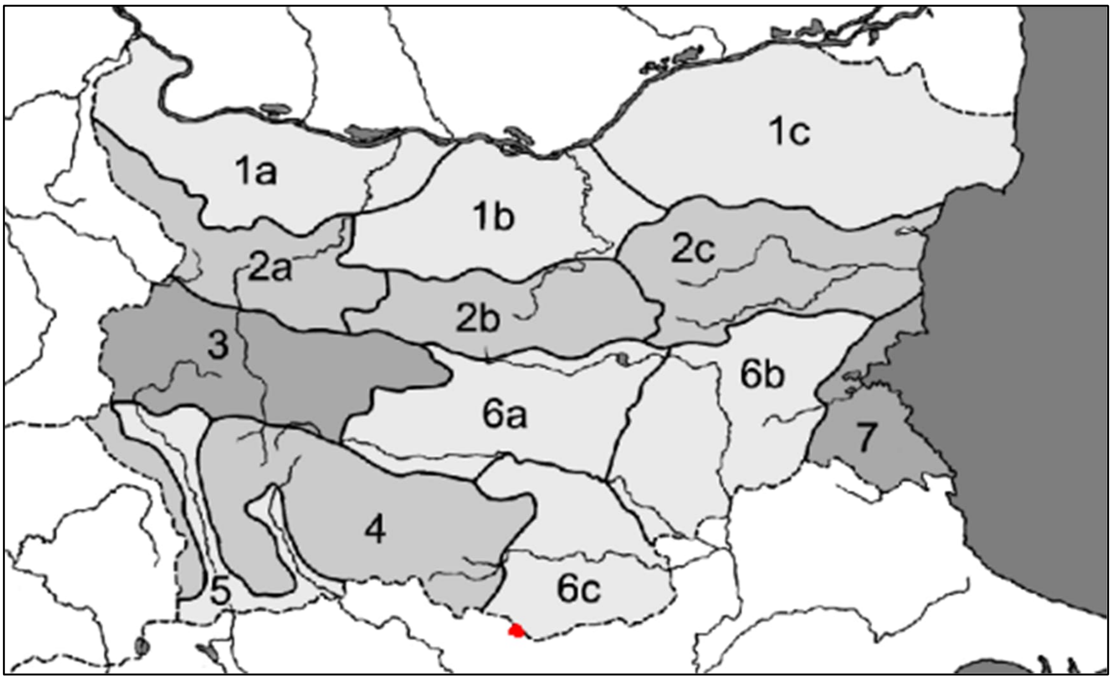
Map 115: Placement of the XEFOTO wind farms within the regional zone where the authors of the publication Vasilakis et al. (2017) proposed the installation of wind farms as a solution to the potential problem of the reduction of the black grouse population.

With regard to handrails, the literature review shows that the closest location for them is more than 17 km away. 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 not used 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 chironomids 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 chironomids, 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 location of important caves** were designed and proposed by the above project. Of the above designated important caves and protection areas around them, it was found that none were located within the field survey area, nor in close proximity to it. In fact, the closest site is located at a distance, as mentioned, of more than 17 km. More specifically, the closest corresponding site is located at an average distance (in a straight line) of 17.45 km south-south-west of the project under study and is the site 'Amaxades' (Map 133).

Concerning the neighbouring Bulgarian study site BG0001032, and within its SPA, 12 species of cephalopods listed in Annex II 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 mehelyi, Rhinolophus blasii*), which were included by the study team in the species of interest in this Special Ecological Assessment and 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 the European mixed forests of south-eastern Europe. Bulgaria's terrain includes a wide mosaic of habitats, from semi-arid steppes and coastal scrubland 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, constantly 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 TAD of the adjacent Bulgarian Natura 2000 site BG0001032. A map of Bulgaria is given below (Map 79, 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 13, within which the records of the 12 species of chironomids are shown, which are listed in the TED of the studied EEZ BG0001032 and belong to the species of interest of the present EEZ.



Map 116: 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 13. Part of a table showing the number of records of the 12 Annex II species of the Annex II of Directive 92/43/EEC listed in the TDB of the SPA BG0001032, in individual biogeographic sites in Bulgaria (Source: Benda et al. 2003)

Kind of	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 mehelyi		5	5	3	1	5			1		3	5	1	29
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 schreibersii	5	22	15	48	9	24	13	11	2	1	4	7	13	174

As shown in Table 13 above, sub-area 6c, which is most adjacent to the study project site, contains the fourth largest number of sites in the whole of Bulgaria in terms of the 12 species of handicap species of interest (114), however 48% of these (55 sites in total) are *Rhinolophus ferrumequinum* and *Rhinolophus hipposideros*, which according to the same source, are the most abundant bat species in Bulgaria. These two species have been found at more than 270 sites and represent 27.1 % of all bats recorded in Bulgaria (Benda et al. 2003).

Also, the central part of area 6c includes the Arda River valley, while its south-eastern boundaries include the Byala and Luda river valleys and next to the Greek-Bulgarian border are the higher Gumurdjinski Snejnik and Muglenik hills with well-preserved and mature oak and beech forests. 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 is located approximately 10 km (in a straight line) from the Arda River. (from its nearest boundary, which is located southwest within Bulgarian territory), and as will be shown below in the distribution maps of the 12 species of chironomid species of interest here, most of the locations of records of these species are located on either side of the Arda River bed.

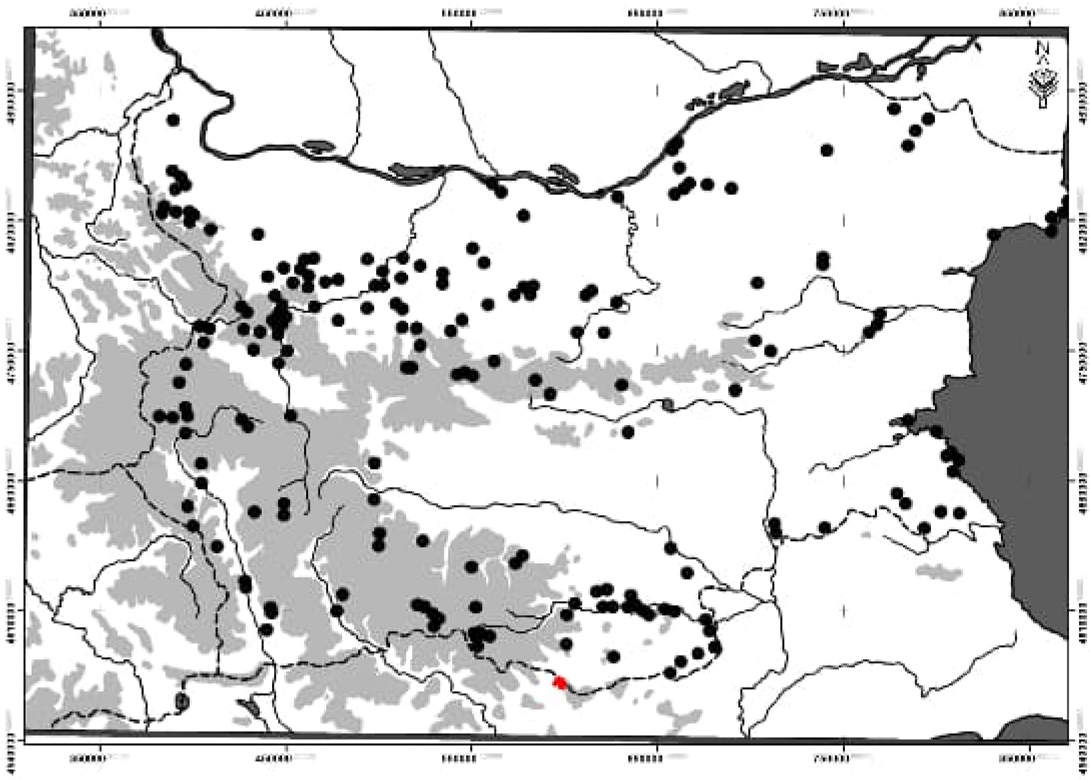
Another numerous group of species with 174 and 184 sites respectively includes *Miniopterus schreibersii* and *Myotis myotis* (together 17.1% of all bats recorded in Bulgaria). The four species mentioned above are mainly cave species, forming numerous colonies in caves, and can be considered as the most 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 species listed in Annex II of Directive 92/43/EEC, but are also not mentioned in the TADs of the Bulgarian study area EEZ BG0001032, and for this reason they have not been included in the species of interest). The above mentioned species *Rhinolophus euryale* and *Myotis blythii* (which are species of interest) have been found in 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.

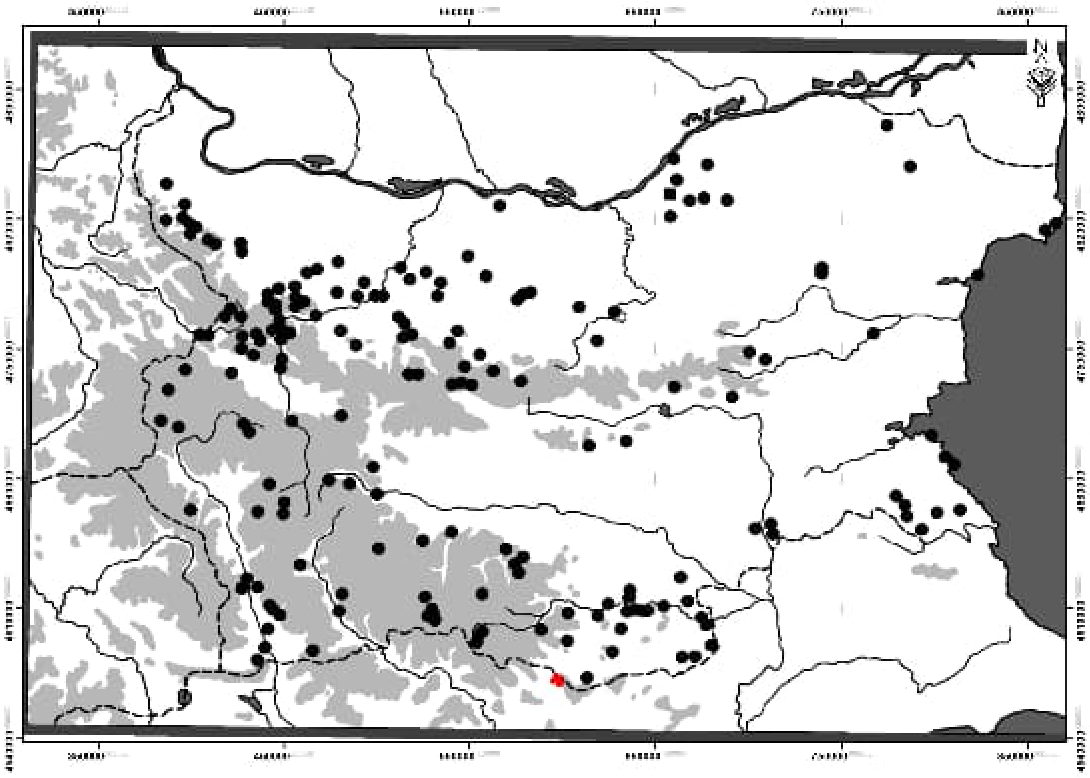
Also, a group of relatively numerous bat species includes *Rhinolophus blasii*, *Myotis emarginatus*, *Myotis capaccinii*, *Eptesicus serotinus* and *Hypsugo savii* (the latter three are not listed in the section of the table above, as they are not Annex II species of Directive 92/43/EEC, but are also not listed in the TDB of the Bulgarian study area EEZ BG0001032, and therefore not 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 the species mentioned 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*).

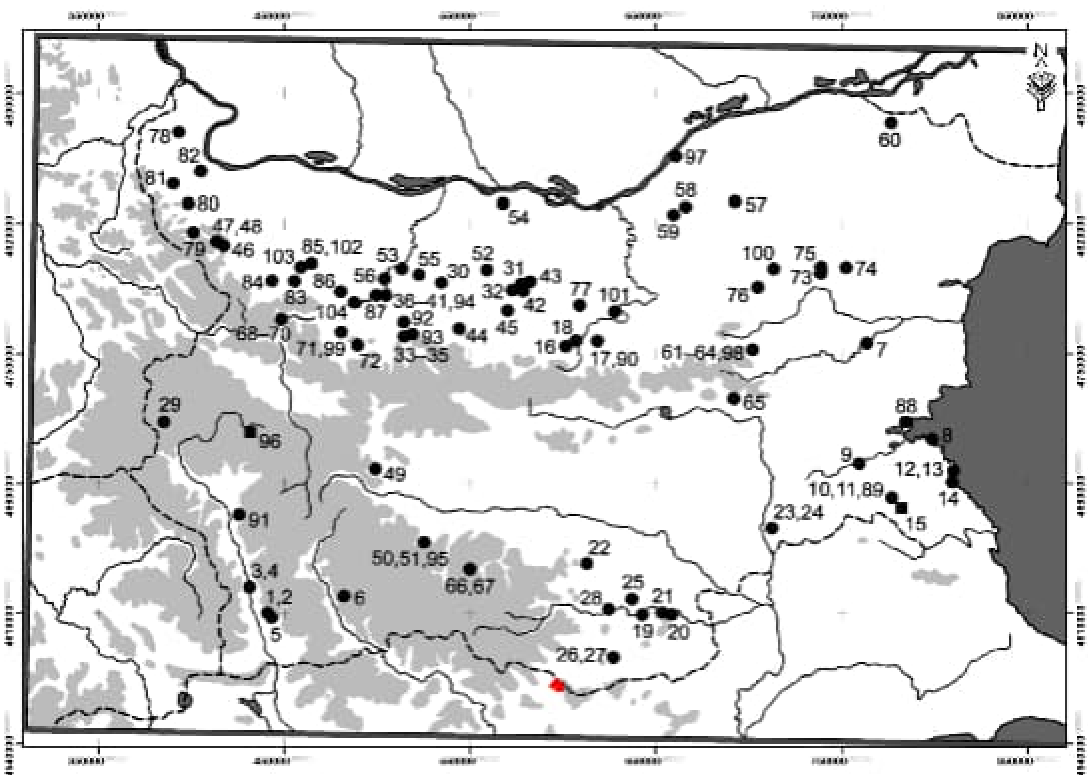
Subsequently, according to the same source (Benda et al. 2003), distribution maps of the individual biogeographic sites in Bulgaria are presented, within which the 12 species of worst concern of this Special Ecological Assessment were recorded. Within these maps, the installation polygons of the project under study were also georeferenced.



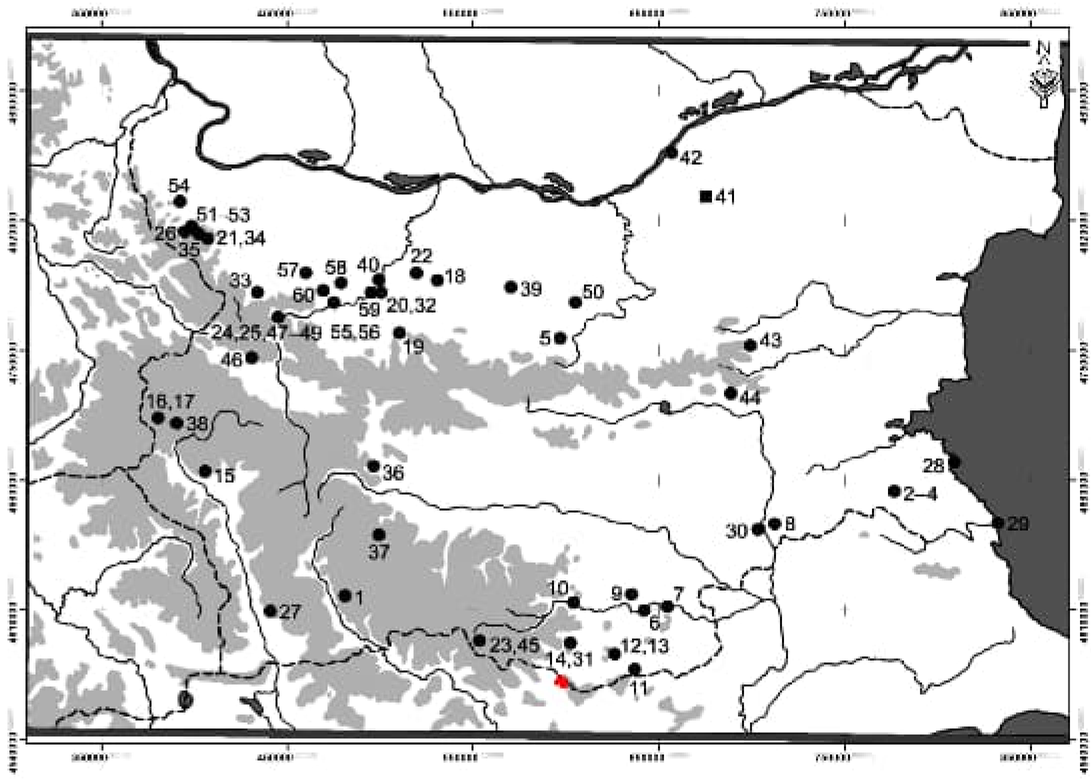
Map 117: Map of records of *Rhinolophus ferrumequinum* in Bulgaria. The black dot indicates the recording sites of the species, while the red dot indicates the area of the production license blocks of the project under study.



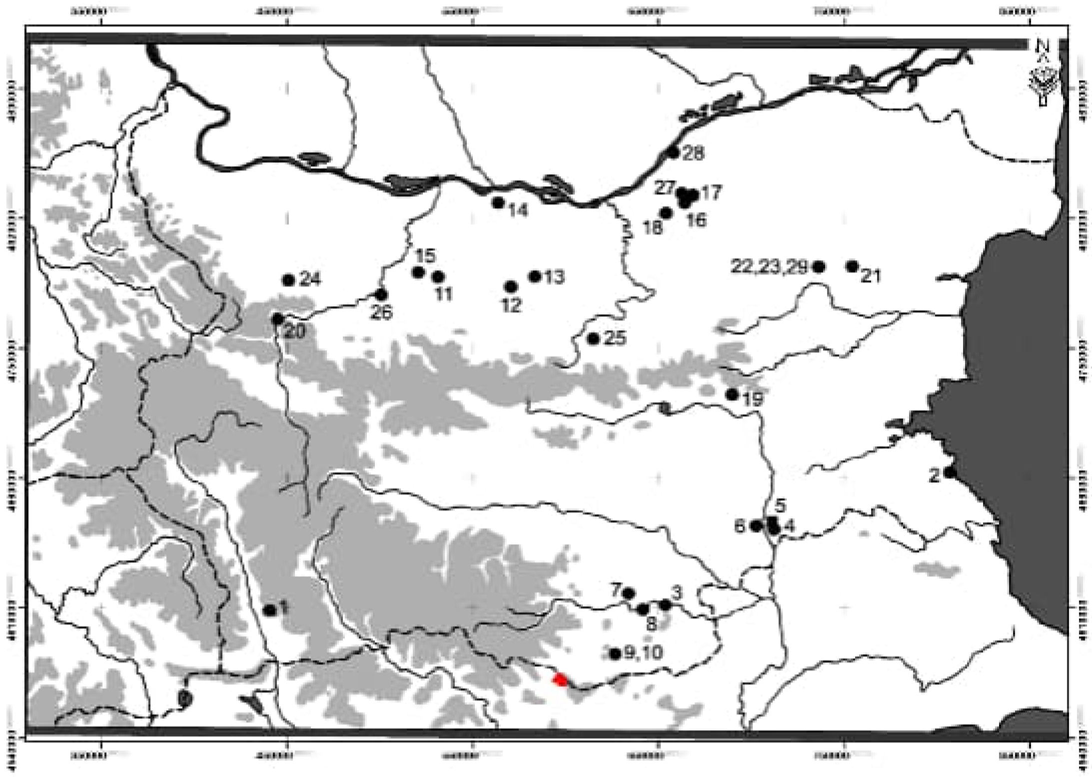
Map 118: Map of records of *Rhinolophus hipposideros* in Bulgaria. The black dot indicates the recording sites of the species, while the red dot indicates the area of the production license blocks of the project under study.



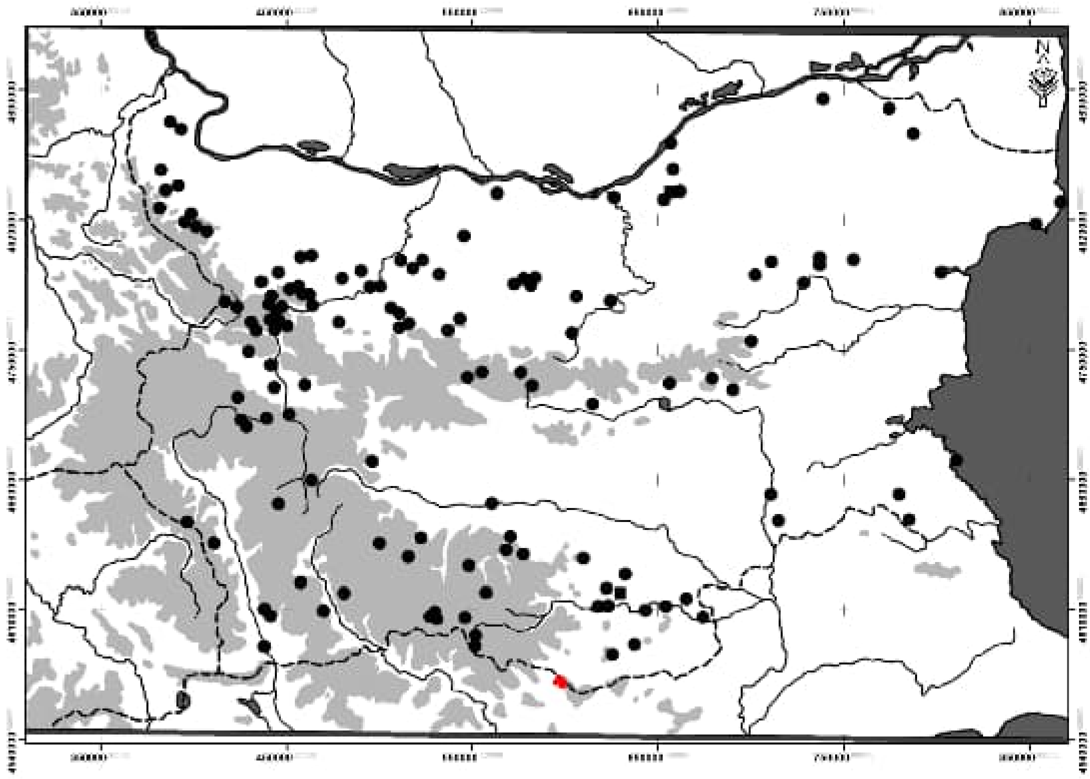
Map 119: Map of records of *Rhinolophus euryale* in Bulgaria. The black dot indicates the recording sites of the species, while the red dot indicates the area of the production permit polygons of the project under study.



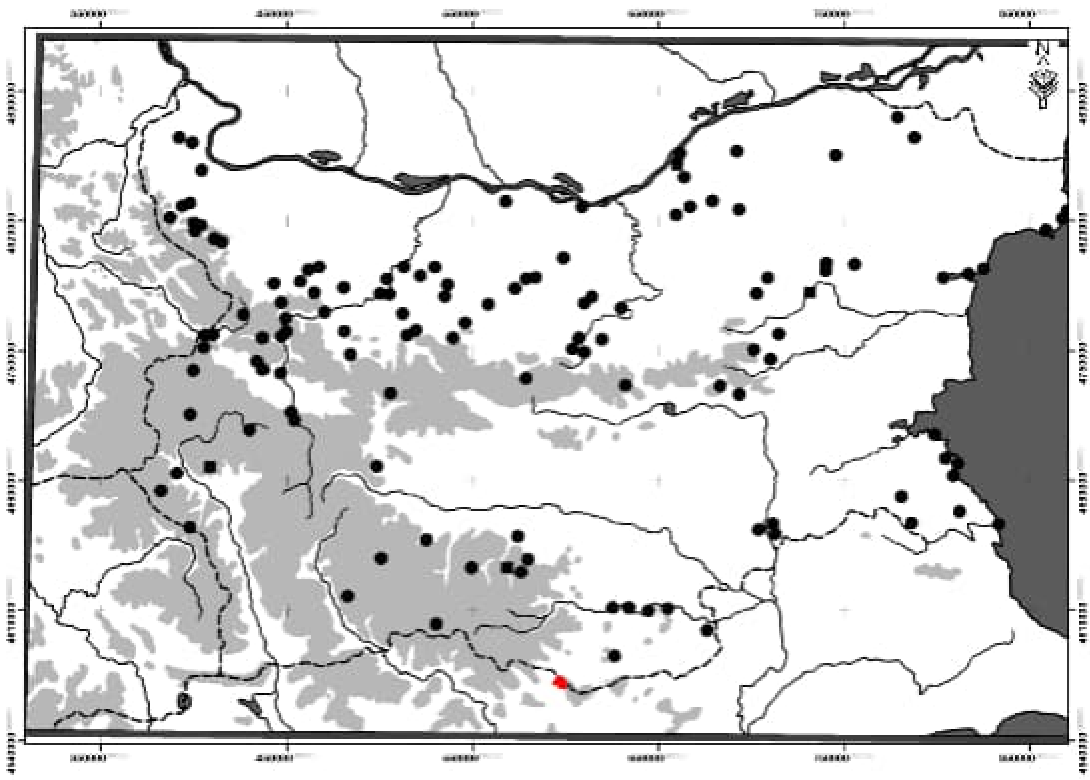
Map 120: Map of records of *Rhinolophus blasii* in Bulgaria. The black dot indicates the recording sites of the species, while the red dot indicates the area of the production license blocks of the project under study.



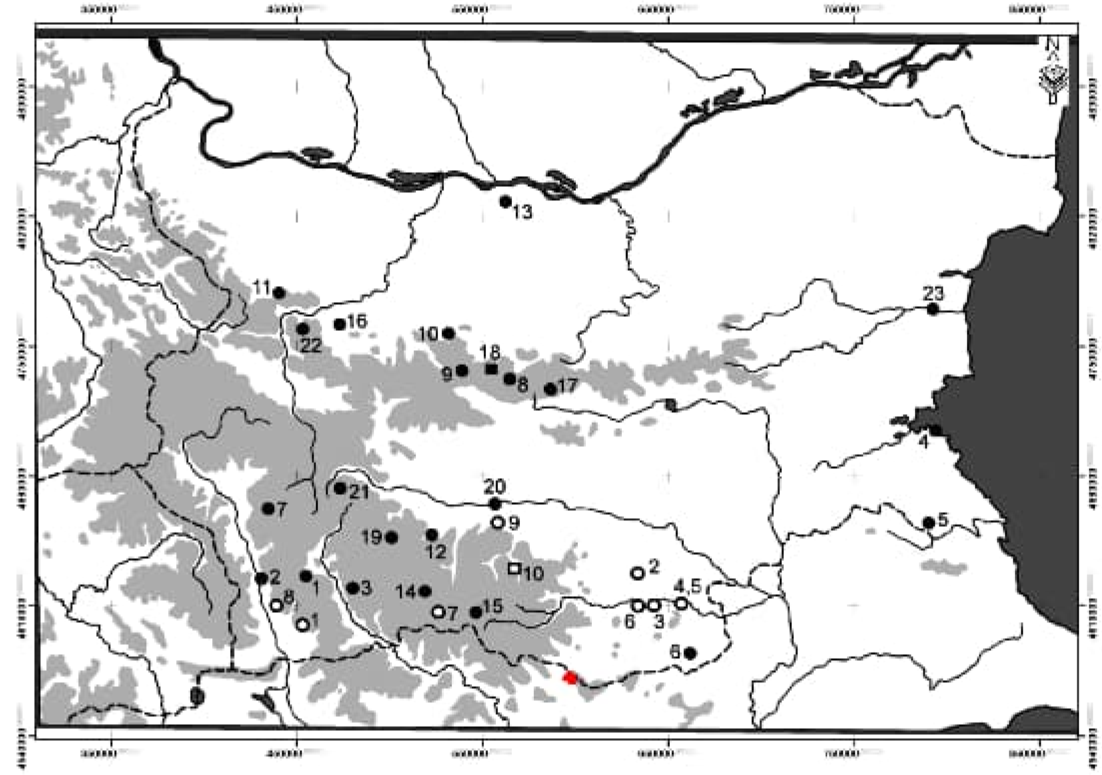
Map 121: Map of records of *Rhinolophus mehelyi* in Bulgaria. The black dot indicates the recording sites of the species, while the red dot indicates the area of the production permit polygons of the project under study.



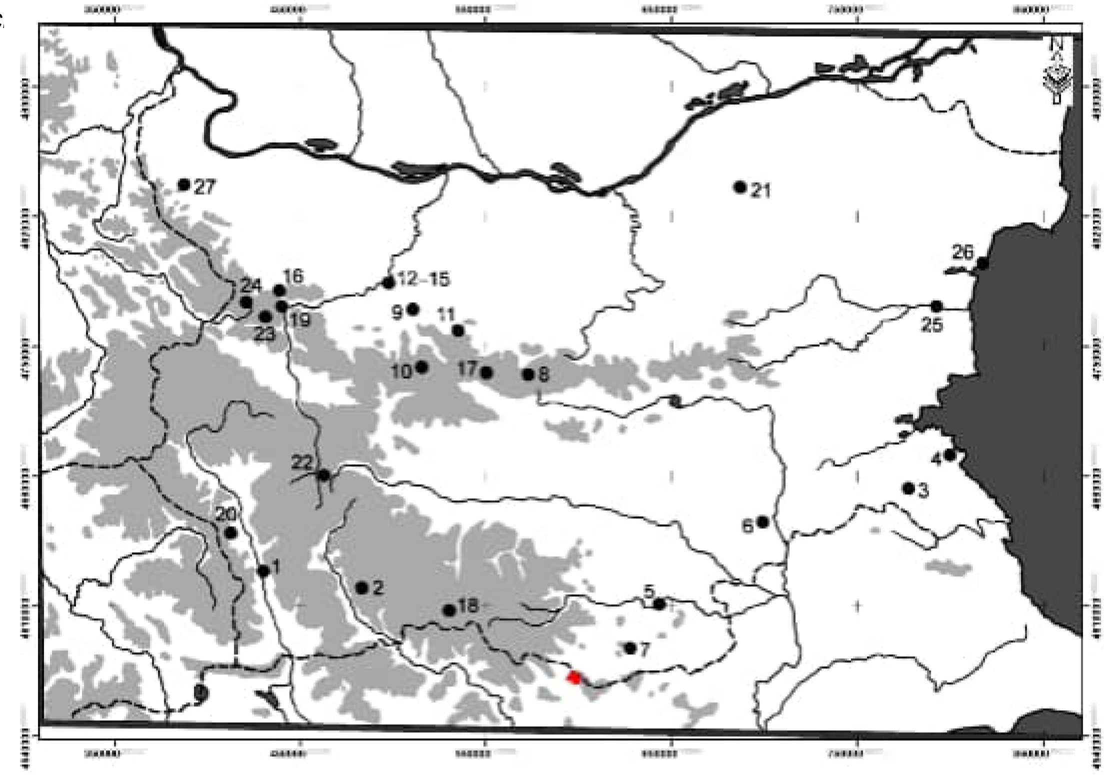
Map 122: Map of records of *Myotis myotis* in Bulgaria. The black dot indicates the recording sites of the species, while the red dot indicates the area of the production permit polygons of the project under study.



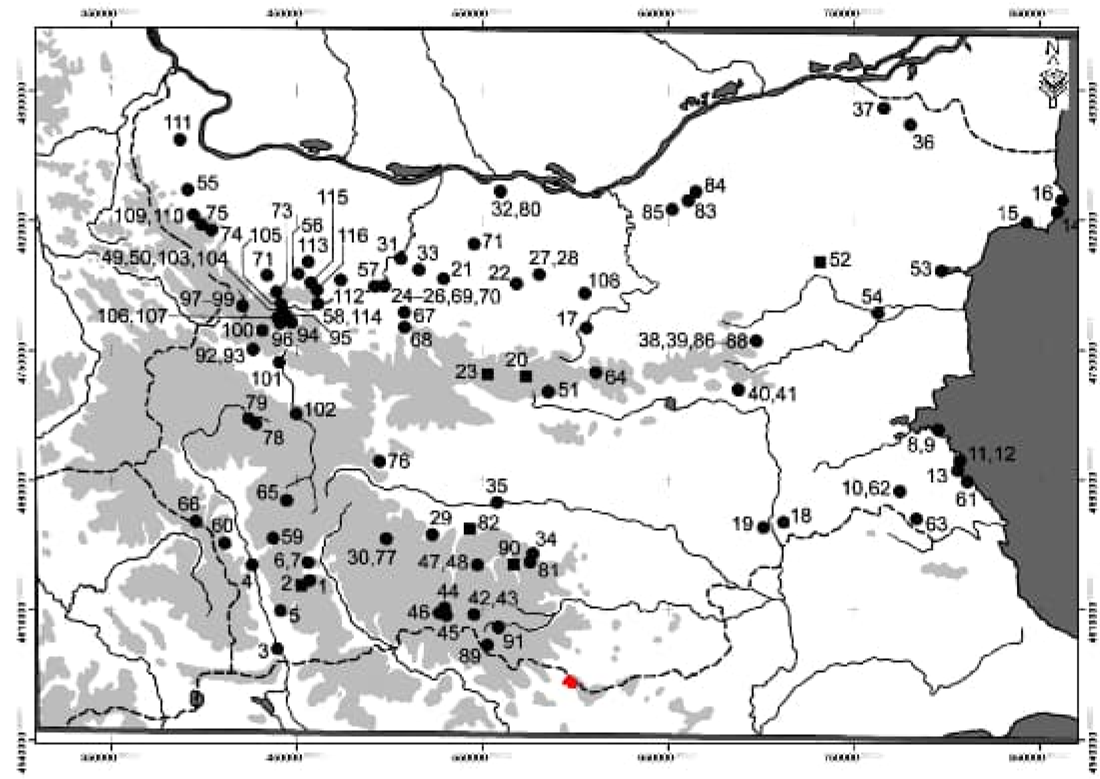
Map 123: Map of records of *Mioniopterus schreibersii* in Bulgaria. The black dot indicates the recording sites of the species, while the red dot indicates the area of the production licence blocks of the project under study.



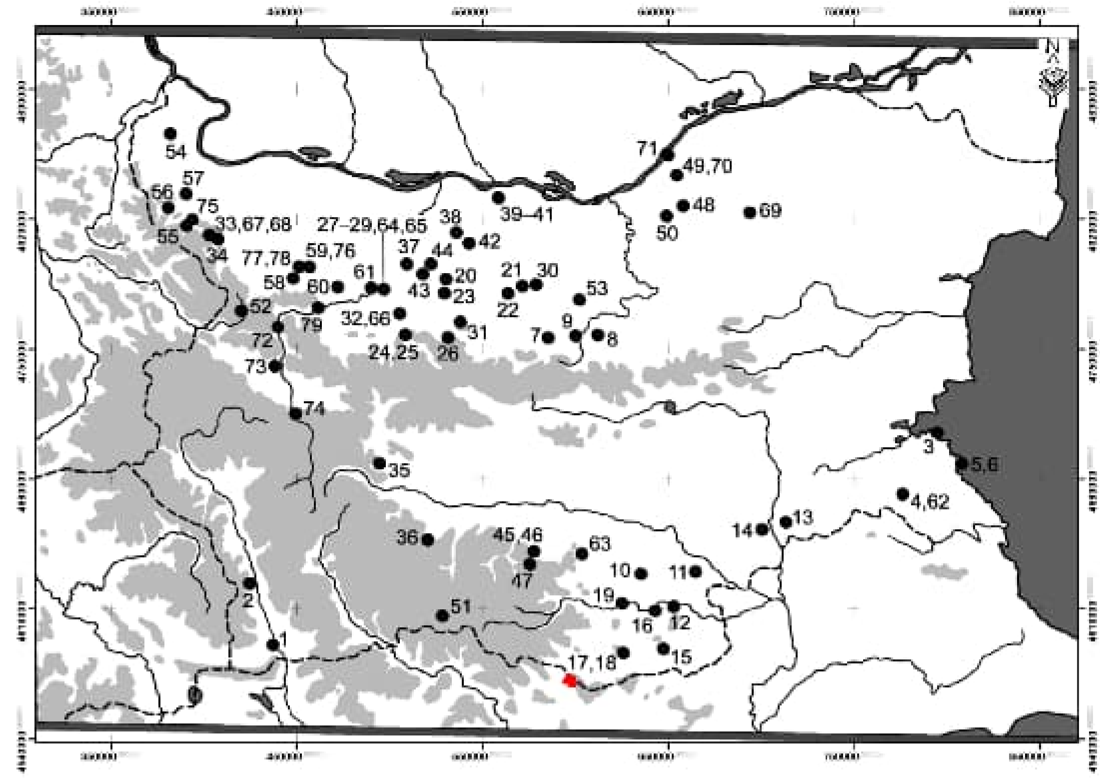
Map 124: Map of records of *Barbastella barbastellus* in Bulgaria. The black dot indicates the recording sites of the species, while the red dot indicates the area of the production licence blocks of the project under study (*white dots indicate the recording sites of Tadarida teniotis, which is not a species of interest here, as it is not a spec*



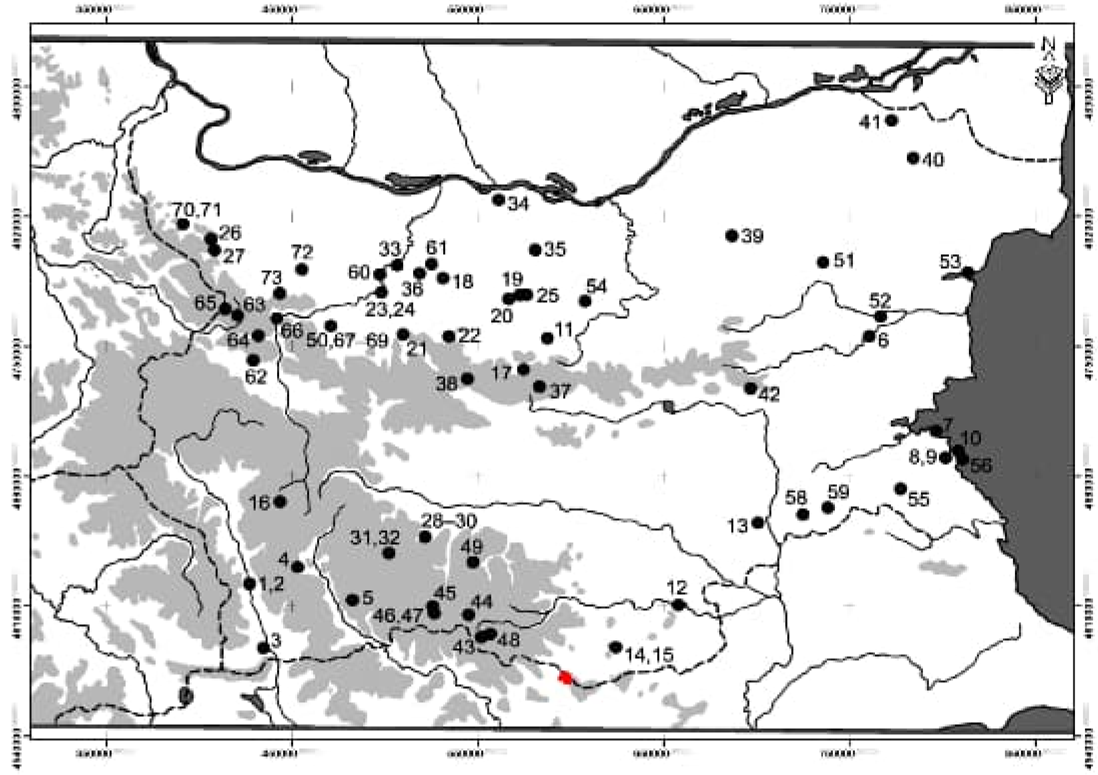
Map 125: Map of records of *Myotis bechsteinii* in Bulgaria. The black dot indicates the recording sites of the species, while the red dot indicates the area of the production permit polygons of the project under study.



Map 126: Map of records of *Myotis blythii* in Bulgaria. The black dot indicates the recording sites of the species, while the red dot indicates the area of the production permit polygons of the project under study.



Map 127: Map of records of *Myotis capaccini* in Bulgaria. The black dot indicates the species' recording sites, while the red dot indicates the area of the production permit polygons of the project under study.



Map 128: Map of records of *Myotis emarginatus* in Bulgaria. The black dot indicates the recording sites of the species, while the red dot indicates the area of the production permit polygons of the project under study.

From the above distribution maps of the 12 species of primary interest in Bulgaria, it can be seen that the nearest individual biogeographic sites of the above species in relation to the project under study are the following:

- *Rhinolophus ferrumequinum*: the nearest recording site is located at a distance (in a straight line) of more than 18 km from the boundaries of the production licence blocks of the project under study.
- *Rhinolophus* hipposideros: the nearest recording site is located at a distance (in a straight line) of more than 13 km from the boundaries of the production licence blocks of the project under consideration.
- *Rhinolophus euryale*: the nearest recording location is more than 30 km (in a straight line) from the boundaries of the production licence blocks of the project under consideration.
- *Rhinolophus mehelyi*: the nearest recording site is located at a distance (in a straight line) of more than 30 km from the boundaries of the production licence blocks of the project under study.

- *Rhinolophus blasii*: the nearest recording site is located at a distance (in a straight line) of more than 18 km from the boundaries of the production licence blocks of the project under study.
- *Myotis myotis*: the nearest survey site is located at a distance (in a straight line) of more than 30 km from the boundaries of the production licence blocks of the project under consideration.
- *Miniopterus schreibersii*: the nearest recording site is located at a distance (in a straight line) of more than 30 km from the boundaries of the production licence blocks of the project under study.
- *Myotis* bechsteinii: the nearest recording location is more than 30 km (in a straight line) from the boundaries of the production licence blocks of the project under consideration.
- *Barbastella barbastellus*: the nearest recording location is more than 60 km (in a straight line) from the boundaries of the production licence blocks of the project under consideration.
- *Myotis blythii:* the nearest survey site is located at a distance (in a straight line) of more than 45 km from the boundaries of the production licence blocks of the project under consideration.
- *Myotis capaccinii*: the nearest recording location is more than 30 km (in a straight line) from the boundaries of the production licence blocks of the project under consideration.
- *Myotis emarginatus*: the nearest recording location is more than 30 km (in a straight line) from the boundaries of the production licence blocks of the project under consideration.

In conclusion, all species of chiropteran interest have been recorded at locations greater than 10 km from the boundaries of the production licence blocks of the project under study, with a shorter distance recorded for *Rhinolophus hipposideros* (13 km).), and although according to the IUCN red list the species is classified as threatened (NT: Endangered), according to the Bulgarian Red Book it is not classified as threatened, since as mentioned above, the species (*together with Rhinolophus ferrumequinum*) is the most abundant in the country (273 sites).

Taking into account all the above mentioned, it is concluded that there is no significant risk that the installation and its operation will have a negative impact on the protected area within which it is located, but also, more generally, on the neighbouring protected areas of the wider area of its installation, on their conservation objectives and on their protected objects.

However, due to the sensitivity and importance of the wider study area, the intention of the study team to further assess the project site to evaluate whether, despite the above, mitigation measures are required to address potential impacts that will be caused and to propose a proper monitoring programme during the construction and operation phase of the project, it is considered that there should be further investigation with the preparation of the next step of the SEA (and the examination of the project's environmental impact assessment).

RESEARCH AREA OF THE FIELD (P.E.P.)

Detailed description of the Field Investigation Area (F.I.A.A.)

The survey area was defined as an area of 2,000 meters radius from the boundaries of the production license polygons of the project under study, much larger than the one defined as a minimum (specifically twice as large) in the EIA specifications in 170225/20-01-2014 KYA (Government Gazette 135/B/27-01-2014) for projects and activities of Category A1, which are implemented within the EEZ, ZEP. In practice, observations and recordings were carried out at a much larger radius, since e.g. from the viewpoints the observation of birds of prey could be carried out at a distance of even more than 5,000 m (using a telescope). The total number of sampling points for avifauna, as well as other fauna, is shown on maps 129, 130, 131 and 132, where the above is also presented on a satellite image background in the documentation maps section.

The W/F under study at the location "XEFOTO" is proposed to be installed in the Municipality of Mykis, of the Regional Unit of Xanthi, by the company HELLENIC PETROLEUM ANNEWABLE ENERGY SOURCES ANONYMIH LTD, at an average distance (in a straight line) of more than 26 km northeast of the city of Xanthi. The project has been granted a production licence and includes 24 wind turbines with a total installed capacity of 148,8 MW (individual power of each wind turbine 6,2 MW), type SG 6.2 - 170, with a rotor diameter of 170 metres and a pylon height of 135 metres.

6 FIELD INVENTORIES AND IMPACT ASSESSMENT

Prior to the fieldwork, the available published literature on 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 fieldwork in relation to the species and sections of the survey area.

For the identification and recording of the priority species of interest, the nomenclature of 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 bird species, of different orders, families, different seasonal presence, distribution, habitat preference and varying ecological requirements, that 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 bird species group, depending on 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
- Historical data on the presence of the species
- The accessibility of the seats and the approach time
- The establishment of a permanent sampling network to allow for comparable data in the future
- The location of the wind turbines

- The habitat types occurring within the field survey area and the stratified selection of sampling plots (except for point survey stations from observation points - see sampling methods)

Timing of measurements and analysis of methodology

A total of 56 field days were spent in the field to achieve the observation programme. More specifically, observation visits were made by three observers of the team for three days in the month of November 2021, six days in the month of December 2021, four days in the month of January 2022, five days in the month of February 2022, six days in the month of March 2022, six days in the month of April 2022, six days in the month of May 2022, five days in the month of June 2022, four days in the month of July 2022, four days in the month of August 2022, four days in the month of September 2022 and three days in the month of October 2022. On the above field days, all the field work was carried out, which involved recording work on avifauna (diurnal and nocturnal) and, in an ancillary capacity, other fauna (with emphasis on chironomids). The above field days also included hours spent observing behaviour and finding possible raptor nesting sites and critical habitats by the study team researchers.

The organisation of the field survey took into account: the number and populations of species hosted by the area, the degree of adequacy of the available ornithological and other fauna data from the literature reports and previous relevant studies that preceded the area, complete or reconnaissance in previous years, which enriched the knowledge and experience of the scientific research team for the area in question, the size, topography and accessibility of the area, the homogeneity, extent and diversity of the habitat, and the number of species in the area.

For the needs of the field research, recording and visualization of the data, appropriate equipment was used consisting of:

- Four-wheel drive vehicles
- Maps of the area
- Mirrors 10 x 50
- Telescopes 20 x 60
- Positioning devices (GPS)
- Laptops and Tablets

- Suitable GIS software
- High brightness lenses
- Digital cameras cameras
- Portable CD players with speakers etc.
- Light traps (Digital trail cameras)
- Bioacoustic station device (Song Meter Micro Wildlife Recorder) and use of special software AviaNZ (v3.2.3).
- Digital ultrasound recorder Batlogger C (Elecon AG) and use of special software program BatExplorer (v.2.1.4.0).
- Digital rangefinders.

Birdlife

According to the international literature and the study of the Ministry of Environment and Natural Resources "Monitoring and assessment of the conservation status of avifauna species in Greece" (Vlachos et al. 2014), but also 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 following methods, per bird group:

GROUP A: Predators (suitable methods for recording waterfowl, waders, large waders and seabirds likely to pass through the area)

1. Recording by the method of point recording stations from monitoring points

2. Recording of nocturnal predators using the method of point recording stations and the reproduction of sound files

3. Recording of the Yidovyzis species using the linear car route method (Synergistic sampling during travel between point recording stations of nocturnal predators).

GROUP B: Oystrus-forming, Oak-forming, Crow-forming, Raven-forming, Decodo-forming, Cockypoo-forming, Pigeon-forming, Horned-forming, Pterocleidomorphs, etc.

1. Recording by the method of point recording stations with 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 of the study area and if a nest is found, its location is recorded and the recording is evaluated accordingly. For the above task, 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, 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 the 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 are the most appropriate for the mentioned bird groups based on international literature and according to the study of the Ministry of Environment and Natural Resources "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, large waders and seabirds likely to pass through the area)

- **Vantage Point-count Stations (VPCS) - (Vantage Point-count Station - VPCS)**

  Survey from fixed points of good surveillance altitude, with scanning through macroscopic observation (binoculars and telescope) of a large part of the study area, preferably 360º circumferentially. The five 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 with a view to obtaining the best coverage around the perimeter of the location of the tested LCP. The recordings were mainly implemented 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 folder, on which the basic station data for each sampling area, such as altitude, coordinates, place name, sampling area code, 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 surveys, the observer took a position at the station by placing the ground-based telescope at a fixed point that allowed it to rotate fully at an angle of 360º . He scanned the area with both binoculars and the telescope and recorded the predators he spotted over a three-hour period. The observer scanned the entire area around him at an angle of 360º for 30 consecutive minutes, followed by stopping to rest for a few minutes and then the same procedure again. All species detected were recorded on the corresponding recording form

- **Playback point-count stations (Playback point-count Station) and recording of the species Yiddish**

  Counting from fixed points by playing an audio call and recording the call-response. It is applied especially to nocturnal predators.

  Five point recording stations with audio call reproduction were selected in the study area, as indicated on the relevant maps (documentation maps section) with blue circles (and with a 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 observer equipment in this case was an audio file on a CD, written in a specific way to ensure that there was proper sequencing between the audio files and the correct 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's engine and after preparing the recording form, waited silently for 2 minutes. He then reproduced the voice of a nocturnal predator species 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 Oystercormorphs**, Druciforms, Ravenforms, Decadomorphs, Cockchaferous, Pigeonforms, Ornithomorphs, Pterocleidomorphs, etc.**

- **Point-count stations from fixed points (Point-count Station**)

Counting from fixed points, within a certain radius around them using both macroscopic observation (mainly with binoculars where required) and species identification by ear. In the field survey area, 12 corresponding locations were selected, as shown on the relevant maps (documentation maps 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 hand-held 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 centre of the imaginary circle of 100 m radius. Initially he waited quietly for 2 to 3 minutes, so that in case his arrival affected any 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 (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 sections of species habitat in the study area sampling plots and are implemented on foot. Six corresponding linear transects were installed in the study field survey area and are depicted in blue on the associated 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 was initially silent for 2 to 3 minutes, so that in case his arrival had affected some species of ostriches, they would return to their previous state. He then carried out a census of the smolt 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 completed whether the individuals he observed were within 100 m of either 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 information on 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 (except for the avifauna) of the floodplain, additional surveys of reptiles, amphibians and mammals were carried out for the comprehensive assessment of the study area based on the following methodology.

Methods of recording handlers

The field survey of the proposed wind turbine sites was carried out using the most appropriate techniques and equipment in relation to the habitats, using an automatic ultrasound recording system. More specifically, monitoring and identification of handbats was carried out using ultrasonic bat detectors with recordings of the ultrasounds of bats during their nocturnal activity (foraging, movements, etc.). The recording of the ultrasounds was carried out by digitally recording them using the Batlogger C (Elecon AG) and analysing the recordings 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 chrysoptera 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 chironomids, 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** have been designed and proposed by the above project **around each location of important cave**. Of the above designated important caves and protection areas around them, it appears that none are located within the field survey area, nor in close proximity to it. In fact, the nearest site is located at a distance of more than 17 km. More specifically, the nearest corresponding site is located at an average distance (in a straight line) of 17.45 km south-southwest of the project under study and is the site of 'Cave Amaxades' (Map 133). In addition, the field survey area falling within Bulgaria was also assessed for chiral species, with a full assessment of the 12 Annex II chiral species of Directive 92/43/EEC, which are listed in the TED of the Bulgarian study site BG0001032. The assessment was based on both literature data and field data (Benda et al. 2003), according to which the closest locations of records of the above-mentioned species of chiroptera species of interest, in relation to the area of the production licence blocks of the project under study, are located at a distance of more than 10 km (with the shortest distance recorded for *Rhinolophus hipposideros* (13 km.), and although according to the IUCN red list the species is classified as endangered (NT: Threatened), according to the Bulgarian Red Book it is not classified as threatened, since, as mentioned above, this species, together with *Rhinolophus ferrumequinum*, is the most abundant in the country - *for more information see the preliminary assessment section*).

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. To monitor and record chironomids in the study area, surveys were conducted throughout the duration of the field survey (November 2021 - October 2022). During the months of November 2021, December 2021, January 2022, April

2022, June 2022 and October 2022 records were conducted for two consecutive evenings at two selected sites (two sites for each month of records - one site for each evening); during the months of February 2022, March 2022, July 2022, August 2022 and September 2022 records were conducted for three consecutive evenings, in three selected locations (three locations for each month of recording - one location for each evening), while in May 2022, recordings were made for four consecutive evenings, in four selected locations (one location for each evening), out of a total of 16 locations selected to make all of the handler recordings (Maps 130 and 132) (Maps 130 and 132). Species that exhibited 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 of recording species of reptiles and amphibians

Linear routes

When applying the method, walks were made to and from specific points within the survey area and the species of amphibians and reptiles spotted by the observer were recorded.

Since no temporary or permanent water bodies were observed in the field survey area, it was not possible to carry out the point-sound recording method used to record anuran amphibians such as toads and frogs. Under this method, reproductive calls of mature males are used, in which mature males from breeding sites are present. In this way the species composition and the relative population status of the species is recorded.

Random routes

The observer moves around an area with as uniform a habitat as possible and records the species observed. The method is very 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 points on the various visits that were made for bird observations (bird sampling sites).

Mammal census method (other species except cephalopods)

Indirect observation using bioluminescent indications 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 the measurement, biotic evidence of mammal presence (droppings, hair, tracks, etc.) was recorded. The trails 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 during the various visits that were made for bird observations.

Installation of a network of light traps in the wider area

For the recording of the mammals of the study area, the placement of 7 automatic recording light traps was also chosen, which covered a total of 25 corresponding recording sites in the wider area (field survey area and wider area) during the period November 2021 - October 2022, with a total stay in the field of 168 days (two days for each month of recording) ensuring a total of 168 days and nights of recording (7 x 24 = 168) (Maps 131 and 132).

List of the habitat types of Annex I of the H.P.14849/853/E103/4.4.2008 (Government Gazette B΄ 645) (if it is an EEZ, TKS).

The site of this project is not located within an EEZ, TKZ and therefore the habitat types of the wider area are not mapped, nor is there a requirement to do so.

According to the database and land cover mapping (Corine land cover 2018) reflected on the documentation maps, the area of the W/F XEFOTO production license blocks is almost entirely within hardwood vegetation and transitional woodland and shrubland, with a small portion of broadleaf forest completing the habitat mosaic of the northernmost production license block of the project under study. (see map documentation section, Map 7). The above habitat types also cover most of the study project field survey area, along with smaller areas of coniferous forest, mixed forest, natural grasslands, and land used primarily for agriculture along with significant portions of natural vegetation. In general, the above habitat types predominate in the area.

Inventory of the fauna species listed in Annex II of the EIS. H.P.14849/853/E103/4.4.2008 (B΄ 645) as regards the size and density of the populations and their conservation status (if they are endangered species, if they are endangered species).

The site of the project under study, as mentioned above, is located outside the Natura 2000 network areas of EZD, TKAS. Nevertheless, during the field survey, and due to the proximity of the installation site to the Natura 2000 network site EEZ BG0001032, the other fauna (except for avifauna) of the wider area and the survey area was recorded, which is presented in Table 14 below.

Table 14. Fauna recorded in the survey area

STATUS AND STATUS OF FAUNA SPECIES OBSERVED IN THE SURVEY AREA			
Latin name	Common name	Status	
		IUCN EU	ELL(KB)
THOUSANDS			
Order Carnivora (Carnivora)			
Canids (Canidae)			
vulpes vulpes	Fox	LC	NE
canis lupus	Wolf	LC	VU
Ictids (Mustelidae)			
Martes foina	Petrocounavo	LC	NE
Meles meles	Badger	LC	NE
Cats (Felidae)			
Felis silvestris	Wildcat	LC	NE
Class Lagomorphs (Lagomorpha)			
Luporidae (Leporidae)			
Lepus europaeus	Hare	LC	NE
Order Artiodactyla (Cetartiodactyla)			
Lice (Suidae)			

STATUS AND STATUS OF FAUNA SPECIES OBSERVED IN THE SURVEY AREA			
Latin name	Common name	Status	
		IUCN EU	ELL(KB)
Sus scrofa	Wild boar	LC	NE
Deer (Cervidae)			
Capreolus capreolus	Zarkadi	LC	VU
Class Rodents (Rodentia)			
Squirrels (Sciuridae)			
Sciurus vulgaris	Skiuros	LC	NE
Bats (Vespertilionidae)			
Barbastella barbastellus	Barbastellos	VU	EN
Eptesicus serotinus	Tranny Bat	LC	LC
hypsugo savii	Mountain Bat	LC	LC
Myotis alcathoe	Myocyte of Alcathol	DD	DD
Myotis capaccinii	Footprint	VU	NT
myotis daubentonii	Myotid of Daubenton	LC	VU
Myotis myotis	Tranomyotida	LC	NT
Nyctalus lasiopterus	Big Night Rider	DD	VU
Nyctalus leisleri	Micronaut	LC	LC
Nyctalus noctula	Nightshade	LC	LC
Pipistrellus cowlick	White bat	LC	LC
Pipistrellus nathusii	Bat of Nathusius	LC	DD
Pipistrellus pipistrellus	Nanobat	LC	DD
Pipistrellus pygmaeus	Micro Bat	LC	DD
Plecotus auritus	Brown bat	LC	VU
Plecotus colombatovici	Mediterranean oton bat	NT	DD
vespertilio murinus	Parallax Bat	LC	DD
Minopterids (Miniopteridae)			
Miniopterus schreibersii	Winged bat	VU	NT
Rhinolophids (Rhinolophidae)			
Rhinolophus euryale	Mesorhinolophus	VU	NT
Rhinolophus hipposideros	Micronova	NT	LC
Rhinolophus ferrumequinum	Tranorhinolophus	NT	LC
HERPETA			
Class Flounder (Squamata)			
Subclass Lizards			
Lizards (Lacertidae)			
Lacerta viridis	Greenosaurs	LC	LC
Podarcis muralis	Tikhosaura	LC	LC
Subordination of buds			
Echidnids (Viperidae)			

STATUS AND STATUS OF FAUNA SPECIES OBSERVED IN THE SURVEY AREA			
Latin name	**Common name**	**Status**	
		IUCN EU	**ELL(KB)**
viper ammodytes	Viper	LC	LC
Natticides (Colubridae)			
Dolichophis caspius	Scarface	LC	LC
Colubrids (Natricidae)			
Natrix natrix	Water bottle	LC	LC
Class Turtles (Testudines)			
Turtles (Testudinidae)			
Testudo graeca	Gray turtle	VU	LC
Testudo hermanni	Mediterranean turtle	NT	VU
AMPHIBIA			
Class Anura (Anura)			
Frynids (Bufonidae)			
Bufo viridis	Green toad	LC	LC

SUBMISSION

Evaluation
EX : Deceased
EW : Extinct from their natural environment
CR: Critically Endangered
EN : Endangered
VU : Vulnerable
NT : Near Threatened
LC : Reduced interest
DD : Insufficiently known

Table 15 lists the fauna species (mammals, reptiles, amphibians) observed in the survey area and their threatened status according to pan-European Directives and Conventions.

Table 15. Fauna species of the survey area and threat status classifications

THREATENED STATUS OF SPECIES OF FAUNA OBSERVED IN THE SURVEY AREA						
Species (Latin name)	**Species (Greek Name)**	**IUCN Threat Regime (EU)**	**Directive 92/43/EEC**	**Bern Convention**	**Bonn Convention**	**CITES**
THOUSANDS						
Order Carnivora (Carnivora)						
Canids (Canidae)						

THREATENED STATUS OF SPECIES OF FAUNA OBSERVED IN THE SURVEY AREA						
Species (Latin name)	**Species (Greek Name)**	**IUCN Threat Regime**	**Directive 92/43/EEC**	**Bern Convention**	**Bonn Convention**	**CITES**
vulpes vulpes	Fox	LC				III
canis lupus	Wolf	LC	V	II		I, II
Ictids (Mustelidae)						
Martes foina	Petrocounavo	LC		III		III
Meles meles	Badger	LC		III		
Cats (Felidae)						
Felis silvestris	Wildcat	LC	IV	II		II
Class Lagomorphs (Lagomorpha)						
Luporidae (Leporidae)						
Lepus europaeus	Hare	LC		III		
Order Artiodactyla (Cetartiodactyla)						
Lice (Suidae)						
Sus scrofa	Wild boar	LC				
Deer (Cervidae)						
Capreolus capreolus	Zarkadi	LC		III		
Class Rodents (Rodentia)						
Squirrels (Sciuridae)						
Sciurus vulgaris	Skiuros	LC		III		
Class Chiroptera (Chiroptera)						
Bats (Vespertilionidae)						
Barbastella barbastellus	Barbastellos	VU	II, IV	II	II	
Eptesicus serotinus	Tranny Bat	LC	IV	II	II	
hypsugo savii	Mountain Bat	LC	IV	II	II	
Myotis alcathoe	Myocyte of Alcathol	DD	IV	II	II	
myotis capaccinii	Footprint	VU	II,IV	II	II	
myotis daubentonii	Myotid of Daubenton	LC	IV	II	II	
Myotis myotis	Tranomyotida	LC	II, IV	II	II	
Nyctalus lasiopterus	Big Night Rider	DD	IV	II	II	
Nyctalus leisleri	Micronaut	LC	IV	II	II	
Nyctalus noctula	Nightshade	LC	IV	II	II	
Pipistrellus cowlick	White bat	LC	IV	II	II	
Pipistrellus nathusii	Bat of Nathusius	LC	IV	II	II	
Pipistrellus pipistrellus	Nanobat	LC	IV	III	II	
Pipistrellus pygmaeus	Micro Bat	LC	IV	II	II	
Plecotus auritus	Brown bat	LC	IV	II	II	
Plecotus colombatovici	Mediterranean oton bat	NT	IV	II	II	
vespertilio murinus	Parallax Bat	LC	IV	II	II	
Minopterids (Miniopteridae)						

THREATENED STATUS OF SPECIES OF FAUNA OBSERVED IN THE SURVEY AREA						
Species (Latin name)	**Species (Greek Name)**	**IUCN Threat Regime (EU)**	**Directive 92/43/EEC**	**Bern Convention**	**Bonn Convention**	**CITES**
Miniopterus schreibersii	Winged bat	VU	II, IV	II	II	
Rhinolophids (Rhinolophidae)						
Rhinolophus euryale	Mesorhinolophus	VU	II, IV	II	II	
Rhinolophus hipposideros	Micronova	NT	II,IV	II	II	
Rhinolophus ferrumequinum	Tranorhinolophus	NT	II,IV	II	II	
HERPETA						
Class Flounder (Squamata)						
Subclass Lizards						
Lizards (Lacertidae)						
Lacerta viridis	Greenosaurs	LC	IV	II		
Podarcis muralis	Tikhosaura	LC	IV	II		
Subordination of buds						
Echidnids (Viperidae)						
viper ammodytes	Viper	LC	IV	II		
Natticides (Colubridae)						
Dolichophis caspius	Scarface	LC	IV	II		
Colubrids (Natricidae)						
Natrix natrix	Water bottle	LC		III		
Class Turtles (Testudines)						
Turtles (Testudinidae)						
Testudo graeca	Gray turtle	VU	II, IV	II		II
Testudo hermanni	Mediterranean turtle	NT	II, IV	II		II
AMPHIBIA						
Class Anura (Anura)						
Frynids (Bufonidae)						
Bufotes viridis	Green toad	LC	IV	II		

Memo

IUCN Threat Status
EX: Extinct, EW: Extinct from their natural habitat, CR: Critically Endangered, EN: Endangered, VU: Vulnerable, NT: Near Threatened, LC: Of Limited 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: belongs to Annex II of the Directive (animal and plant species of Community interest whose conservation requires the designation of Special Conservation Areas)
III: belongs to Annex III of the Directive (criteria for the selection of sites that can be recognised as sites of Community interest and designated as Special Areas of Conservation)
IV: belongs to Annex IV of the Directive (animal and plant species of Community interest requiring strict protection)

V: included in Annex V of the Directive (animal and plant species of Community interest whose capture in the wild and exploitation may be subject to management measures)
Treaty of Bern
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 possession or trade in them, alive or dead)
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 offer for sale of these species, whether alive or dead)
Treaty of Bonn
I: listed in Annex I to the Treaty (migratory species in danger of extinction)
II: listed in Annex II to the Treaty (migratory species benefiting from international cooperation on conservation and management measures)
International CITES Convention
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 of the Convention (species which, although not threatened, are currently endangered, but may be threatened in the future if their 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 designed to prevent or restrict the exploitation of such species and which requires the cooperation of the other Contracting States)

As already mentioned, the site of the project and the field survey area is not located within any of the 230 most important bat refuges in Greece according to the LIFE GRECABATS project. The nearest one is located at a distance of more than 17 km. More specifically, the nearest corresponding site is located at an average distance (in a straight line) of 17,45 km south-southwest of the project site and is the site 'Amaxades' (Map 133). The field surveys revealed the presence in the area of seven species of chiral species belonging to Annex II (and Annex IV) of Directive 92/43/EEC (barbastelle, footed flycatcher, crinoid, winged bat, mesrinolophus, microrhinolophus, tranrinolophus), while the species of crinoid, mountain bat, Alcathus myotis, Daubenton's myotis, Daubenton's myotis, great night-owl bat, small night-owl bat, night-owl bat, white bat, Nathusius's bat, nanon bat, micro bat, brown oton bat, Mediterranean oton bat, parsnip bat, belong to the corresponding Appendix IV. Of all the other mammals recorded (except chimaeras), none belong to Annex II of the above Directive, while the bobcat is a species of Annex IV and the wolf is a species of Annex V of the Directive. Of all the reptile species, two turtle species (gray turtle and Mediterranean turtle) are species listed in Annex II to the Directive, while of all the species, the gray turtle, Mediterranean turtle, green lizard, wall lizard, viper and starry-eyed viper are species listed in Annex IV to the Directive. The water snake does not belong to any of the above Annexes. As regards amphibians, only the species *Bufo viridis* (green toad), *which* belongs to Annex IV of the above Directive, was observed during the fieldwork. It is worth noting that throughout the fieldwork (*as shown below in the section of photographs documenting the fieldwork*), the presence of horses was recorded in the area of the project site, which, although referred to as wild horses, are in fact natural populations of individuals of the species that were abandoned in the area decades ago by their owners, who used them for agricultural and livestock work, managed to survive and reproduce in the area.

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, as to their conservation status and their isolation (if they are in a SPA).

As already mentioned, the site of the project under consideration is located within a Natura 2000 network area designated as an SPA. The avifauna in the study area recorded during the field survey is presented in Table 16 below:

Table 16. Birds recorded in the survey area

STATUS AND STATUS OF PRESENCE OF AVIFAUNA SPECIES OBSERVED IN THE SURVEY AREA				
Latin name	**Common name**	**Status**		**Presence in Greece**
		IUCN EU	**ELL(KB)**	
Class Aetomorphs *(Accipiteriformes)*				
Eagles *(Accipitridae)*				
Circus aeruginosus	Kalamokirkos	LC	VU	WV, PM, r
Accipiter nisus	Xefteri	LC	NE	WV, r
Accipiter brevipes	Saini	LC	NE	sv, pm
Buteo buteo	Gerakina	LC	NE	R, WV
Circaetus gallicus	Snake Eagle	LC	NT	sv, pm
Circus cyaneus	Wintergreen	LC	NE	wv, pm
Aquila chrysaetos	Golden Eagle	LC	EN	r
Circus pygargus	Livadocricks	LC	CR	PM, sv
clanga pomarina	Screamer	LC	EN	sv, pm
Hieraaetus pennatus	Falcon Eagle	LC	EN	sv, pm
Pernis apivorus	Cuneiaris	LC	LC	sv, PM
Accipiter gentilis	Diploysino	LC	NE	R
Gyps fulvus	Vulture	LC	VU/CR	R

STATUS AND STATUS OF PRESENCE OF AVIFAUNA SPECIES OBSERVED IN THE SURVEY AREA				
Latin name	**Common name**	**Status**		**Presence in Greece**
		IUCN EU	**ELL(KB)**	
Aegypius monachus	Black vulture	LC	EN	r
Milvus migrans	Tsiftis	LC	CR	wv, pm, r
Pandionidae *(Pandionidae)*				
Pandion haliaetus	Osprey	LC	LC	pm, FBr
Order Hieracomorphs *(Falconiformes)*				
Ieracidae *(Falconidae)*				
Falco tinnunculus	Brachokirkejo	LC	NE	R
Falco subbuteo	Tree Horn	LC	NE	SV, PM
Falco eleonorae	Blackstone	LC	LC	SV
Falco peregrinus	Petrite	LC	LC	r, wv
Order Pelagomorphs *(Ciconiiformes)*				
Stork *(Ciconiidae)*				
Ciconia nigra	Blackbird	LC	EN	sv, pm
Order *Pelecaniformes (Pelecaniformes)*				
Herodidae *(Ardeidae)*				
ardea cinerea	Cinderella	LC	Ne	R, PM
Pelecanidae *(Pelecanidae)*				
Pelecanus onocrotalus	Rose-breasted pelican	LC	VU	sv, pm
Pelecanus crispus	Silver pelican	LC	VU	R
Class Suliformes *(Suliformes)*				
Phalacrocoracidae (Phalacrocoracidae)				
Phalacrocorax carbo	Cormorant	LC	NE	WV, r
Order Glaucomorphs *(Strigiformes)*				
Glaucidae *(Strigidae)*				
anthena noctua	Owl	LC	NE	R
otus scops	Gionis	LC	NE	PLM
Strix aluco	Hoochie	LC	NE	R
Order Coraciiformes *(Coraciiformes)*				
Meropidae *(Meropidae)*				
Merops apiaster	Bee-eater	LC	NE	SV, PM
Order Ornithomorphs *(Galliformes)*				
Pheasants *(Phasianidae)*				
Alectoris chukar	Island partridge	LC	NE	R
Class Haemothilomorphs *(Caprimulgiformes)*				
Apodidae (*Apodidae)*				

STATUS AND STATUS OF PRESENCE OF AVIFAUNA SPECIES OBSERVED IN THE SURVEY AREA				
Latin name	**Common name**	**Status**		**Presence in Greece**
		IUCN EU	**ELL(KB)**	
Apus apus	Cinderella	LC	NE	SV
tachymarptis melba	Mountain Dazzle	LC	NE	SV, PM
Goatfish (*Caprimulgidae)*				
Caprimulgus europaeus	Yiddish	LC	LC	SV
Class Bucerotiformes *(Bucerotiformes)*				
Epopods *(Upopidae)*				
Upupa epops	Ruffed Grouse	LC	NE	SV, PM
Order Peristeriformes *(Columbiformes)*				
Pigeons *(Columbidae)*				
Streptopelia turtur	Trygoni	VU	NE	SV, PM
Columba palumbus	Fassa	LC	NE	R
Order Coccygomorphs *(Cuculiformes)*				
Cockchafer *(Cuculidae)*				
Cuculus canorus	Cuckoo	LC	NE	sv, pm
Order *Piciformes (Piciformes)*				
Oak warblers *(Picidae)*				
Dryobates minor	Nanodigger	LC	NE	r
Dendrocopos major	Pinecodoncolipper	LC	NE	r
Dendrocopos syriacus	Balkan woodpecker	LC	NE	R
Leiopicus medius	Medium woodpecker	LC	NE	R
picus viridis	Green woodpecker	LC	NE	r
Dryocopus martius	Black woodpecker	LC	LC	r
Order Charadriiformes *(Charadriiformes)*				
Scolopacidae (Scolopacidae)				
Scolopax rusticola	Bekacha	LC	NE	WV, r
Order *Passerine (Passeriformes)*				
Swallows *(Hirundinidae)*				
Delichon urbicum	White Swallow	LC	NE	SV, PM
cecropis daurica	Miltohelidon	LC	NE	SV, pm
Phylloscopids *(Phylloscopidae)*				
Phylloscopus collybita	Arborvitae	LC	NE	WV, sv?
Phylloscopus sibilatrix	Woodcutter	LC	NE	PM, SV
Passerias *(Passeridae)*				
Passer domesticus	Spitfire	LC	NE	R
Regulids *(Regulidae)*				

STATUS AND STATUS OF PRESENCE OF AVIFAUNA SPECIES OBSERVED IN THE SURVEY AREA				
Latin name	**Common name**	**Status**		**Presence in Greece**
		IUCN EU	**ELL(KB)**	
Regulus regulus	Gold Basilisk	LC	NE	WV
Certhiidae *(Certhiidae)*				
Certhia brachydactyla	Cambodian	LC	NE	R
Corydalis *(Alaudidae)*				
Lullula arborea	Treestar	LC	LC	R
alauda arvensis	Wheatgrass	LC	NT	WV, r
Aegithalidae *(Aegithalidae)*				
Aegithalos caudatus	Aegithalos	LC	NE	R
Oriolidae *(Oriolidae)*				
Oriolus oriolus	Sykophagos	LC	NE	SV, PM
Sittidae (Sittidae)				
pitta europaea	Dentrotsopanakos	LC	NE	R
Flycatchers *(Muscicapidae)*				
oenanthe oenanthe	Cinderella	LC	NE	SV, PM
oenanthe hispanica	Whitehead	LC	NE	SV
Phoenicurus ochruros	Carbuncle	LC	NE	WV, r
Erithacus rubecula	Kokkinolaimi	LC	NE	WV, r
Luscinia megarhynchos	Nightingale	LC	NE	SV
Saxicola torquatus	European Blackfeather	LC	NE	R, wv
Muscicapa striata	Cinderella	LC	NE	PM, sv
Ficedula semitorquata	Oak woodpecker	LC	DD	sv
Eagle rabbits *(Laniidae)*				
Lanius collurio	Eagle Eagle	LC	NE	SV, PM
Lanius minor	Cinderella	LC	NT	sv, pm
Lanius senator	Redhead	NT	NE	SV, PM
Cichlids *(Turdidae)*				
turdus merula	Blackbird	LC	NE	R, WV
Turdus pilaris	Kerdochilla	LC	NE	WV, r?
Turdus viscivorus	Gerakotsichla	LC	NE	R, wv
Shrimp *(Paridae)*				
Parus major	The Monk	LC	NE	R
cyanistes caeruleus	Ducky	LC	NE	R
Poecile lugubris	Keydonas	LC	NE	r
Periparus ater	Fir trap	LC	NE	R
Crows *(Corvidae)*				

STATUS AND STATUS OF PRESENCE OF AVIFAUNA SPECIES OBSERVED IN THE SURVEY AREA				
Latin name	**Common name**	**Status**		**Presence in Greece**
		IUCN EU	**ELL(KB)**	
Corvus corax	Crow	LC	NE	R
corvus cornix	Windlass	LC	NE	R
Garrulus glandarius	Kissa	LC	NE	R
Sturnidae *(Sturnidae)*				
Sturnus vulgaris	Fisherman	LC	NE	WV, R
Troglodytes *(Troglodytidae)*				
Troglodytes troglodytes	Woodpecker	LC	NE	R
Sylviiidae *(Sylviiidae)*				
curruca communis	Bushy-tailed Grouse	LC	NE	SV, PM
Curruca cantillans	Red-winged blackbird	LC	NE	SV, PM
Curruca melanocephala	Black-eared Owl	LC	NE	R
Sylvia atricapilla	Mavroskoufis	LC	NE	R, WV
Curruca curruca	Bunotsirovacos	LC	NE	SV, PM
Spiracles *(Fringillidae)*				
Carduelis carduelis	Cardarina	LC	NE	R, wv
fringilla coelebs	Finch	LC	NE	R, WV
Linnaria cannabina	Fan photo	LC	NE	R, wv
chloris chloris	Florus	LC	NE	R, wv
Coccothraustes coccothraustes	Coconut Crusher	LC	NE	WV, r
Pyrrhula pyrrhula	Pyrrula	LC	NE	r
Emberizidae *(Emberizidae)*				
Emberiza cirlus	Syringa	LC	NE	R
Emberiza calandra	Tsiftas	LC	NE	R
Emberiza hortulana	Strawberry	LC	LC	SV
Emberiza citrinella	Goldfinch	LC	NE	R, WV

SUBMISSION

Evaluation
EX : Deceased
EW : Extinct from their natural environment
CR: Critically Endangered
EN : Endangered
VU : Vulnerable
NT : Near Threatened
LC : Reduced interest
DD : Insufficiently known
NE : Unevaluated
Status of presence

R: Epidemic - Resident
PM : Passage Migrant - Passage Migrant
SV: Summer visitor (breeding) - Summer visitor (breeding)
PLM: Partial migrant (breeding)
NBV: Non breeding visitor - Non breeding visitor
WV :Winter visitor - Winter visitor
Capital letters indicate that the species is common in this category and lower case indicates that it is rare.
Acc : Accidental / misguided visitor - Accidental
Ext : Extinct
Int : Introduced - Introduced
FBr : Formerly breeding - Formerly breeding

Table 17 lists the species of bird fauna observed in the survey area and their threatened status according to pan-European Directives and Conventions, while Table 18 lists the species of bird fauna observed and the months in which they were observed.

Table 17. Species of avifauna in the survey area and threat status classifications

THREATENED STATUS OF BIRD SPECIES OBSERVED IN THE SURVEY AREA							
Species (Latin name)	**Species (Greek Name)**	**Category SPEC**	**IUCN Threat Regime (EU)**	**Directive for Birds**	**Bern Convention**	**Bonn Convention**	**CITES**
Class Aetomorphs *(Accipiteriformes)*							
Eagles *(Accipitridae)*							
Circaetus gallicus	Snake Eagle	n	LC	I	II	II	II
Buteo buteo	Gerakina	n	LC		II	II	II
Accipiter nisus	Xefteri	n	LC		II	II	II
Circus aeruginosus	Kalamokirkos	n	LC	I	II	II	II
Accipiter brevipes	Saini	2	LC	I	II	II	II
Circus cyaneus	Wintergreen	3	LC	I	II	II	II
Aquila chrysaetos	Golden Eagle	n	LC	I	II	II	II
Circus pygargus	Livadocricks	n	LC	I	II	II	II
clanga pomarina	Screamer	n	LC	I	II	II	II
Hieraaetus pennatus	Falcon Eagle	n	LC	I	II	II	II
Pernis apivorus	Cuneiaris	n	LC	I	II	II	II
Accipiter gentilis	Diploysino	n	LC		II	II	II

THREATENED STATUS OF BIRD SPECIES OBSERVED IN THE SURVEY AREA							
Species (Latin name)	**Species (Greek Name)**	**Category SPEC**	**IUCN Threat Regime (EU)**	**Directive for Birds**	**Bern Convention**	**Bonn Convention**	**CITES**
Gyps fulvus	Vulture	n	LC	I	II	II	II
Aegypius monachus	Black vulture	1	LC	I	II	II	II
Milvus migrans	Tsiftis	3	LC	I	II	II	II
Pandionidae *(Pandionidae)*							
Pandion haliaetus	Osprey	n	LC	I	II	II	II
Order Hieracomorphs *(Falconiformes)*							
Ieracidae *(Falconidae)*							
Falco tinnunculus	Brachokirkejo	3	LC		II	II	II
Falco subbuteo	Tree Horn	n	LC		II	II	II
Falco eleonorae	Blackstone	n	LC	I	II	II	II
falco peregrinus	Petrite	n	LC	I	II	II	I
Order Pelagomorphs *(Ciconiiformes)*							
Stork *(Ciconiidae)*							
Ciconia nigra	Blackbird	n	LC	I	II	II	II
Order *Pelecaniformes (Pelecaniformes)*							
Herodidae *(Ardeidae)*							
ardea cinerea	Cinderella	n	LC		III		
Pelecanidae *(Pelecanidae)*							
Pelecanus onocrotalus	Rose-breasted pelican	3	LC	I	II	I/II	
Pelecanus crispus	Silver pelican	1	LC	I	II	I/II	I
Class Suliformes *(Suliformes)*							
Phalacrocoracidae (Phalacrocoracidae)							
Phalacrocorax carbo	Cormorant	n	LC		III		
Order Glaucomorphs *(Strigiformes)*							
Glaucidae *(Strigidae)*							
anthena noctua	Owl	3	LC		II		II
otus scops	Gionis	2	LC		II		II
Strix aluco	Hoochie	n	LC		II		II
Order Coraciiformes *(Coraciiformes)*							
Meropidae *(Meropidae)*							
Merops apiaster	Bee-eater	n	LC		II	II	
Order Ornithomorphs *(Galliformes)*							
Pheasants *(Phasianidae)*							
Alectoris chukar	Island partridge	3	LC	II	III		
Class Haemothilomorphs *(Caprimulgiformes)*							
Apodidae (*Apodidae)*							

THREATENED STATUS OF BIRD SPECIES OBSERVED IN THE SURVEY AREA							
Species (Latin name)	**Species (Greek Name)**	**Category SPEC**	**IUCN Threat Regime (EU)**	**Directive for Birds**	**Bern Convention**	**Bonn Convention**	**CITES**
Apus apus	Cinderella	3	LC		III		
tachymarptis melba	Mountain Dazzle	n	LC		II		
Goatfish (*Caprimulgidae)*							
Caprimulgus europaeus	Yiddish	3	LC	I	II		
Class Bucerotiformes *(Bucerotiformes)*							
Epopods *(Upopidae)*							
Upupa epops	Ruffed Grouse	n	LC		II		
Order Peristeriformes *(Columbiformes)*							
Pigeons (*Columbidae*)							
Streptopelia turtur	Trygoni	1	VU	II	III	II	
Columba palumbus	Fassa	n	LC	II/III			
Order Coccygomorphs *(Cuculiformes)*							
Cockchafer *(Cuculidae)*							
Cuculus canorus	Cuckoo	n	LC		III		
Order *Piciformes (Piciformes)*							
Oak warblers *(Picidae)*							
Dryobates minor	Nanodigger	n	LC		II		
Dendrocopos major	Pinecodonculus	n	LC		II		
Dendrocopos syriacus	Balkan woodpecker	n	LC	I	II		
Leiopicus medius	Medium woodpecker	n	LC	I	II		
picus viridis	Green woodpecker	n	LC		II		
Dryocopus martius	Black woodpecker	n	LC	I	II		
Order Charadriiformes *(Charadriiformes)*							
Scolopacidae (Scolopacidae)							
Scolopax rusticola	Bekacha	n	LC	II/III	III	II	
Order *Passerine (Passeriformes)*							
Swallows *(Hirundinidae)*							
Delichon urbicum	White Swallow	2	LC		II		
cecropis daurica	Miltohelidon	n	LC		II		
Phylloscopids *(Phylloscopidae)*							
Phylloscopus collybita	Arborvitae	n	LC		II	II	
Phylloscopus sibilatrix	Woodcutter	n	LC		II	II	
Passerias *(Passeridae)*							
Passer domesticus	Spitfire	3	LC		III		
Regulids *(Regulidae)*							
Regulus regulus	Gold Basilisk	2	LC		II	II	
Certhiidae *(Certhiidae)*							

THREATENED STATUS OF BIRD SPECIES OBSERVED IN THE SURVEY AREA							
Species (Latin name)	**Species (Greek Name)**	**Category SPEC**	**IUCN Threat Regime (EU)**	**Directive for Birds**	**Bern Convention**	**Bonn Convention**	**CITES**
Certhia brachydactyla	Cambodian	n	LC		II		
Corydalis *(Alaudidae)*							
Lullula arborea	Treestar	2	LC	I	III		
alauda arvensis	Wheatgrass	3	LC	II	III		
Aegithalidae *(Aegithalidae)*							
Aegithalos caudatus	Aegithalos	n	LC		III	II	
Oriolidae *(Oriolidae)*							
Oriolus oriolus	Sycophagus	n	LC		II	II	
Sittidae (Sittidae)							
pitta europaea	Dentrotsopanakos	n	LC		II		
Flycatchers *(Muscicapidae)*							
oenanthe oenanthe	Cinderella	3	LC		II	II	
oenanthe hispanica	Whitehead	n	LC		II	II	
Phoenicurus ochruros	Carbuncle	n	LC		II	II	
Erithacus rubecula	Kokkinolaimi	n	LC		II	II	
Luscinia megarhynchos	Nightingale	n	LC		II	II	
Saxicola torquatus	European Blackfeather	n	LC		II	II	
Muscicapa striata	Cinderella	2	LC		II	II	
Ficedula semitorquata	Oak woodpecker	2	LC	I	II	II	
Eagle rabbits *(Laniidae)*							
Lanius collurio	Eagle Eagle	2	LC	I	II		
Lanius minor	Cinderella	2	LC	I	II	II	
Lanius senator	Redhead	2	NT		II		
Cichlids *(Turdidae)*							
turdus merula	Blackbird	n	LC	II	III	II	
Turdus pilaris	Kerdochilla	n	LC	II	III	II	
Turdus viscivorus	Gerakotsichla	n	LC	II	III	II	
Shrimp *(Paridae)*							
Parus major	The Monk	n	LC		II		
cyanistes caeruleus	Ducky	n	LC		II		
Poecile lugubris	Keydonas	n	LC		II		
Periparus ater	Spruce trap	n	LC		II		
Crows *(Corvidae)*							
Corvus corax	Crow	n	LC		III		
corvus cornix	Windlass	n	LC	II			
Garrulus glandarius	Kissa	n	LC	II			
Sturnidae *(Sturnidae)*							

THREATENED STATUS OF BIRD SPECIES OBSERVED IN THE SURVEY AREA							
Species (Latin name)	**Species (Greek Name)**	**Category SPEC**	**IUCN Threat Regime (EU)**	**Directive for Birds**	**Bern Convention**	**Bonn Convention**	**CITES**
Sturnus vulgaris	Fisherman	3	LC	II			
Troglodytes *(Troglodytidae)*							
Troglodytes troglodytes	Woodpecker	n	LC		II		
Sylviiidae *(Sylviiidae)*							
curruca communis	Bush Grouse	n	LC		II	II	
Curruca cantillans	Red-winged blackbird	n	LC		II	II	
Curruca melanocephala	Black-eared Owl	n	LC		II	II	
Sylvia atricapilla	Mavroskoufis	n	LC		II	II	
Curruca curruca	Bunotsirovacos	n	LC		II	II	
Spiracles *(Fringillidae)*							
Carduelis carduelis	Cardarina	n	LC		II		
fringilla coelebs	Finch	n	LC		III		
Linnaria cannabina	Fan photo	2	LC		II		
chloris chloris	Florus	n	LC		II		
Coccothraustes coccothraustes	Coconut Crusher	n	LC		II		
Pyrrhula pyrrhula	Pyrrula	n	LC		III		
Emberizidae *(Emberizidae)*							
Emberiza cirlus	Syringa	n	LC		II		
Emberiza calandra	Tsiftas	2	LC		III		
Emberiza hortulana	Strawberry	2	LC	I	III		
Emberiza citrinella	Goldfinch	2	LC		II		

Memo

IUCN Threat Status
EX: Extinct, EW: Extinct from their natural habitat, CR: Critically Endangered, EN: Endangered, VU: Vulnerable, NT: Near Threatened, LC: Of Limited Concern, DD: Not well known, NE: Not assessed.

Category SPEC
1: SPEC category 1. European species of global conservation concern, e.g. species classified as critically endangered, endangered, 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 category^E or Non- SPEC: 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: belongs to Appendix I of the Directive (species classified as vulnerable, rare or endangered and subject to special protection measures)
II: belongs to Appendix II of the Directive (II/1 species that can be hunted in all states, and II/2 species that can be hunted in some states)
III: belongs to Appendix III of the Directive (species allowed to be traded under certain conditions)

Treaty of Bern
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 possession or trade in them, whether alive or dead)
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 offer for sale of these species, whether alive or dead)
Treaty of Bonn
I: listed in Annex I to the Treaty (migratory species in danger of extinction)
II: listed in Annex II to the Treaty (migratory species benefiting from international cooperation on conservation and management measures)
International CITES Convention
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 of the Convention (species which, although not threatened, are currently endangered, but may be threatened in the future if their 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 designed to prevent or restrict the exploitation of such species and which requires the cooperation of the other Contracting States)

Table 18. Species of avifauna in the survey area by month of observations

Scientific Name	Greek Name	November 2021	December 2021	January 2022	February 2022	March 2022	April 2022	May 2022	June 2022	July 2022	August 2022	September 2022	October 2022
Accipiter brevipes	Saini								*		*		
Accipiter gentilis	Diploysino						*						
Accipiter nisus	Xefteri	*	*		*	*	*	*	*	*	*	*	*
caudate aegithalus	Aegithalos	*	*	*	*	*	*	*	*			*	*
Aegypius monachus	Black vulture	*		*		*		*		*	*	*	
alauda arvensis	Wheatgrass									*	*		
Alectoris chukar	Island partridge	*	*		*	*	*	*	*	*		*	*
Apus apus	Cinderella								*				
Aquila chrysaetos	Golden Eagle				*		*	*	*	*			
ardea cinerea	Cinderella				*							*	
athena noctua	Owl	*				*			*		*	*	
Buteo buteo	Gerakina	*	*	*	*	*	*	*	*	*	*	*	*
Caprimulgus europaeus	Yiddish						*	*	*				
Carduelis carduelis	Cardarina	*	*	*	*		*		*		*		*
cecropis daurica	Miltohelidon						*	*	*	*	*		
Certhia brachydactyla	Cambodian	*	*	*	*	*	*	*	*	*	*	*	*

Scientific Name	Greek Name	November 2021	December 2021	January 2022	February 2022	March 2022	April 2022	May 2022	June 2022	July 2022	August 2022	September 2022	October 2022
chloris chloris	Florus	*	*	*			*	*					*
Ciconia nigra	Blackbird					*	*	*	*	*	*		
Circaetus gallicus	Snake Eagle						*	*	*	*	*	*	
Circus aeruginosus	Kalamokirkos					*	*						
Circus cyaneus	Wintergreen					*							
Circus pygargus	Livadocricks							*					
clanga pomarina	Screamer							*					
Coccothraustes coccothraustes	Coconut Crusher	*	*	*			*	*					*
Columba palumbus	Fassa	*	*	*	*	*	*	*	*	*	*	*	*
Corvus corax	Crow	*	*	*	*	*	*	*	*	*	*	*	*
corvus cornix	Cinderella	*	*	*	*	*	*	*	*	*	*	*	*
Cuculus canorus	Cuckoo						*	*					
Curruca cantillans	Red-winged blackbird						*	*	*	*			
curruca communis	Bushy-tailed Grouse							*	*				
Curruca curuca	Bunotsirovacos							*	*				
Curruca melanocephala	Black-eared Owl						*	*	*	*			
cyanistes caeruleus	Ducky	*	*	*	*	*	*	*	*	*	*	*	*
Delichon urbicum	White Swallow						*	*	*	*	*	*	
Dendrocopos major	Pinecodonculus		*		*	*	*	*		*			*
Dendrocopos syriacus	Balkan woodpecker							*	*	*			
Dryobates minor	Nanodigger	*	*			*	*		*				*
Dryocopus martius	Black woodpecker	*			*			*				*	
Emberiza calandra	Tsiftas									*			
Emberiza cirlus	Syringa	*	*	*	*	*	*	*	*	*	*	*	*
Emberiza citrinella	Goldfinch	*	*										
Emberiza hortulana	Strawberry						*	*	*	*			

Scientific Name	Greek Name	November 2021	December 2021	January 2022	February 2022	March 2022	April 2022	May 2022	June 2022	July 2022	August 2022	September 2022	October 2022
Erithacus rubecula	Kokkinolaimi	*	*	*	*	*	*	*	*	*	*	*	*
Falco eleonorae	Blackstone									*			
Falco peregrinus	Petrite						*		*				
Falco subbuteo	Tree Horn						*	*	*				
Falco tinnunculus	Brahokirkejo		*		*	*	*	*	*	*	*	*	*
Ficedula semitorquata	Oak woodpecker							*					
fringilla coelebs	Finch	*	*	*	*	*	*	*	*			*	
Garrulus glandarius	Kissa	*	*	*	*	*	*	*	*	*	*	*	*
Gyps fulvus	Vulture	*	*	*	*		*	*	*	*	*	*	*
Hieraetus pennatus	Falcon Eagle							*	*	*	*		
Lanius collurio	Eagle Eagle							*	*	*	*	*	
Lanius minor	Cinderella							*	*				
Lanius senator	Redhead						*						
Leiopicus medius	Medium woodpecker			*			*					*	
linaria cannabina	Fan photo	*	*	*	*	*	*	*	*		*	*	*
Lullula arborea	Treestar	*	*		*	*	*	*	*	*	*		
Luscinia megarhynchos	Nightingale						*	*					
Merops apiaster	Bee-eater						*	*	*	*	*	*	
Milvus migrans	Tsiftis						*						
Muscicapa striata	Cinderella									*	*	*	
oenanthe hispanica	Whitehead						*	*	*			*	
oenanthe oenanthe	Cinderella					*	*			*	*		
Oriolus oriolus	Sykophagos						*	*	*				
otus scops	Gionis						*	*	*				
Pandion haliaetus	Osprey					*		*					
Parus major	The Monk	*	*	*	*	*	*	*	*	*	*	*	*

Scientific Name	Greek Name	November 2021	December 2021	January 2022	February 2022	March 2022	April 2022	May 2022	June 2022	July 2022	August 2022	September 2022	October 2022
Passer domesticus	Spitfire					*	*	*	*		*		
Pelecanus crispus	Silver pelican	*			*			*					
Pelecanus onocrotalus	Rose-breasted pelican							*					
Periparus ater	Spruce trap	*	*	*									
Pernis apivorus	Cuneiaris						*	*	*	*	*		
Phalacrocorax carbo	Cormorant		*		*	*							
Phoenicurus ochruros	Carbuncle	*	*	*	*	*							*
Phylloscopus collybita	Arborvitae					*	*	*					
Phylloscopus sybilatrix	Woodcutter											*	
picus viridis	Green woodpecker	*	*	*	*	*	*	*	*			*	
Poecile lugubris	Keydonas			*	*		*				*		
Pyrrhula pyrrhula	Pyrrula	*											
Regulus regulus	Gold Basilisk									*	*		
Saxicola torquatus	Blackmail						*	*	*				
Scolopax rusticola	Bekacha	*	*										
pitta europaea	Dentrotsopanakos	*	*	*	*	*	*	*	*		*	*	*
Streptopelia turtur	Trygoni						*	*	*	*			
Strix aluco	Hoochie	*	*	*	*	*	*	*	*	*	*	*	*
Sturnus vulgaris	Fisherman	*	*	*	*	*	*	*	*		*	*	*
Sylvia atricapilla	Mavroskoufis						*	*	*			*	
tachymarptis melba	Mountain Dazzle								*		*		
Troglodytes troglodytes	Woodpecker	*	*	*	*	*	*	*	*	*	*	*	*
turdus merula	Blackbird	*	*	*	*	*	*	*	*	*	*	*	*
Turdus pilaris	Cedrocilla			*	*								
Turdus viscivorus	Gerakotsichla	*	*	*	*	*	*	*	*	*	*	*	*
Upupa epops	Ruffed Grouse						*	*	*	*	*	*	

For the population data of the avifauna of the survey area, which is located both within the statutory area as a Natura 2000 SPA with the code GR1130012, and within the non-statutory area GR009 with the designation SPA, population estimates from both the non-governmental organisation Hellenic Ornithological Society and from monitoring programmes implemented in the study area and other literature sources have also been provided and are shown in the preceding Tables 9 and 10.

The following table (Table 19) presents the records of raptor species and species considered "important" for the field survey area, the frequency with which these species were observed in the survey and study area, and the months during 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 observed in the field survey area that are either a species of designation (or of interest, as selected in a previous section of this document) of the main study SPA GR1130012 or the study SPA GR0009 (within which the project is located - the designation species of the SPA coincide with the designation species of the SPA), or are designation species of the nearest SPA GR1130010 or are included in Annex I of Directive 79/409/EEC, as codified by Directive 2009/147/EC .

From the field measurements it appears that 27 species listed in Annex I of Directive 2009/147/EC were identified in the area. Of these species, three (Emberiza *hortulana*, *Ficedula semitorquata* and *Dendrocopos syriacus*) are species of designation of the studied SPA GR1130012 (and of the studied SPA GR009) and two (*Lanius minor* and *Pelecanus crispus*) are species of designation of the studied SPA GR1130010. Also observed was the species *Phalacrocorax carbo* which, although not an Annex I species of the above Directive, is included in the table below as it was included in the species of interest of this ERA as a designation species of the study SPA GR1130010.

Table 19. Important species of avifauna that meet the criteria for further analysis.

Kind of	Total species records	Months (numeric: e.g. 1=January)
Accipiter brevipes	2	6, 8
Aegypius monachus	14	11, 1, 3, 5, 7, 8, 9
Aquila chrysaetos	17	2, 4, 5, 6, 7
Caprimulgus europaeus	3	4, 5, 6

Ciconia nigra	29	3, 4, 5, 6, 7, 8
Circaetus gallicus	57	4, 5, 6, 7, 8, 9
Circus aeruginosus	3	3, 4
Circus cyaneus	1	3
Circus pygargus	1	5
clanga pomarina	1	5
Dendrocopos syriacus	3	5, 6, 7
Dryocopus martius	5	11, 2, 5, 9
Emberiza hortulana	11	4, 5, 6, 7
Falco eleonorae	2	7
Falco peregrinus	3	4, 6
Ficedula semitorquata	1	5
Gyps fulvus	30	11, 12, 1, 2, 4, 5, 6, 7 ,8, 9, 10
Hieraetus pennatus	12	5, 6, 7, 8
Lanius collurio	15	5, 6, 7, 8, 9
Lanius minor	2	5, 6
Leiopicus medius	4	1, 4, 9
Lullula arborea	29	11, 12, 2, 3, 4, 5, 6, 7, 8
Milvus migrans	1	4
Pandion haliaetus	2	3, 5
Pelecanus crispus	3	11, 2, 5
Pelecanus onocrotalus	1	5
Pernis apivorus	52	4, 5, 6, 7, 8
Phalacrocorax carbo	4	12, 2, 3

Below is a commentary on the recorded flights and sightings of the raptor species (as well as the Black-backed Stork, Roseate Pelican, Silver Pelican and Cormorant) presented in the table above, as well as the other important species listed in Annex I of Directive 2009/147/EC.

Black vulture (*Aeygypius monachus*) was recorded 14 times (total of 18 individuals) in the study area during observations in November 2021, January 2022, March 2022, May 2022, July 2022, August 2022 and September 2022, with four of the total records involving transits of two individuals per flight. Of these four recordings involving two person crossings per flight, one took place within Zone A (distance less than 250 m from the location of the nearest wind turbine of the wind turbine under study), two took place within Zone B (distance between 250 to 1.000 metres from the location of the nearest wind turbine of the wind turbine under study) and the fourth was carried out within the Direct Impact Zone (distance of less than 100 metres from the location of the nearest wind turbine of the wind turbine under study, but with a flight altitude of more than 50 metres and less than 220 metres). Of the remaining ten single records (one person crossing per flight), two were made within the Direct Effect Zone, four were made within Zone A, two were made within Zone B, one was made within Zone C (distance between 1.000 to 2 000 m from the location of the nearest wind turbine of the wind turbine under study) and the last one was carried out outside the zones of influence with the wind turbine (distance of more than 2 km from the location of the nearest wind turbine).

The **golden eagle (*Aquila chrysaetos*)** was recorded 17 times (27 individuals in total) in the study area during the observations in February 2022, April 2022, May 2022, June 2022 and July 2022, with ten of the total number of records being two individuals per flight. Of these ten records involving two persons passing per flight, two occurred within the Direct Effect Zone, two occurred within Zone A (with one of the two also occurring at a distance of less than 100 metres but with a flight altitude of more than 300 metres, and therefore this flight is not classified as a Direct Effect Zone), five occurred within Zone B and the last occurred within Zone C. Of the remaining seven single recordings (one person crossing per flight), one took place within the Direct Effect Zone, two took place within Zone A and four took place within Zone B.

The **Shark (*Accipiter brevipes*)** was recorded twice (two individuals) in the study area during the observations in June 2022 and August 2022, with one of these flights taking place within Zone A and the second within Zone B.

The **vulture (*Gyps fulvus*)** was recorded 30 times (50 individuals in total) in the study area, throughout the entire period of observations except for the month of March 2022, with one of the total records being a passage of eight individuals and occurring within Zone B. In addition, of the total records, two involved the passage of three individuals per flight and occurred within Zone A (with one of the two also occurring at a distance of less than 100 metres but with a flight altitude greater than 300 metres, and for this reason this flight is not classified in the Direct Effect Zone). Also, of the total number of records, nine involved the transit of two persons per flight. Of these nine recordings involving two persons per flight, one took place within the direct impact zone, one took place within Zone A, four took place within Zone B, two took place within Zone C and the last one took place outside the impact zones with the VFRS. Finally, of the remaining 18 single records (one person crossing per flight), five were made within the direct impact zone, five were made within Zone A (with one of the five being made at a distance of less than 100 m but with a flight altitude of more than 500 m), and for this reason this flight is not classified as a direct impact zone), six took place within Zone B, one took place within Zone C and the last one took place outside the impact zones with the wind turbines of the wind farm under study.

The **Black-backed Gull (*Ciconia nigra*)** was recorded 29 times (a total of 37 individuals) in the study area during the observations in March 2022, April 2022, May 2022, June 2022, July 2022 and August 2022, with one of these records involving the passage of four individuals occurring within Zone B. Also, of the total number of records, five involved the passage of two individuals per flight. Of these five recordings involving two persons per flight, one took place within the direct impact zone, two took place within Zone A, one took place within Zone B and the last one took place outside the impact zones with the wind turbines of the wind farm under study. Of the remaining 23 single records (one person crossing per flight), five were made within the Direct Effect Zone, four were made within Zone A (with one of the four also being made at a distance of less than 100 m but with a flight altitude greater than 250 m, and for this reason this flight is not classified as a Direct Effect Zone), 11 were made within Zone B and three were made within Zone C.

Snake eagle (*Circaetus gallicus*) was recorded 57 times (72 individuals in total) in the study area during observations in April 2022, May 2022, June 2022, July 2022, August 2022 and September 2022, with three of these records involving the passage of three individuals per flight, two of which occurred within Zone B and the third within Zone A. Also, of the total number of recordings, nine involved the transit of two persons per flight. Of these nine records involving two persons per flight, two occurred within the Direct Effect Zone, one occurred within Zone A and six occurred within Zone B. Of the remaining 45 odd records (one person crossing per flight), 12 occurred within the Direct Effect Zone, nine occurred within Zone A (with three of the nine also occurring at a distance of less than 100 metres but with a flight altitude of more than 400 and 250 metres - two and one respectively - and therefore these flights are not classified in the Direct Effect Zone), 20 occurred within Zone B and four occurred within Zone C. From the field observations, no snake nests were detected within the field survey area, nor were any behaviours directly indicative of its presence (branch-carrying flights or food transport). However, it is possible that a snake nest may be present in the wider area of the W/F, outside the field survey area, and therefore most of the above flights may involve the same individuals using the open areas of the wider area as part of their foraging area. As discussed in section "3. Institutional Context" the snake darter is not included in the species for which there is a requirement to designate an additional perimeter exclusion zone from a nest of the species, however, as stated above, no nest of the species was found within the field survey area.

Scaup (*Circus aeruginosus*) were recorded three times (three individuals) in the study area during the observations in March 2022 and April 2022, with one flight occurring within Zone A and the other two occurring within Zone B.

The **sandhill crane (*Circus pygargus*)** was recorded once (one individual) in the study area during observations in May 2022, with this passage occurring within Zone B.

Winter Petrel (*Circus cyaneus*) was recorded once (one individual) in the study area during observations in March 2022, with this passage occurring within Zone B.

Crake (*Clanga pomarina*) was recorded once (one individual) in the study area during observations in May 2022, with this passage occurring within Zone B.

Black-winged Teal **(*Falco eleonorae*)** was recorded twice (two individuals) in the study area during observations in July 2022. Both of these transits occurred within Zone B.

Peregrine *Falcon* (*Falco peregrinus*) was recorded three times (three individuals) in the study area during observations in April 2022 and June 2022, with one flight occurring within Zone A and the other two occurring within Zone B.

The **hawk eagle (*Hieraaetus pennatus*)** was recorded 12 times (13 individuals in total) in the study area during observations in May 2022, June 2022, July 2022 and August 2022, with one of these flights being a two-person crossing and taking place within the Direct Effect Zone. Of the remaining 11 single recordings, two occurred within the Direct Impact Zone, two occurred within Zone A, three occurred within Zone B, and four occurred within Zone C.

Cheetah (*Milvus migrans*) was recorded once (one individual) in the study area during observations in April 2022, with this passage occurring within Zone B.

The **osprey (*Pandion haliaetus*)** was recorded twice (two individuals) in the study area during observations in March 2022 and May 2022, with one of these crossings occurring within Zone A and the second within Zone B.

Silver pelican (*Pelecanus crispus*) was recorded three times (a total of seven individuals) in the study area during the observations in November 2021, February 2022 and May 2022. One of the three flights involved the passage of four individuals and occurred within Zone B. The second flight of the three involved the transit of two individuals and took place within Zone A (this flight also took place at a distance of less than 100 metres but with a flight altitude of more than 300 metres, and therefore this flight is not classified as a Direct Effect Zone). The third and final flight was a single person crossing and took place within Zone C.

Roseate Pelican **(*Pelecanus onocrotalus*)** was recorded once (a total of four individuals) in the study area during observations in May 2022. This flight involved the passage of four individuals and occurred within Zone B.

Cormorant (*Phalacrocorax carbo*) was recorded four times (37 individuals in total) in the study area during observations in December 2021, February 2022 and March 2022. One of these flights involved the passage of 21 individuals and occurred within Zone B. The second flight of all observations involved the transit of 13 individuals and took place within Zone A. The third flight of all observations involved the transit of one individual and took place within Zone A. The fourth and final flight of all observations involved the transit of two individuals and took place within the Direct Effect Zone.

Wasp (*Pernis apivrous*) was recorded 52 times (59 individuals in total) in the study area during observations in April 2022, May 2022, June 2022, July 2022 and August 2022, with seven of these records involving the passage of two individuals per flight. Of these seven records involving two persons per flight, one occurred within the Direct Effect Zone, four occurred within Zone A and two occurred within Zone B. Of the remaining 45 odd recordings (one person crossing per flight), five were made within the Direct Effect Zone, 14 were made within Zone A, 20 were made within Zone B and six were made within Zone C. From the field observations, as noted above for the snake eagle, no wasp nests were detected within the field survey area, nor were any behaviors directly indicative of its presence (branch-carrying flights or food transport). However, it is possible that a wasp nest may be present in the wider area of the W/F, outside the field survey area, and therefore most of the above flights may be of the same individuals using the woodland and forest gaps in the wider area as part of their foraging area. As discussed in section "3. Institutional Context" the horned owl is not included in the species for which there is a requirement to establish an additional perimeter exclusion zone from a nest of the species, however, as noted above, no nest of the species was found within the field survey area.

In summary, for all of the above species no active nest was detected near the project area, nor was the presence of a nest in the field survey area detected by their movements.

Apart from the above species, which, based on their protection status and other criteria that they meet and were analysed in the previous sections, deserve further analysis, two of the most common raptor species in Greece (although they are not species of Annex I of Directive 2009/147/EC), the **falcon (*Buteo Buteo)*** and the **rock shrike** (***Falco tinnunculus***), as well as the **white-tailed godwit** (***Accipiter nisus***)

were observed in the area. The two common species mentioned above were recorded several times in the study area (hawk: 98 times with 114 individuals passing (Rock Turtle 59 times with 67 individuals passing), while the **White-tailed Godwit** was observed 33 times in the area with 34 individuals passing, its flights being usually low-altitude flights (characteristic of the species). The **Tree Sparrow (*Falco subbuteo*)** was also observed in the area (eight records with eight individuals passing) and the **Double-crested Bunting (*Accipiter gentilis*)** (one record with one individual passing). The above species as a whole are not species listed in Annex I of Directive 2009/147/EC. With regard to the records of hawksbill, throughout the annual cycle of fieldwork, they are obviously not in their entirety records of different individuals but rather individuals (possibly a pair) for which the area is part of their endemic range. From the field observations, no nesting sites of the kestrel were identified within the field survey area. However, it is estimated that there is one nesting site for the hawk in the area, which is located within the wider area of the production licence blocks of the study LPA, but outside both the project site and the field survey area.

Apart from the raptor species, as well as the Black-backed Stork, Silver Pelican, Roseate Pelican and Cormorant, whose flights are described above, a description of the other species of interest identified in the area and which are species of Annex I of Directive 2009/147/EC follows.

The **giant** hummingbird **(*Caprimulgus europaeus*)** was recorded three times (three individuals) in the study area during the observations in April 2022, May 2022 and June 2022.

The **Balkan woodpecker (*Dendrocopos syriacus*)** was recorded three times (three individuals) in the study area during the observations in May 2022, June 2022 and July 2022.

Black Woodpecker (*Dryocopus martius*) was recorded five times (five individuals) in the study area during observations in November 2021, February 2022, May 2022 and September 2022.

***Emberiza hortulana* (*Emberiza hortulana*)** was recorded 11 times (total 18 individuals) in the study area during the observations in April 2022, May 2022, June 2022 and July 2022.

The **oak flycatcher (*Ficedula semitorquata*)** was recorded once (one individual) in the study area during the observations in May 2022.

Eagle-eye (*Lanius collurio*) was recorded 15 times (23 individuals in total) in the study area during observations in May 2022, June 2022, July 2022, August 2022 and September 2022.

Cinderella (*Lanius minor*) was recorded twice (two individuals) in the study area during the observations in May 2022 and June 2022.

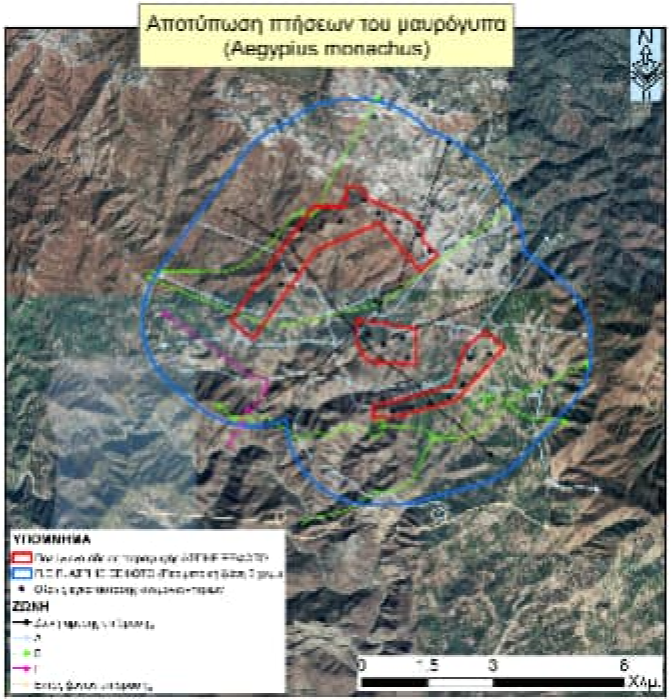
The **medium woodpecker (*Leiopicus medius*)** was recorded four times (four individuals) in the study area during observations in January 2022, April 2022 and September 2022.

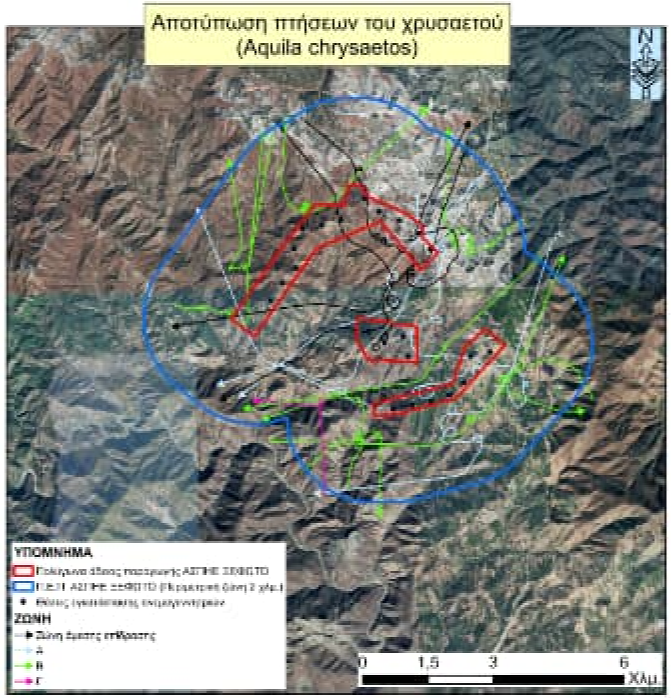
The **tree starling *(Lullula arborea*)** was recorded 29 times (46 individuals in total) in the study area during observations in November 2021, December 2021, February 2022, March 2022, April 2022, May 2022, June 2022, July 2022 and August 2022, and can be classified as abundant in the general area, with the species observed within the open farmland and natural grasslands of the study area.

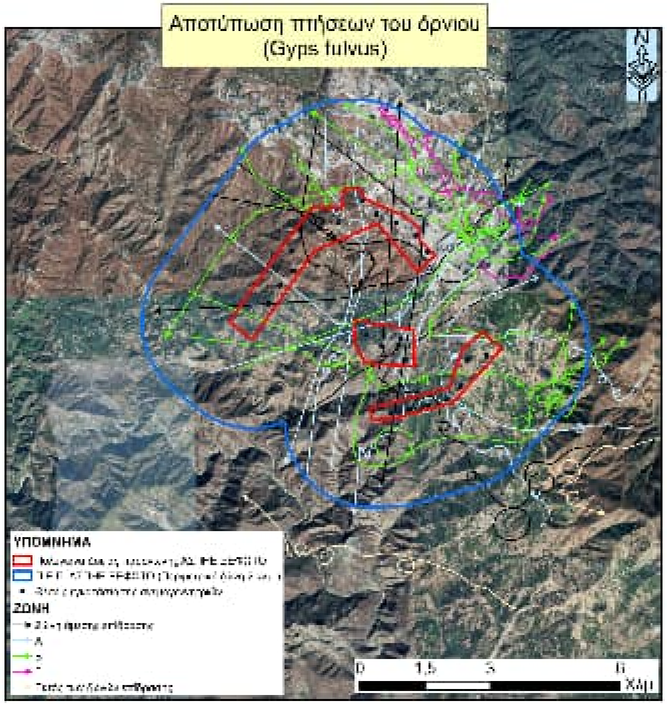
Capturing the above information on Documentation Maps

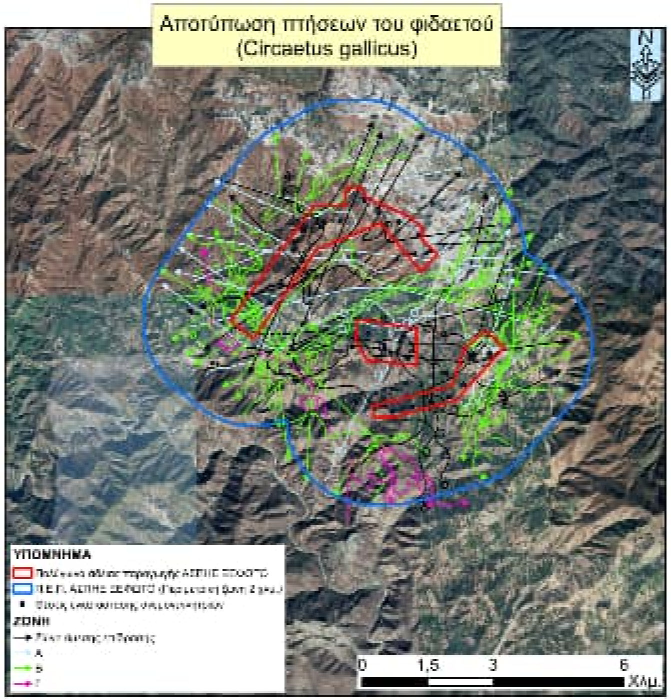
The field survey area and the field sampling locations of the avifauna and other fauna within it (and with satellite image background), as analysed in the previous section, the locations for recording the hand-feeders, the locations of the light traps, etc. In addition, maps and land use and habitat types of the field survey area according to the Corine land cover 2018 base are also depicted on maps and satellite image background maps of all flights of raptors and other important species recorded during the field survey along with the locations of the wind turbine installation sites of the project under study. Finally, a documentation map also depicts the locations of the nearest significant bat caves in the study area and their locations relative to the location of the field survey area.

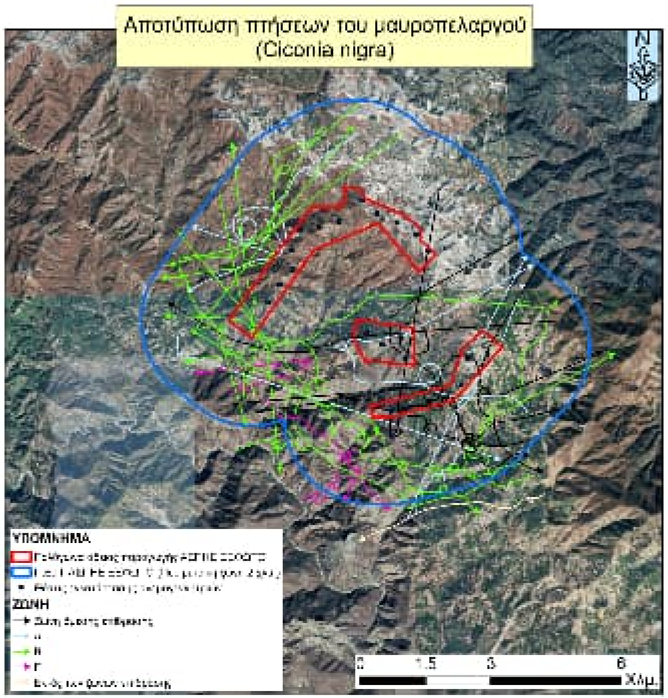
Mapping of the flights of important species (and other predators) recorded during the field survey

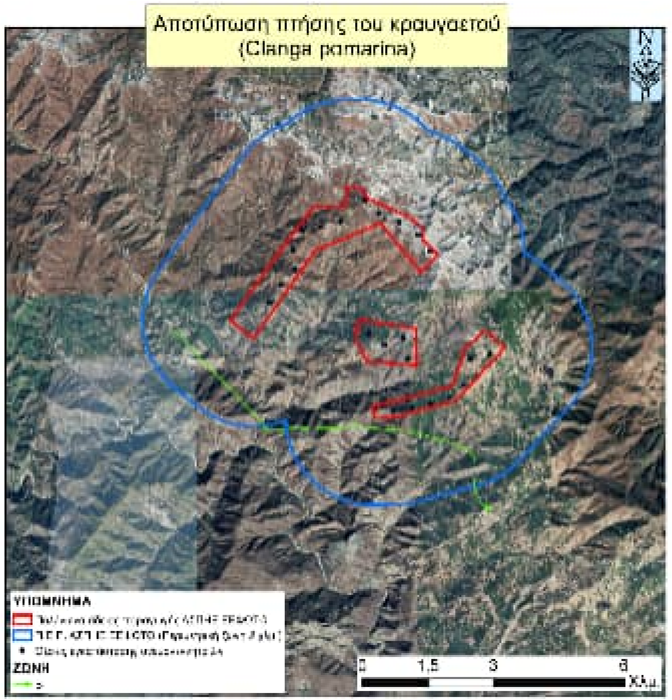


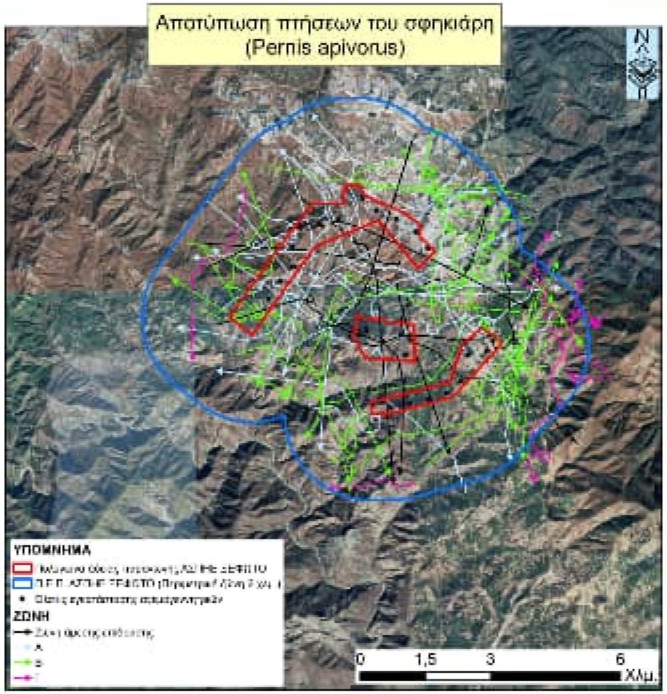


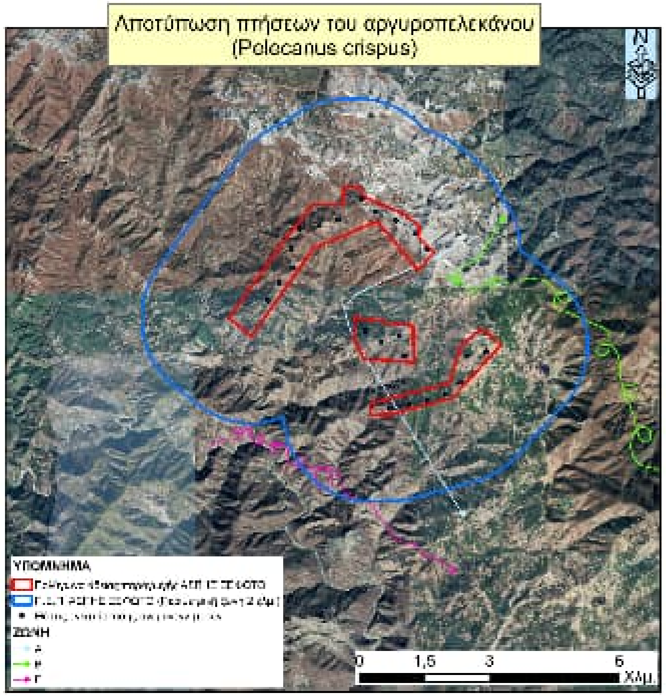


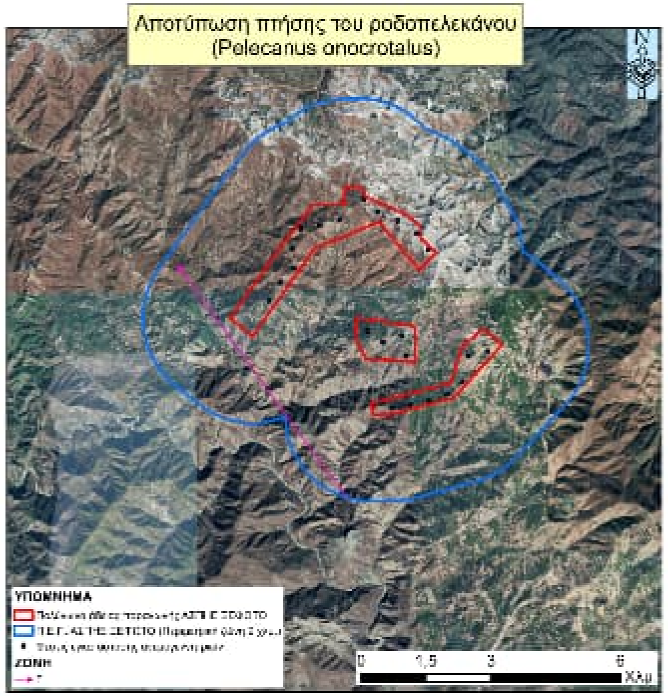


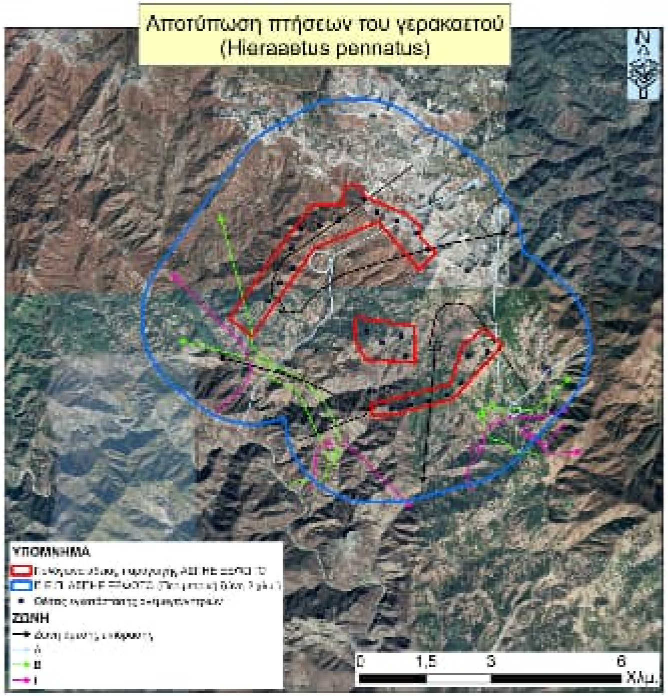


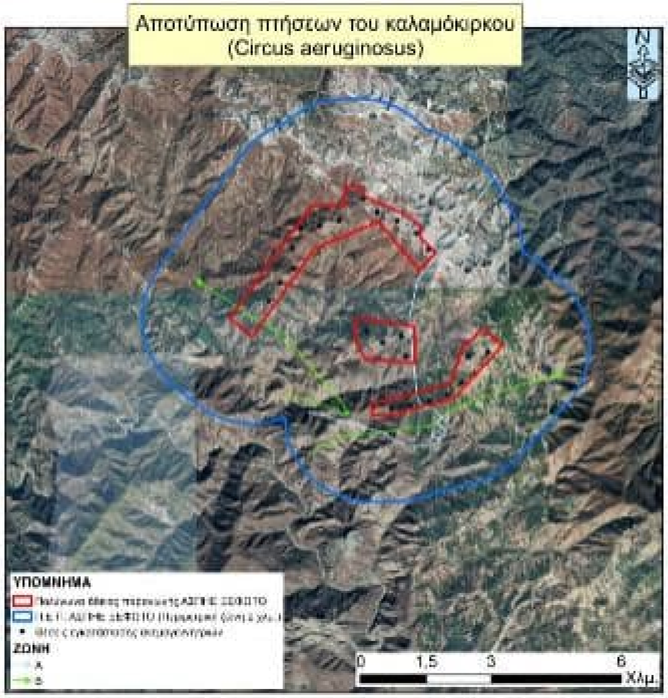


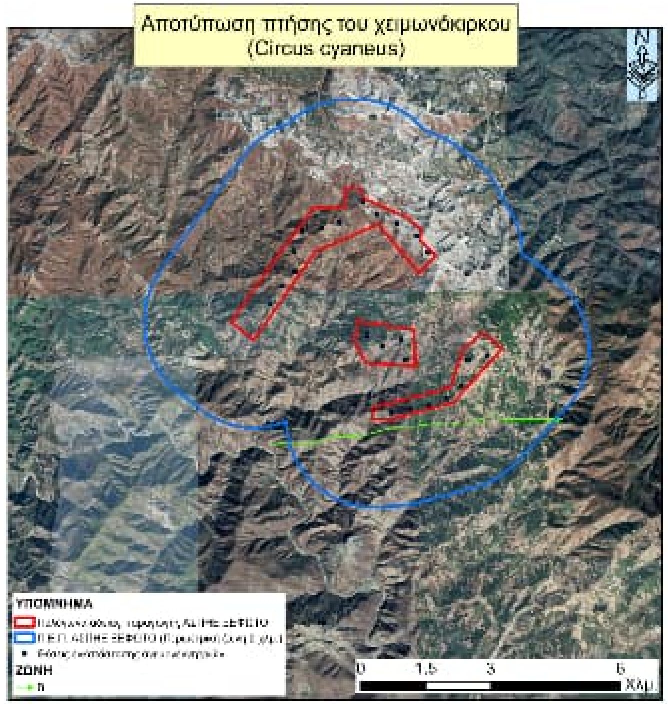

Αποτύπωση πτήσεων του σφηκιάρη
(Pernis apivorus)
ΥΠΟΜΝΗΜΑ
ΖΩΝΗ
0 1,5 3 6 Χλμ.

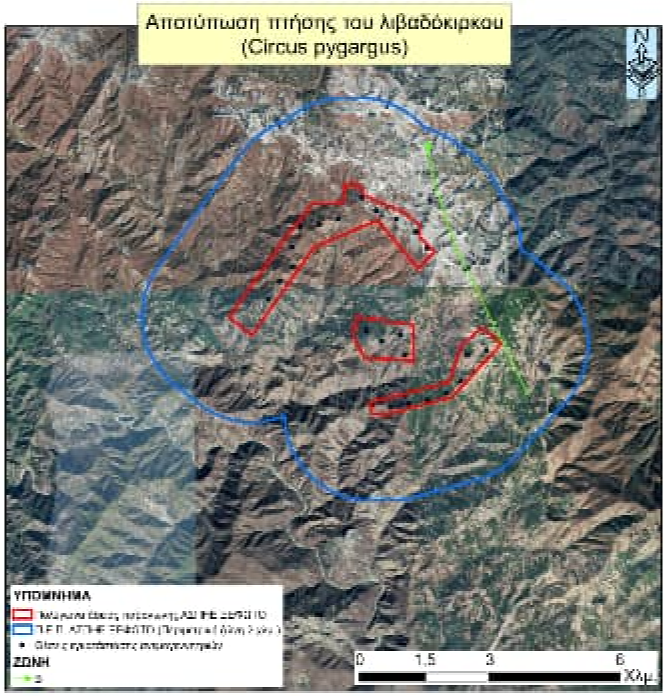

Αποτύπωση πτήσεων του αργυροπελεκάνου
(Pelecanus crispus)
ΥΠΟΜΝΗΜΑ
ΖΩΝΗ
0 1,5 3 6 Χλμ.

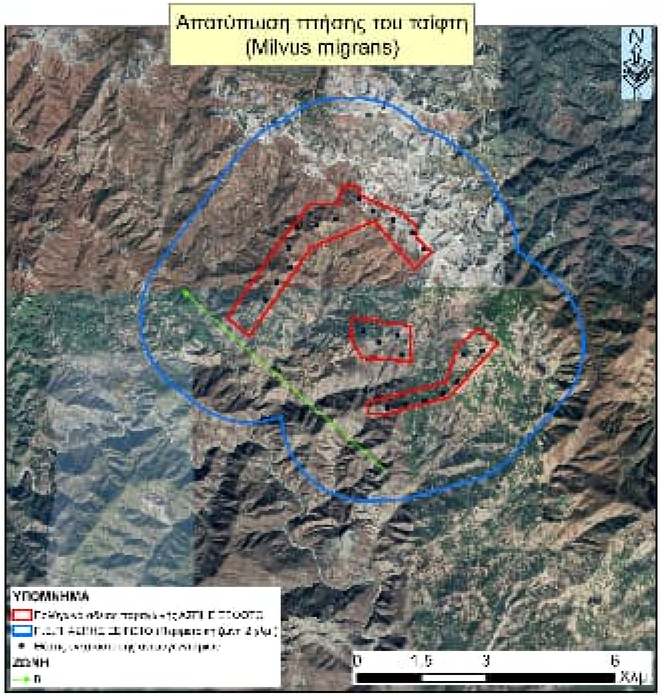

Αποτύπωση πτήσης του ροδοπελεκάνου
(Pelecanus onocrotalus)
ΥΠΟΜΝΗΜΑ
ΖΩΝΗ
0 1,5 3 6 Χλμ.

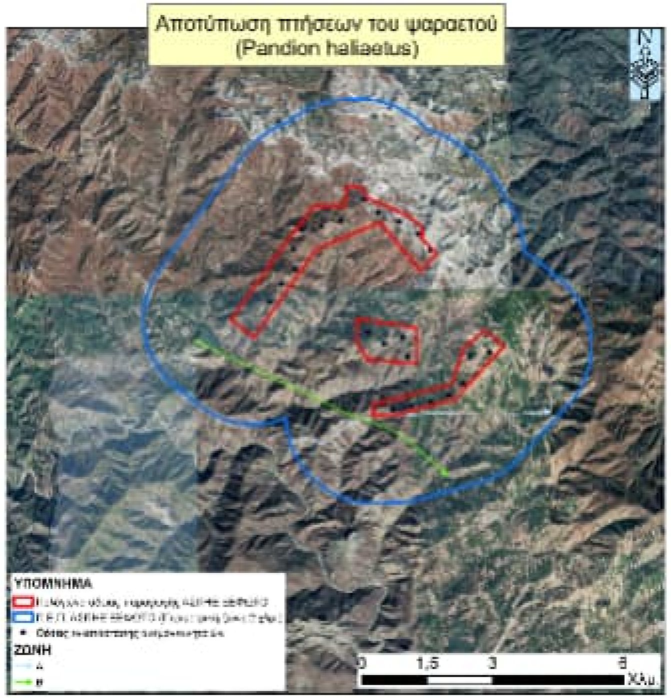

Αποτύπωση πτήσεων του γερακαετού
(Hieraaetus pennatus)
ΥΠΟΜΝΗΜΑ
ΖΩΝΗ
0 1,5 3 6 Χλμ.

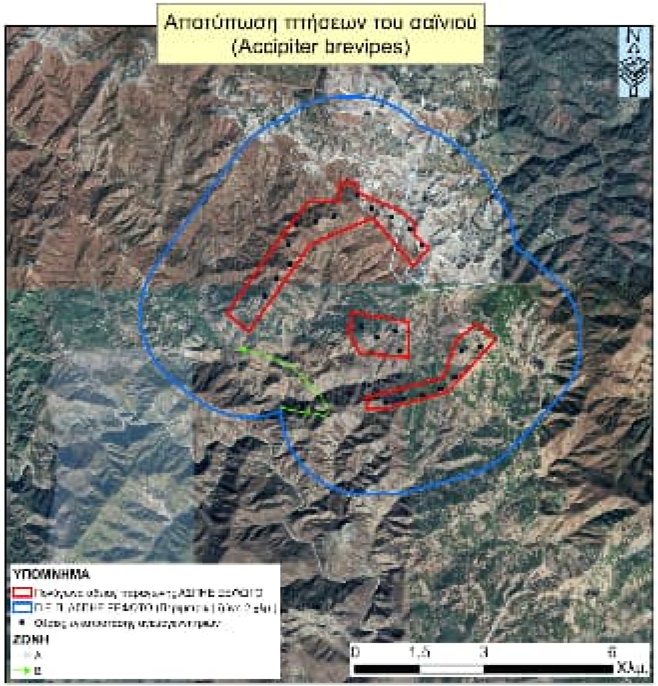

Αποτύπωση πτήσεων του καλαμόκιρκου
(Circus aeruginosus)
ΥΠΟΜΝΗΜΑ
ΖΩΝΗ
0 1,5 3 6 Χλμ.

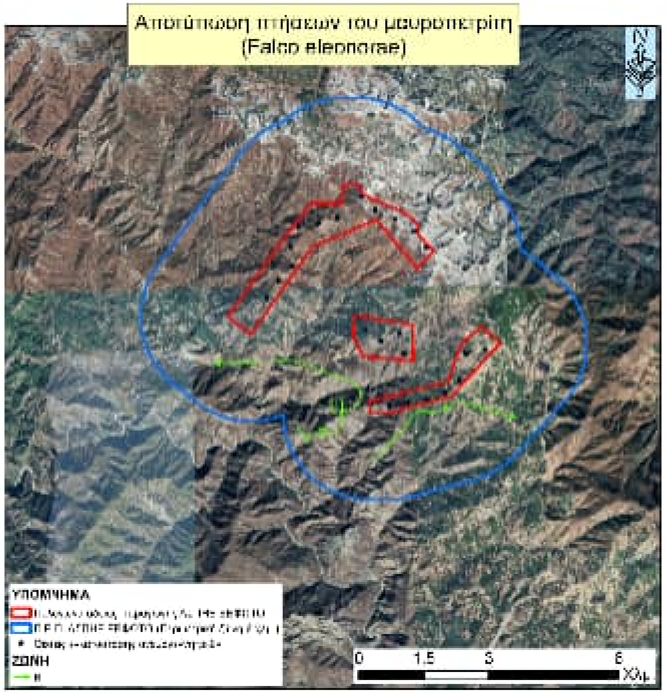

Αποτύπωση πτήσης του χειμωνόκιρκου
(Circus cyaneus)
ΥΠΟΜΝΗΜΑ
ΖΩΝΗ
0 1,5 3 6 Χλμ.

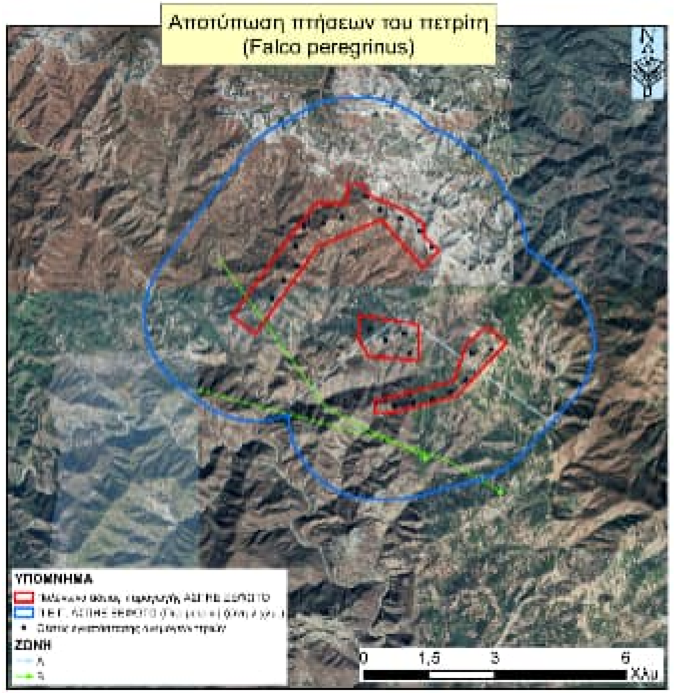

Αποτύπωση πτήσης του λιβαδόκιρκου
(Circus pygargus)
ΥΠΟΜΝΗΜΑ
ΖΩΝΗ
0 1,5 3 6 Χλμ.

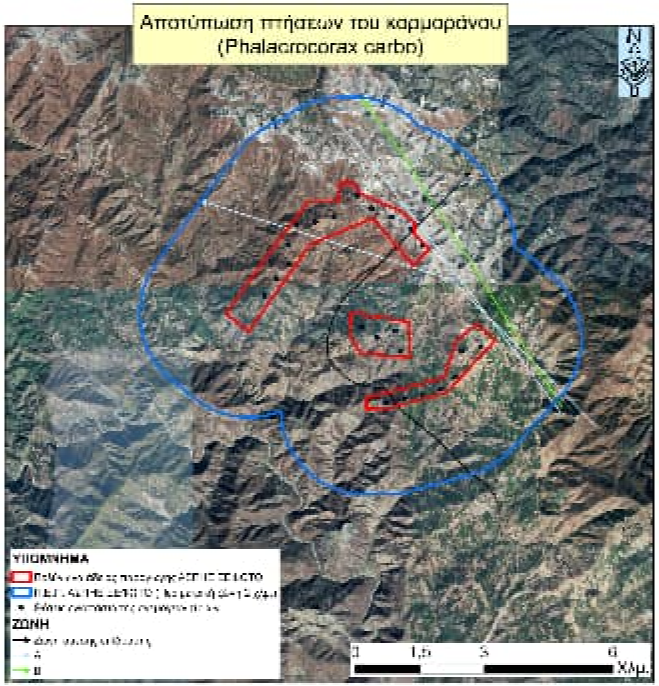

Αποτύπωση πτήσης του τσίφτη
(Milvus migrans)
ΥΠΟΜΝΗΜΑ
ΖΩΝΗ
0 1,5 3 6 Χλμ.

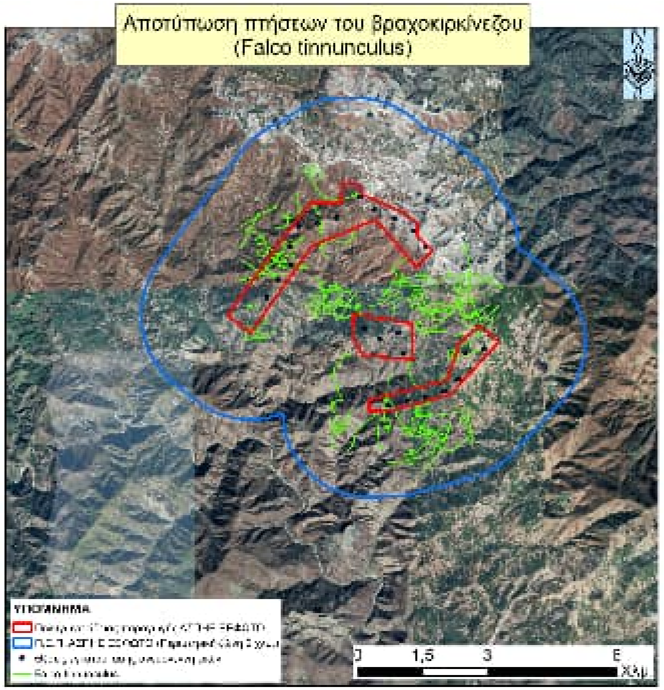

Αποτύπωση πτήσεων του ψαραετού
(Pandion haliaetus)
ΥΠΟΜΝΗΜΑ
ΖΩΝΗ
0 1,5 3 6 Χλμ.

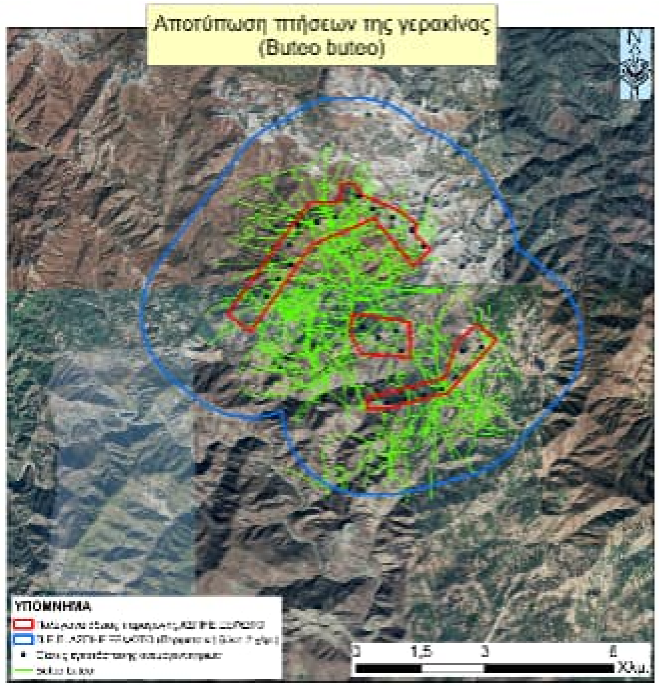

Αποτύπωση πτήσεων του σαΐνιού
(Accipiter brevipes)
ΥΠΟΜΝΗΜΑ
ΖΩΝΗ
0 1,5 3 6 Χλμ.

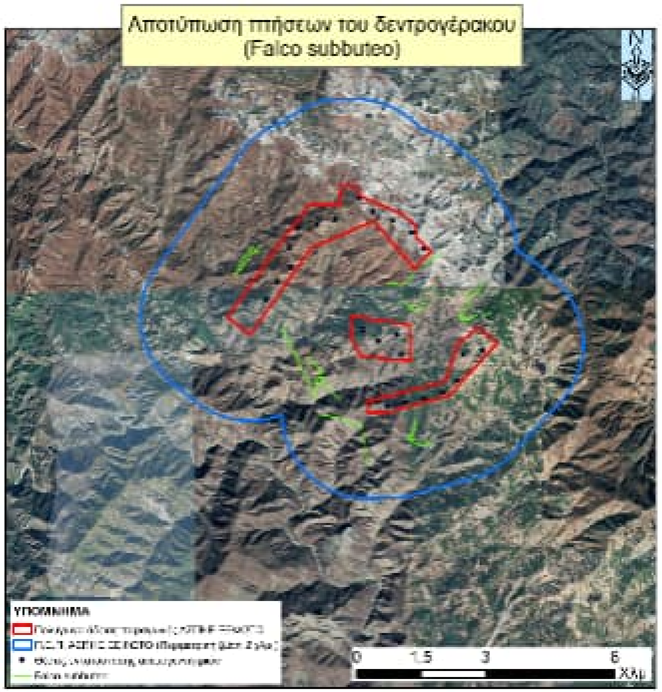

Αποτύπωση πτήσεων του μαυροπετρίτη
(Falco eleonorae)
ΥΠΟΜΝΗΜΑ
ΖΩΝΗ
0 1,5 3 6 Χλμ.

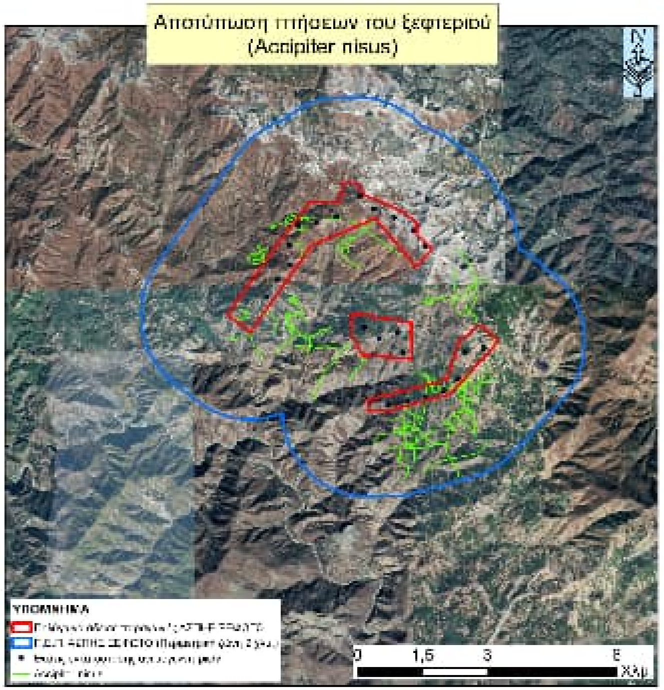

Αποτύπωση πτήσεων του πετρίτη
(Falco peregrinus)
ΥΠΟΜΝΗΜΑ
ΖΩΝΗ
0 1,5 3 6 Χλμ.

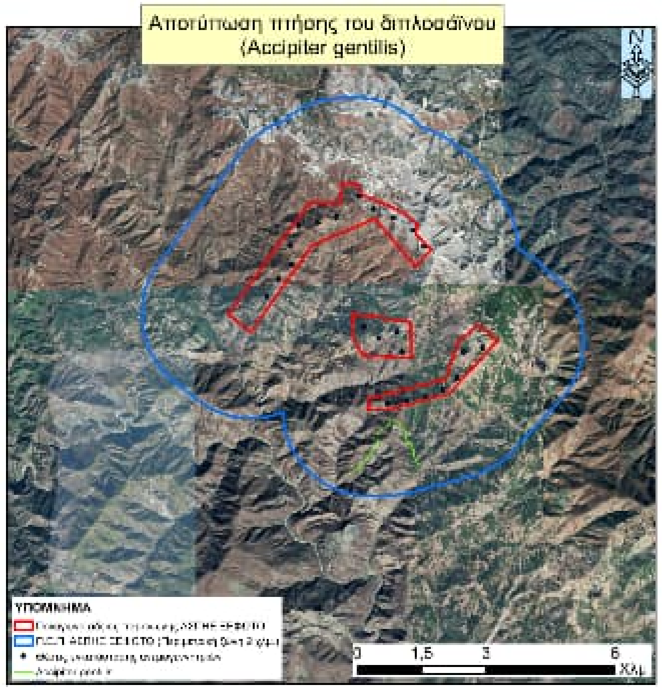

Αποτύπωση πτήσεων του καρμοράνου
(Phalacrocorax carbo)
ΥΠΟΜΝΗΜΑ
ΖΩΝΗ
0 1,5 3 6
Χλμ.

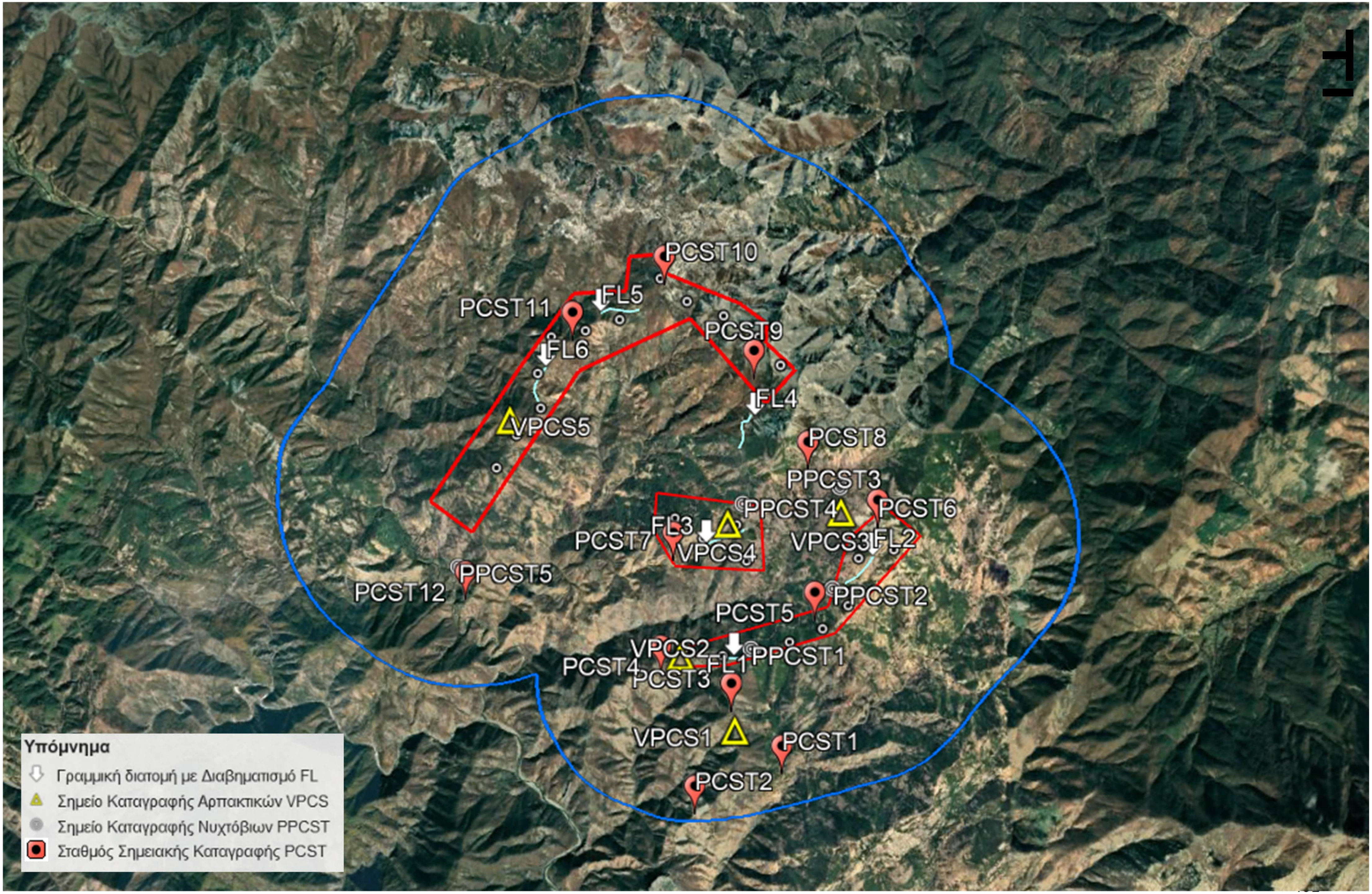

Αποτύπωση πτήσεων του βραχοκιρκίνεζου
(Falco tinnunculus)
ΥΠΟΜΝΗΜΑ
0 1,5 3 6
Χλμ.


Αποτύπωση πτήσεων της γερακίνας
(Buteo buteo)
ΥΠΟΜΝΗΜΑ
0 1,5 3 6
Χλμ.

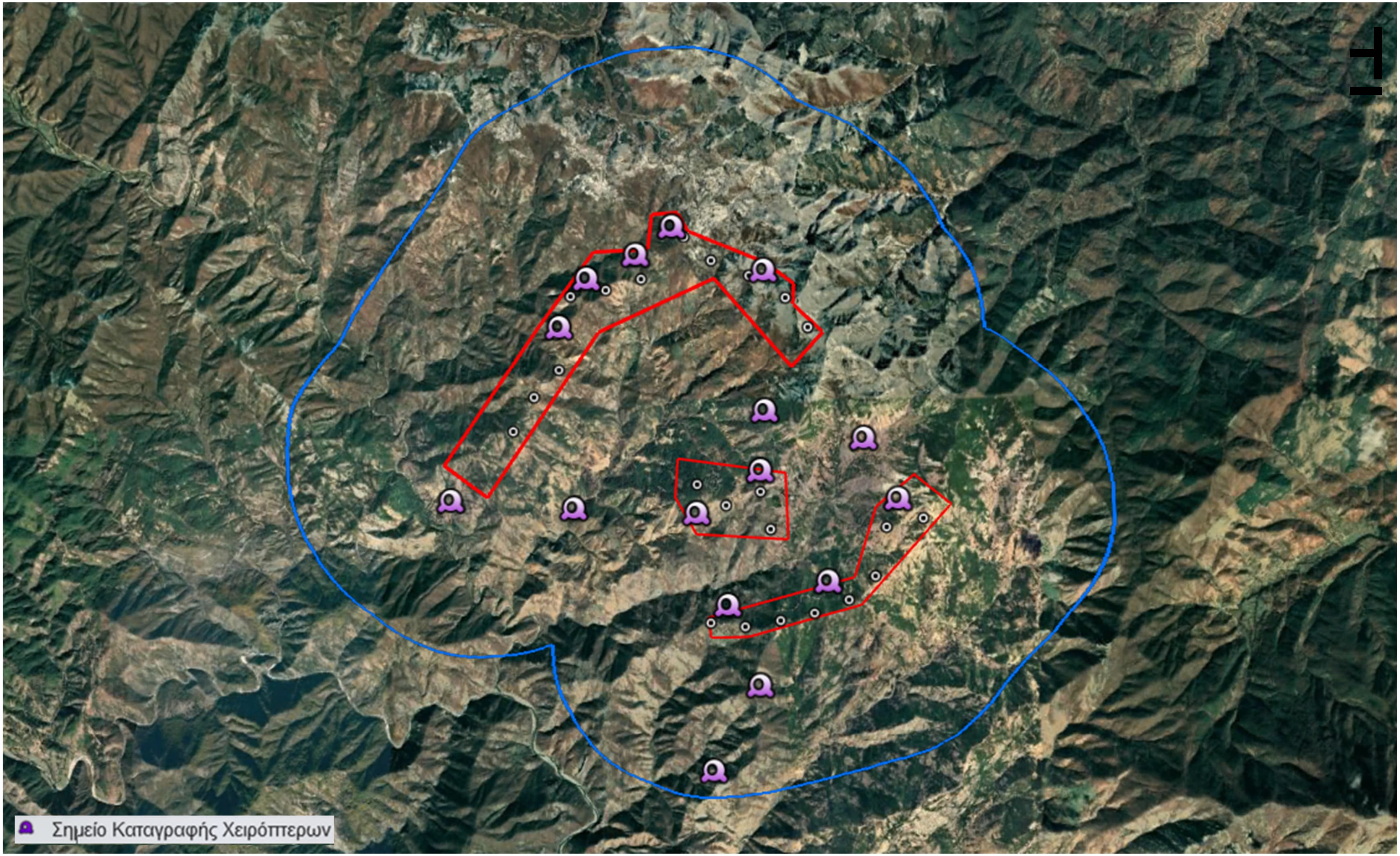

Αποτύπωση πτήσεων του δεντρογέρακου
(Falco subbuteo)
ΥΠΟΜΝΗΜΑ
0 1,5 3 6
Χλμ.


Αποτύπωση πτήσεων του ξεφτεριού
(Accipiter nisus)
ΥΠΟΜΝΗΜΑ
0 1,5 3 6
Χλμ.

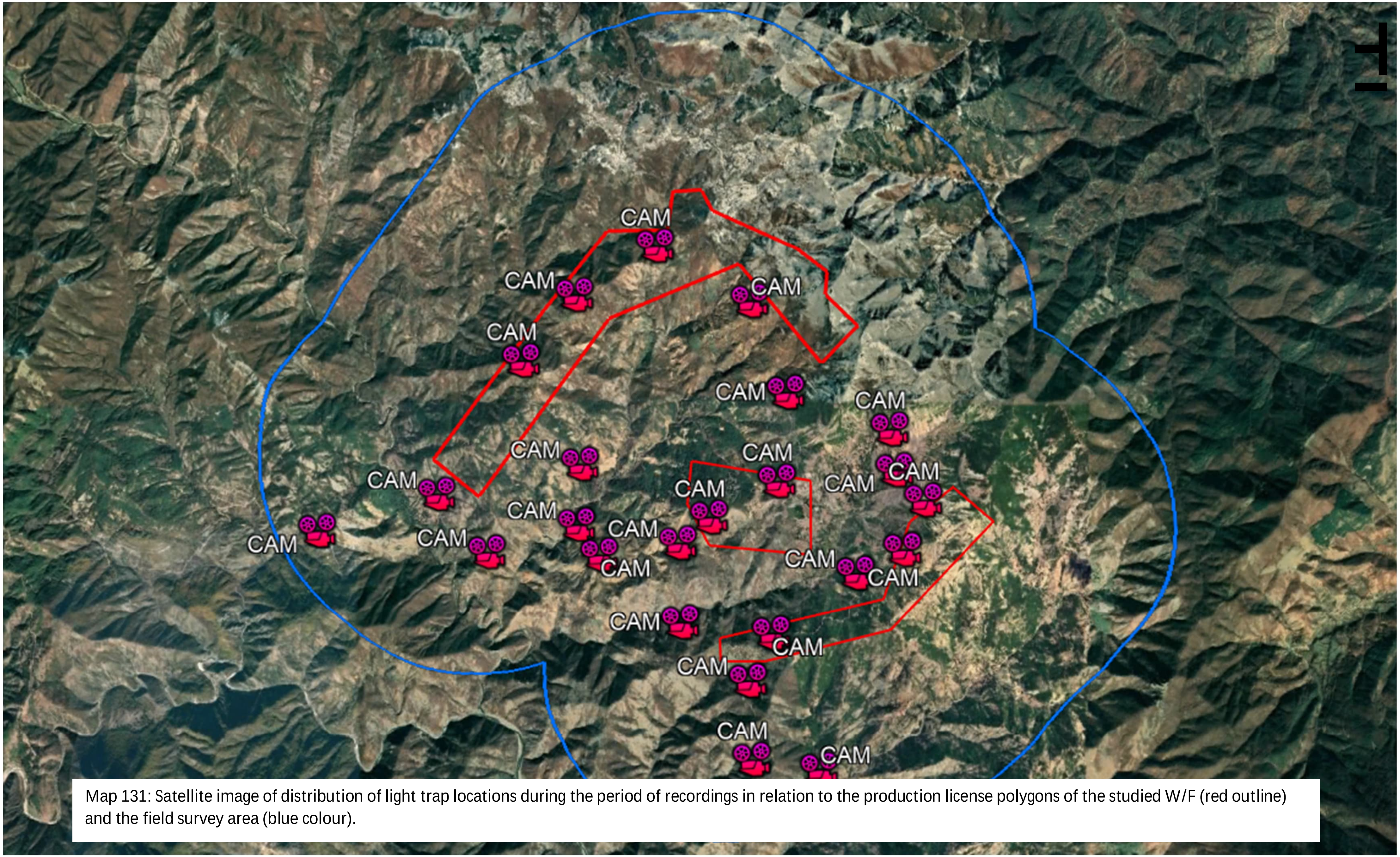

Αποτύπωση πτήσης του διπλοσαΐνου
(Accipiter gentilis)
ΥΠΟΜΝΗΜΑ
0 1,5 3 6
Χλμ.



Map 129: Satellite image of the distribution of field data collection sites for avifauna (red outline shows the production permit polygons of the project under study and blue outline shows the field survey area).

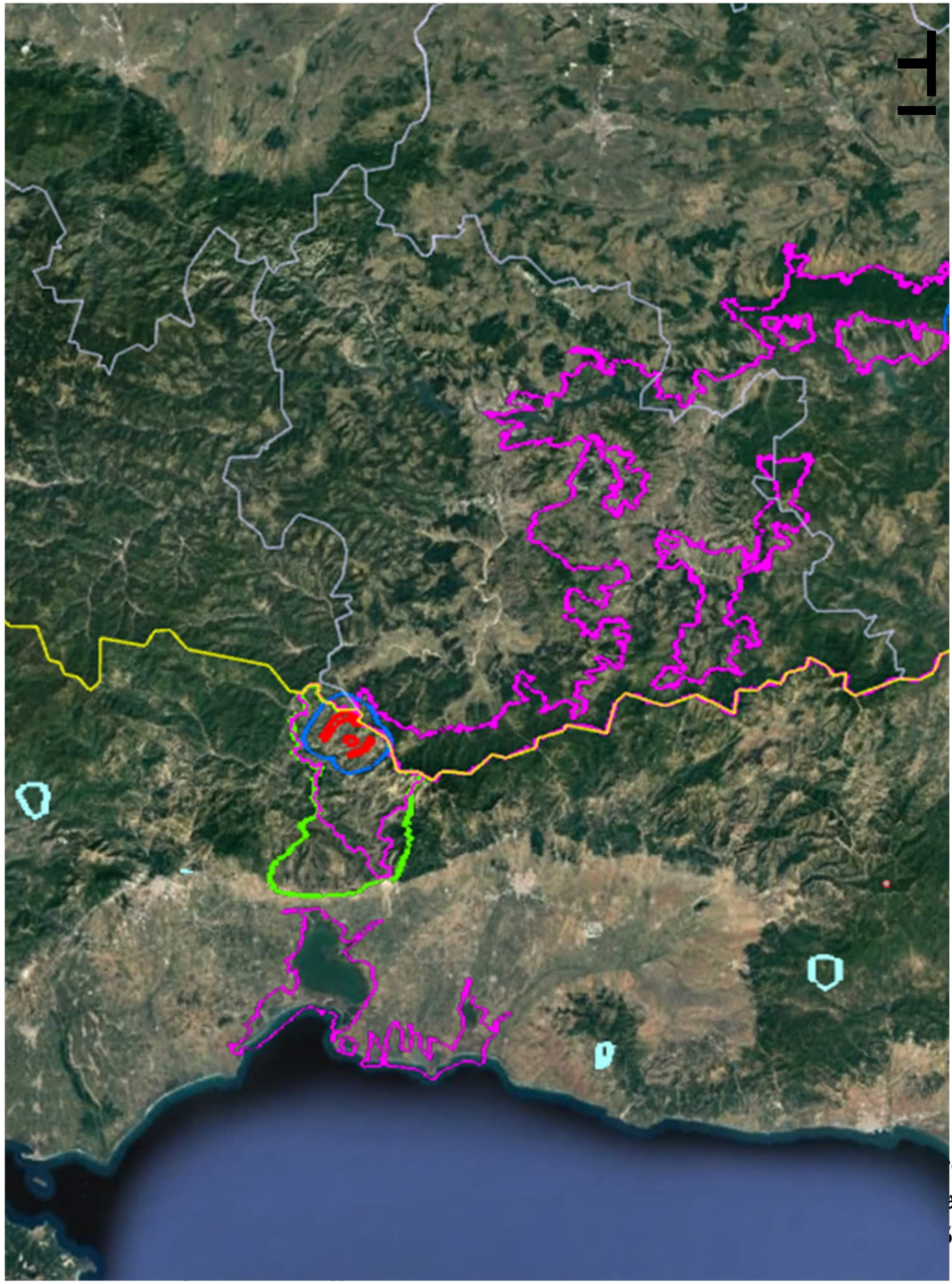


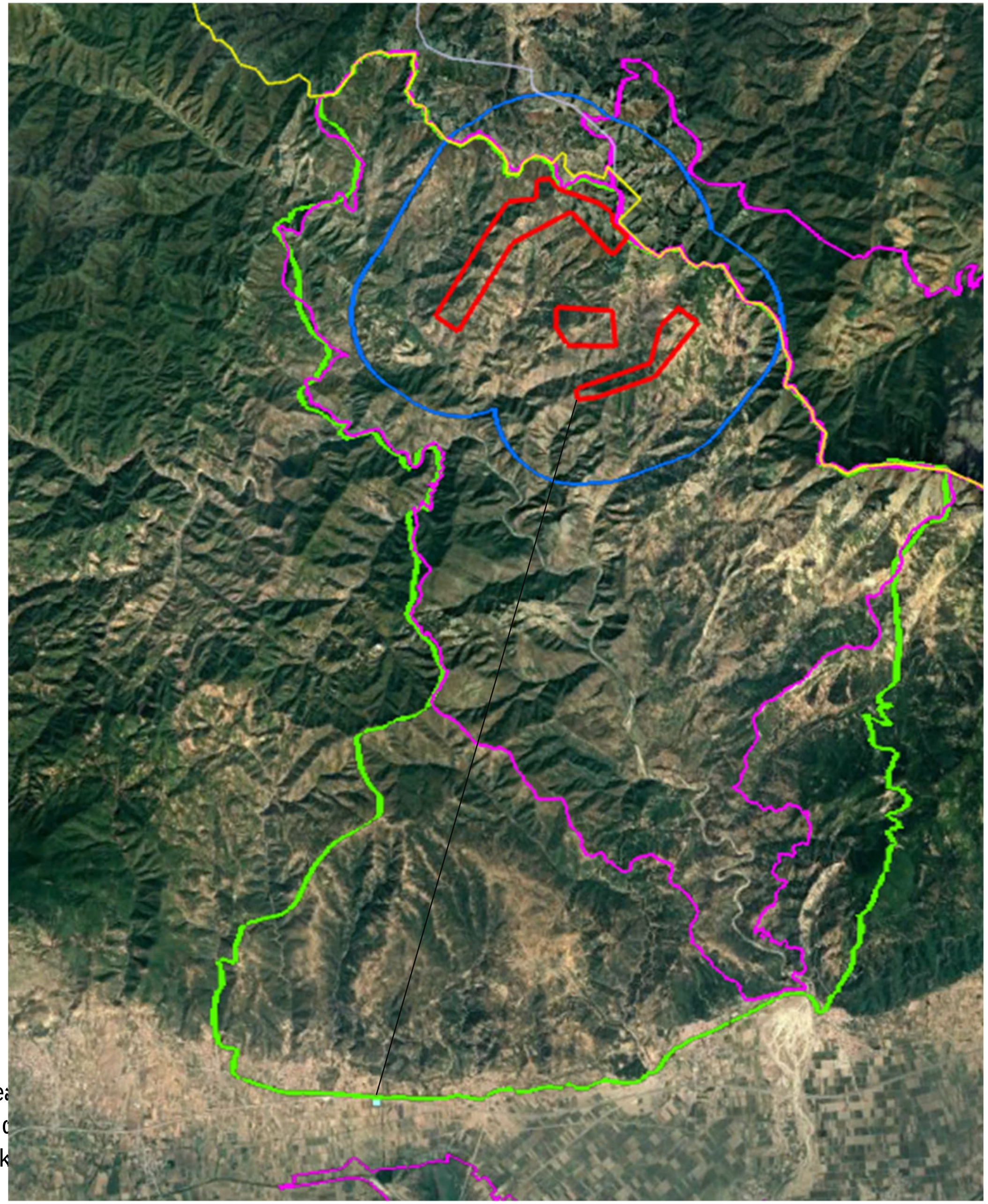
Map 130: Satellite image of the distribution of locations of tipping points during the recording period in relation to the production license polygons of the studied wind turbine (red outline), the field survey area (blue) and the wind turbine installation sites (white).

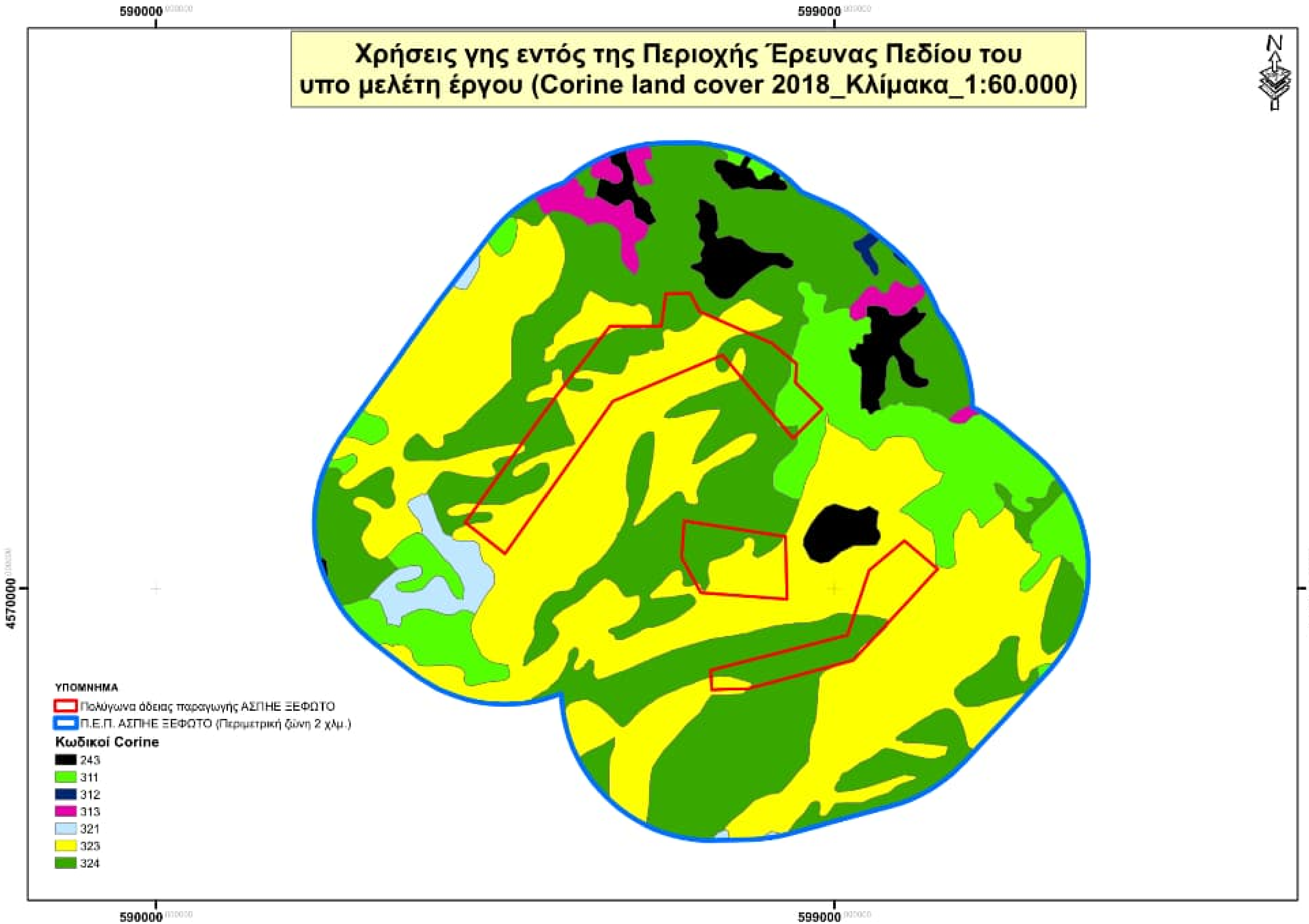


Map 131: Satellite image of distribution of light trap locations during the period of recordings in relation to the production license polygons of the studied W/F (red outline) and the field survey area (blue colour).

Χάρτης 132: Χάρτης κατανομής θέσεων συλλογής δεδομένων πεδίου εντός της Περιοχής Έρευνας πεδίου του υπό μελέτη έργου.







Χάρτης 134: Χρήσεις γης εντός της Περιοχής Έρευνας πεδίου του υπό μελέτη έργου, σύμφωνα με τη βάση δεδομένων και τη χαρτογράφηση για την κάλυψη της γης (Corine land cover 2018)

Photographic documentation of the study area: Ground photographs from different viewpoints of the production license blocks of the study project and the wider area





















































































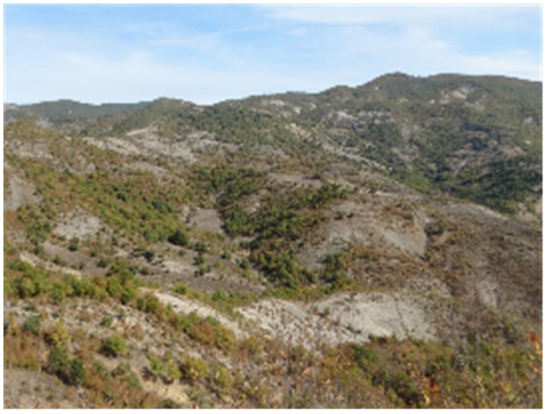


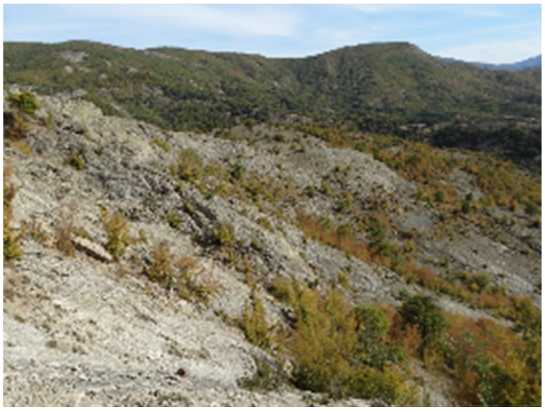










Photographs 93 to 218: Photographs of the project area and the wider area from different viewpoints and in different directions of the horizon to better capture the wider study area.

Photographic documentation of the study area: Indicative photographs of wildlife species from the field survey

Leiopicus medius

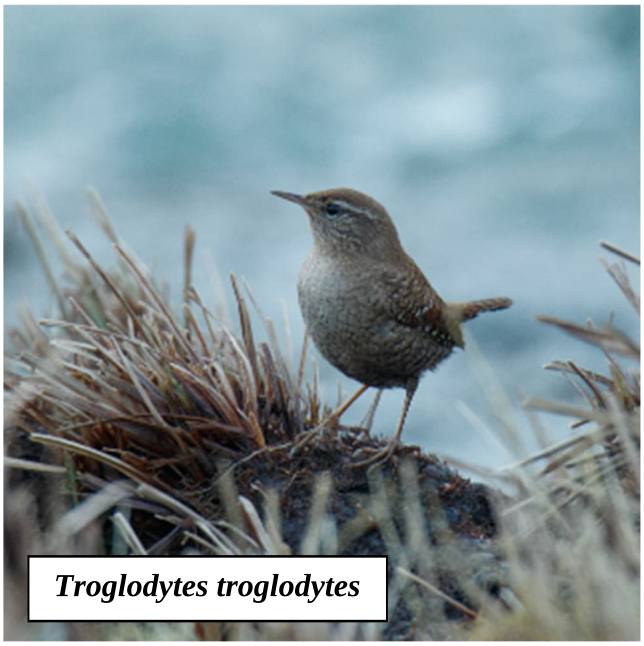
Fringilla coelebs

Gyps fulvus

Aegithalos caudatus

Buteo buteo

Erithacus rubecula



Troglodytes troglodytes

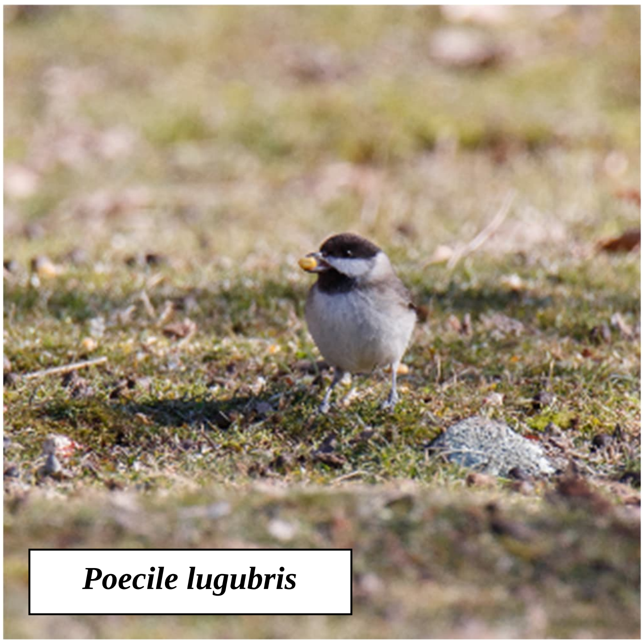
Buteo buteo

Corvus cornix

Leiopicus medius

Emberiza cirlus

Gyps fulvus



Poecile lugubris

Accipiter nisus

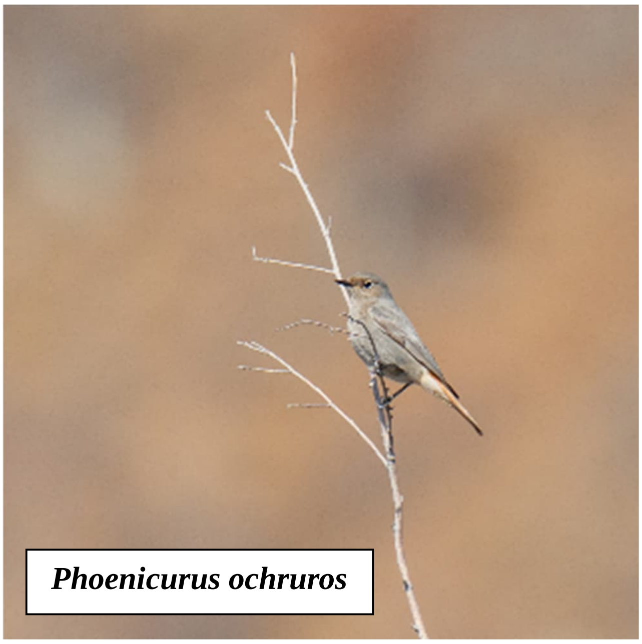
Aquila chrysaetos

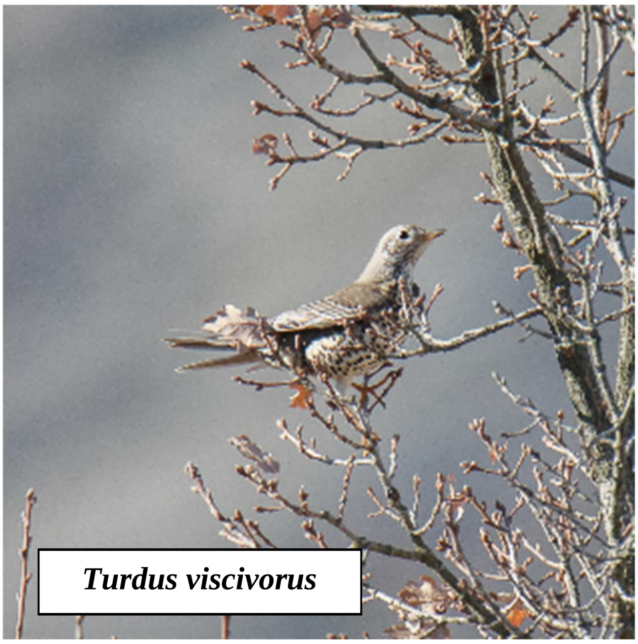
Aquila chrysaetos

Ardea cinerea

Parus major


Phalacrocorax carbo


Phoenicurus ochruros


Turdus viscivorus


Linaria cannabina


Phalacrocorax carbo


Aquila chrysaetos

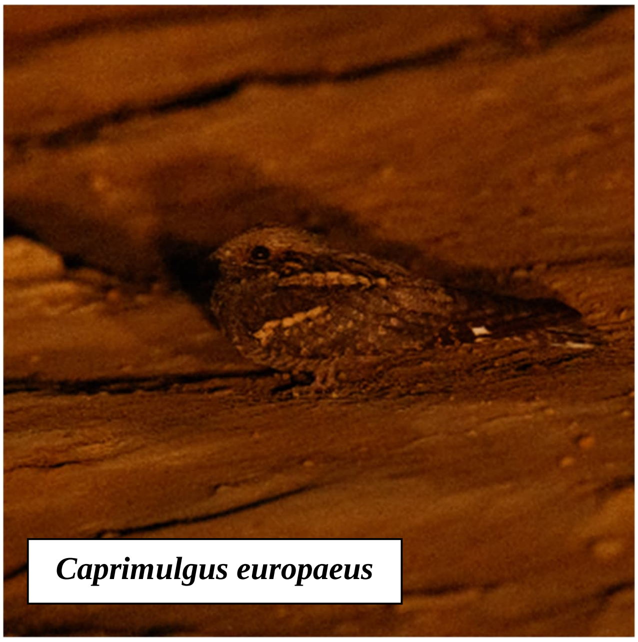
Sturnus vulgaris

Turdus merula

Aquila chrysaetos

Hieraaetus pennatus

Buteo buteo

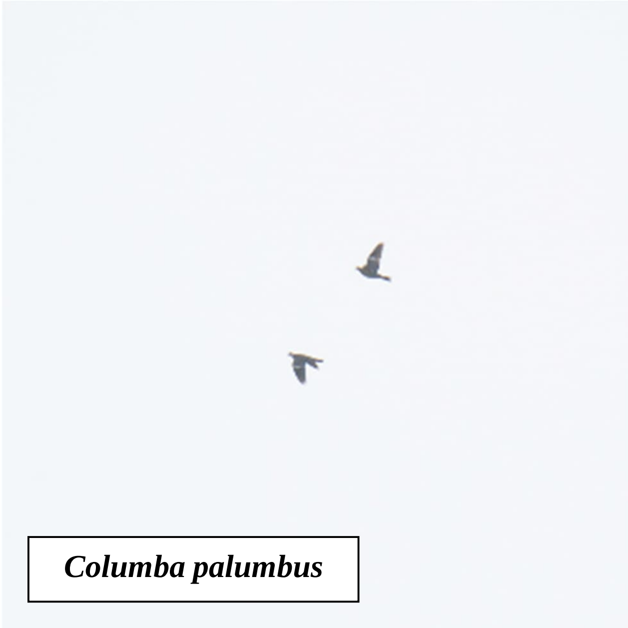


Caprimulgus europaeus


Ciconia nigra


Circaetus gallicus


Coccothraustes coccothraustes


Columba palumbus


Cyanistes caeruleus


Emberiza hortulana

Falco tinnunculus

Cecropis daurica

Lanius senator

Luscinia megarhynchos

Merops apiaster

Milvus migrans

Oenanthe hispanica

Pernis apivorus

Saxicola torquatus

Streptopelia turtur

Sylvia atricapilla

Curruca cantillans


Upupa epops


Accipiter nisus


Aegypius monachus


Aquila chrysaetos

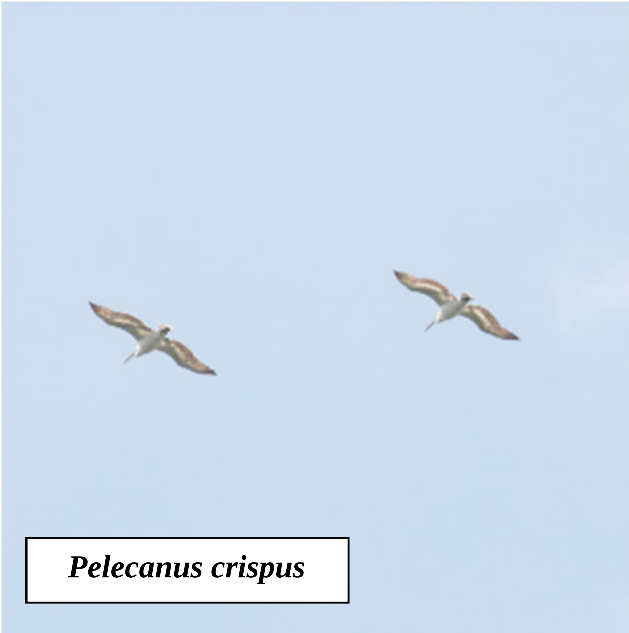

Circus pygargus


Gyps fulvus

Lanius collurio

Lanius minor

Lullula arborea



Pelecanus crispus

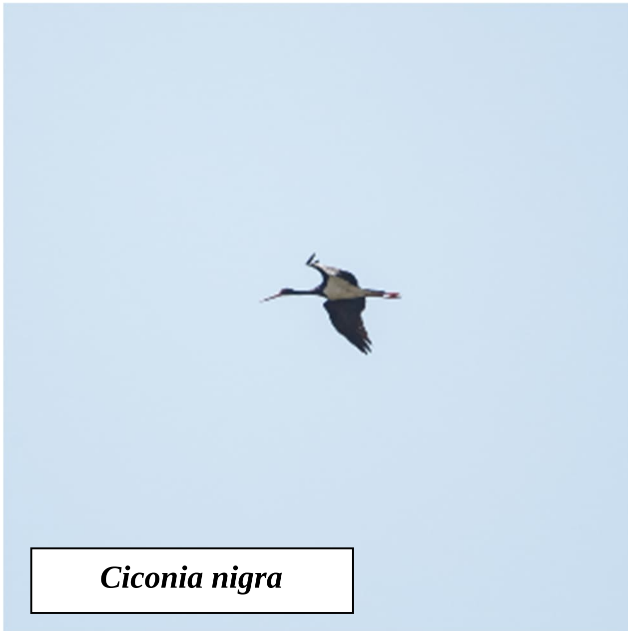
Pelecanus onocrotalus

Pernis apivorus

Curruca communis

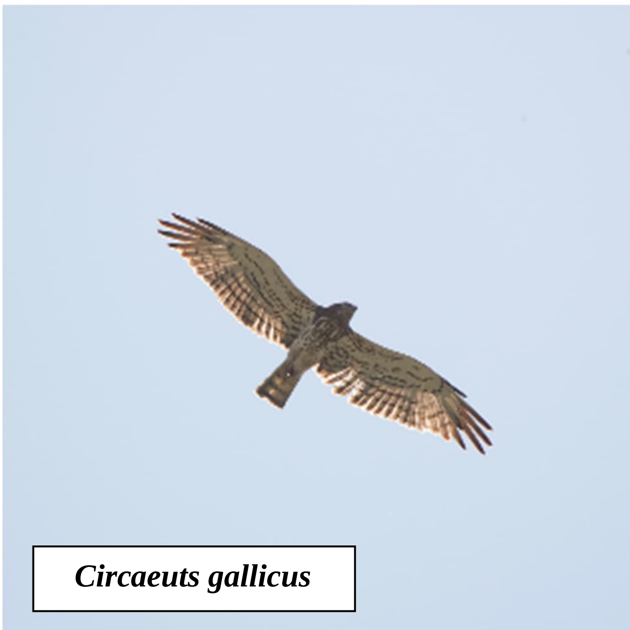
Accipiter brevipes

Apus apus



Ciconia nigra

Buteo buteo και *Falco tinnunculus*



Circaeuts gallicus


Falco subbuteo


Muscicapa striata


Buteo buteo


Aquila chrysaetos


Sciurus vulgaris


Lacerta viridis

Lepus europaeus

Testudo graeca

Natrix natrix

Dolichophis caspius

«Άγριο» άλογο

«Άγριο» άλογο

Photographic documentation of the study area: Indicative photographs of phototrap placement sites, handholding sites and bioacoustic station placement sites









WILDLIFE

Φωτογραφική τεκμηρίωση της περιοχής μελέτης: Ενδεικτικές φωτογραφίες ειδών της άγριας πανίδας από την λειτουργία των φωτοπαγίδων

Capreolus capreolus

Felis silvestris

Lepus europaeus

Vulpes vulpes

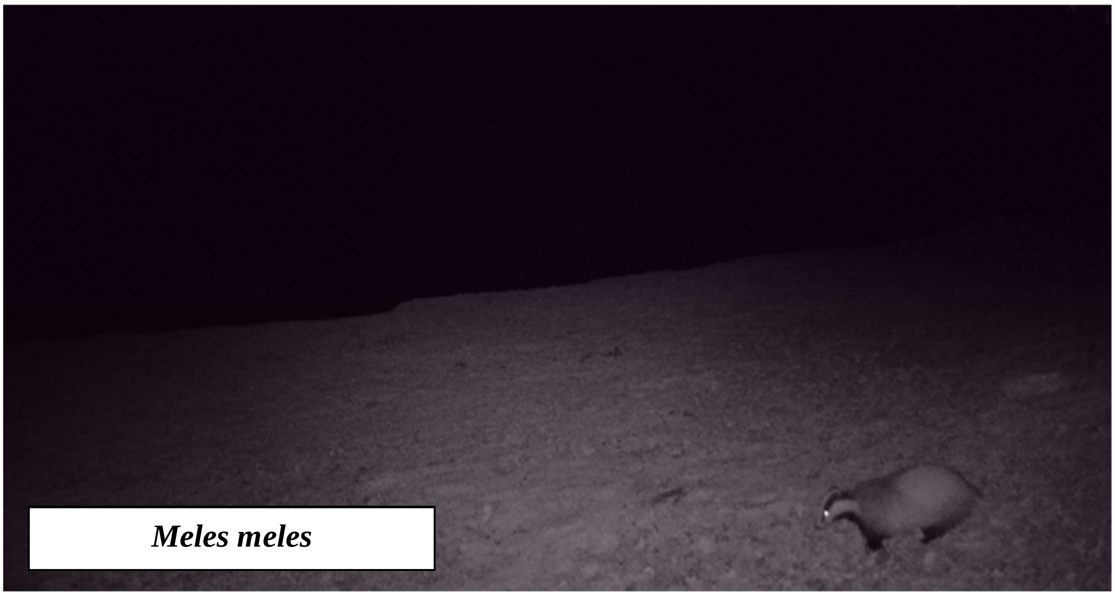
Sus scrofa

Vulpes vulpes


Buteo buteo


Capreolus capreolus


Capreolus capreolus


Meles meles


Canis lupus


Canis lupus

Vulpes vulpes

Canis lupus

Vulpes vulpes

Meles meles

Vulpes vulpes

Vulpes vulpes

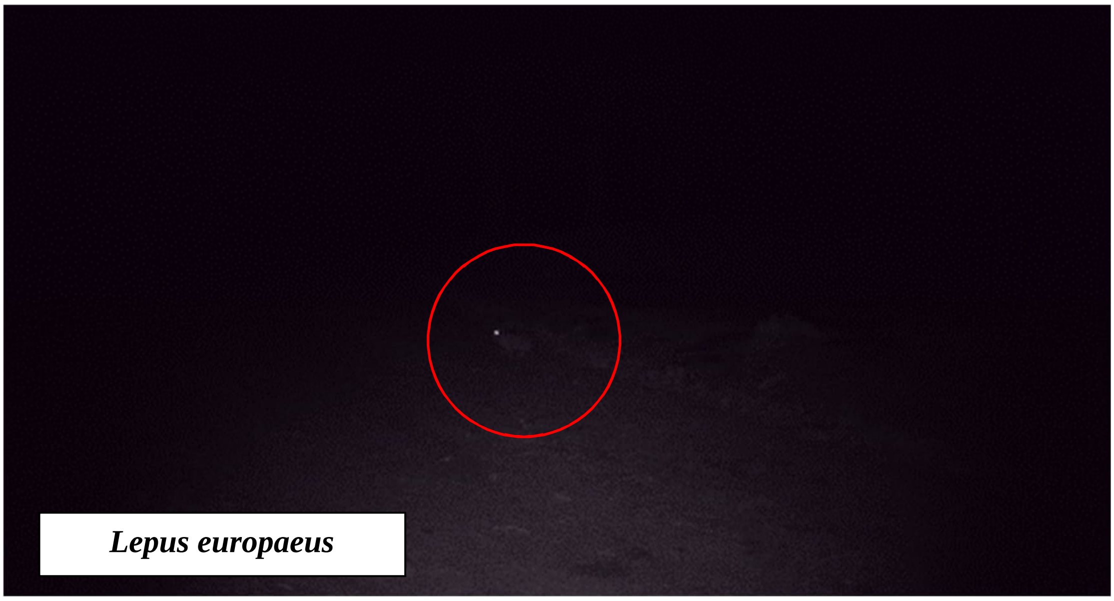
Sus scrofa

Capreolus capreolus

Capreolus capreolus

Capreolus capreolus

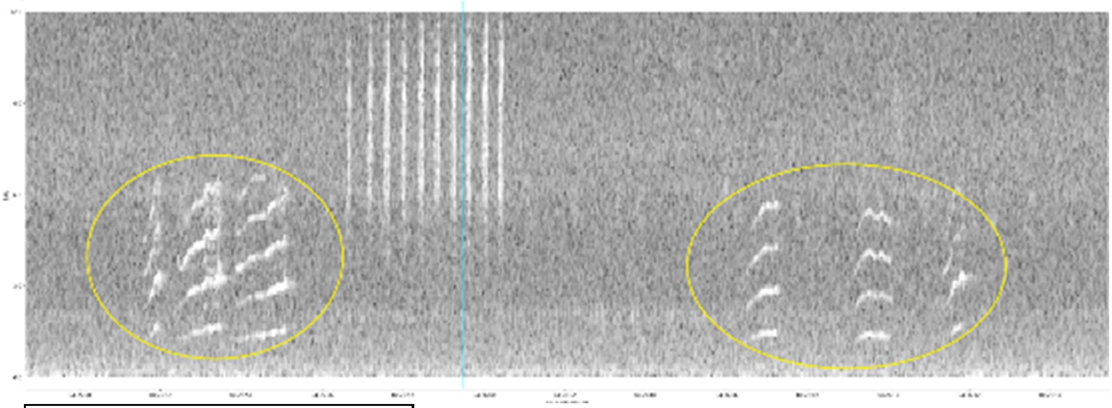
Sus scrofa



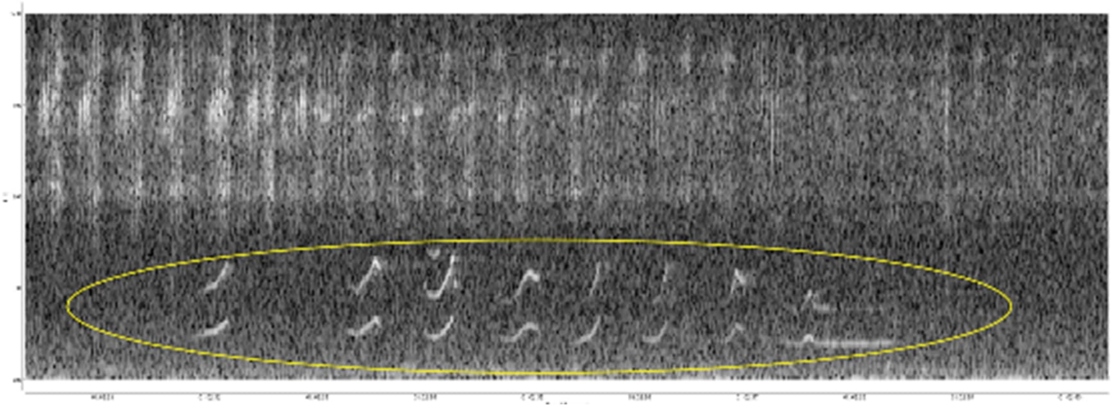
Lepus europaeus



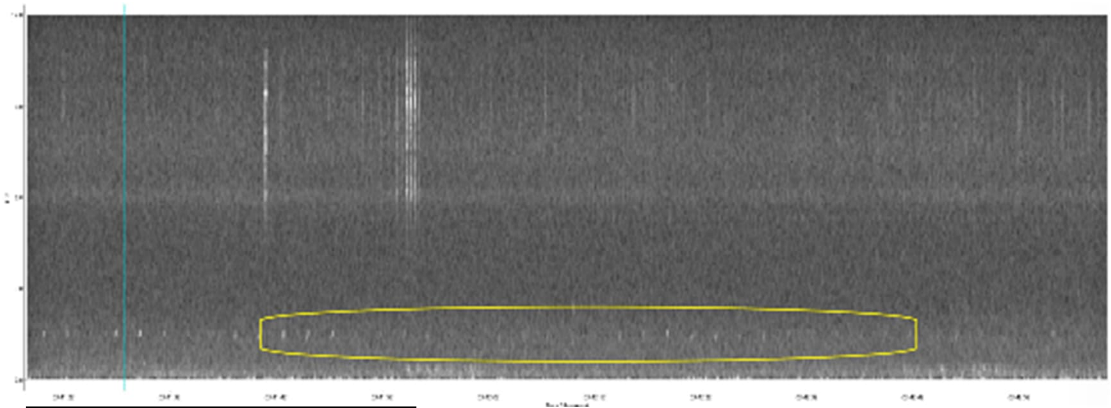




Strix aluco



Strix aluco



Otus scops

INVENTORY OF **THE STATE OF THE NATURAL ENVIRONMENT IN THE NATURA 2000 NETWORK AREA**

The production license blocks of the project under study, as mentioned in previous sections of this SEA, are located within the protected Natura 2000 network site GR1130012, as well as within the SPA GR0009, while the nearest Natura 2000 network site GR1130010 and the adjacent Bulgarian Natura 2000 network site BG0001032 have been taken into account.

Conservation objectives of the Natura 2000 site concerned and parameters contributing to the conservation value of the site.

For the Natura 2000 network sites under study (ZEP GR1130012 and GR1130010 and EEZ BG0001032) no Management Plan has been prepared and no conservation objectives have been defined on the basis of the above mentioned Management Plans. The objective of this EIA 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 no conservation objectives have been defined for the study area and no satisfactory reference values for the species have been established on the basis of the Management Plan, the general conservation objective of the SPAs is to maintain or restore to a satisfactory conservation status the important species of Community interest of the sites, which are the main object of protection, on the basis of the content of the Standard Data Forms for these SPAs. As regards the neighbouring SPA

The ecological requirements of the species and habitat types for which the Natura 2000 sites concerned have been designated

This study area does not belong to the Natura 2000 network sites of EEZs or TKCs and there is no requirement, according to the EAA specifications, for further analysis of habitat types. With regard to the Natura 2000 network sites ZEP GR1130012 (within which the project under study is located) and GR1130010 the ecological requirements of 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, the ecological requirements of the species of interest are analysed below according to the "*Deliverable 8 Guide to ecological requirements, threats* and

Balkan woodpecker (*Dendrocopos syriacus*)

The species prefers low-altitude areas with mature forests, mainly deciduous, adjacent to open areas e.g. gaps, meadows, fields with scattered old trees, stream tree vegetation such as willows and poplars. The availability of suitable trees for foraging increases with the proportion of mature forest, and foraging habitat is characterised by high structural heterogeneity as sites with mature forest and tall trees alternate with open areas, grasslands or forest gaps where they are rich in ant colonies or fruit trees.

In more detail:

Breeding habitat: The species nests in a wide variety of tree species, in cavities opened by both sexes (Cramp 1998). Selection of suitable nesting sites is related to the availability of mature trees near areas rich in food resources (Tucker and Heath 1994). The species selects sites with a strong habitat mosaic, where forests (mainly deciduous) alternate with open areas with scattered old trees and hedgerows or stream vegetation in agricultural or agroforestry areas (Tucker and Heath 1994; Handrinos and Akriotis 1997). Also, forests with natural openings and gaps or forest habitats with grassland are preferred.

Food ecology: The species feeds mainly on insects, foraging in the crown and branches of trees but sometimes on the ground. Also, fruits and nuts form an important part of its diet (Cramp 1998). The species' feeding areas should provide a variety of food for both insects and fruits, so the species chooses complex cropping systems (e.g. perennial tree crops) adjacent to mainly deciduous forests. Plantations with conifers are usually avoided (Cramp 1998).

Main habitats that support the species:

- Habitat of the forest boundaries
- Cultivated land
- Perennial crops, tree crops
- Urban parks and gardens

Corydalis (*Emberiza hortulana*)

The species prefers highly heterogeneous agricultural landscapes or pastures. Areas of extensive crops (mainly cereals) or grasslands alternating with forest islands, scrubland and scattered trees are the optimal habitat for the species. Meadows, pastures and fields under fallow with the presence of plant barriers are also heavily used.

In more detail:

Reproduction interest: The species builds its nest on the ground in places with vegetation cover (Cramp 1998). It nests at the edges of crops or meadows where there is natural vegetation (firebreaks) or in bushes. It has also been observed nesting in gaps or natural openings and in forest patches with agricultural or grassland areas (Handrinos and Akriotis 1997). The species prefers areas with high heterogeneity of vegetation at ground level (Vepsäläinen et al. 2005), where sites with bare ground or sparse vegetation are mixed with sites with taller vegetation e.g. bushes or trees (Berg 2008). The availability of nesting, singing and foraging sites accounts for this selection (Golawski and Dombrowski 2002). Population density is higher in extensive croplands (including those under fallow) and in grasslands in the presence of shrubs (Berg 2008). In contrast, the species is absent from areas at an advanced stage of vegetation succession (e.g. forested grasslands) (Sirami et al. 2007). The species benefits from small-scale fires that create openings and open spaces in areas of dense vegetation (Dale and Olsen 2002, Pons and Bas 2005) and colonises them in a short period of time (Pons and Prodon 1996). A typical example is the spread of the species in Catalonia, Spain, which is largely attributed to fires (Brotons et al. 2008).

Food ecology: The species feeds on seeds (mainly cereals or grasses), and supplements its diet with invertebrates during the breeding season. It collects its food mainly on the ground and often in close proximity to shrubs or trees that provide cover (Cramp 1998). Rural landscapes or pastures with high heterogeneity, where crops or meadows are mixed with islands of forest, hedgerows and scattered shrubs are the optimal habitat for the species, (Fonderflick et al. 2005, Sirami et al. 2007, Brotons et al. 2008). The above selection is related to the availability of suitable singing sites, the supply of cover from predators and the availability of food resources (Vepsäläinen et al. 2005, Berg 2008). The species also prefers grasslands, pastures or fields under fallow in the presence of scattered shrubs, as insect and invertebrate availability is high in these areas due to the limited use of agrochemicals (Berg 2008). Mild grazing and small-scale fires have a positive effect on foraging habitat by providing the necessary vegetation heterogeneity at the ground level. (Pons and Prodon 1996, Dale and Olsen 2002, Brotons et al. 2008).

Main habitats that support the species:

- Habitat of the forest boundaries
- Dry, siliceous grasslands
- Mesophilic meadows
- Steppes and dry calcareous grasslands
- Cultivated land

Oak woodpecker (*Ficedula semitorquata*)

The species prefers mature, closed deciduous forests of mainly beech, with no understory and with high and bare trunks. Also, in lowland areas, it is found along streams, in the presence of surface water, dominated by stands of *Platanus orientalis* or *Alnus glutinosa*. In some cases it is possible to nest near or within settlements, e.g. in central squares with mature plane trees and in the presence of water. During the breeding season it feeds on insects in close proximity to the nest.

In more detail:

Reproduction interest: The species nests in natural cavities or cavities opened by woodpeckers in dead webbed trunks or dead branches, mainly of deciduous trees. The height of the nest ranges from 2.5 to 12 m above the ground (Cramp 1998). The selection of suitable nest sites is closely related to the presence of oakleafs in the area which open suitable cavities for nesting, which are colonised by the oakleaf. The species selects mature, closed deciduous (mainly beech) forests, with high and bare trunks, in the absence of understory (Handrinos and Akriotis 1997). It is also observed in lowland areas along streams, in the presence of surface water, dominated by stands of Platanus *orientalis* or Alnus *glutinosa* (Tucker and Heath 1994). In some cases it is possible to nest near or within settlements e.g. in central squares with mature sycamore trees and in the presence of water (Tucker and Heath 1994). In suitable habitats population density is high as neighbouring pairs may nest on average within 70 m of each other (Cramp 1998).

Food ecology: The species feeds on insects which it catches in flight (Cramp 1998). During the breeding season the species feeds in close proximity to the nest. This leads to the selection of sites with high insect abundance. For this reason, in lowland areas it feeds in streams in the presence of water and mature forest as the availability of insects in these areas is particularly high (Tucker and Heath 1994). At the spatial level of the landscape, mature forests with a high proportion of deciduous species (especially beech) are preferred.

Competition: the species develops intense competition for nesting space with other species that colonise oak nesting sites, such as puffins, woodpeckers and treefrogs (Cramp 1998).

Main habitats that support the species:

- Alluvial and hydric forests
- Broad-leaved deciduous forests

Langonia (*Microcarbo pygmaeus*)

Reproduction interest: 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 creating 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 that support the species:

- Rivers and streams
- Constant brackish and salt water
- Standing fresh water

Shark (*Accipiter brevipes*)

The existence of tall trees or shrubs in deciduous forests and forest gaps with meadows or rivers and streams rich in riparian and aquatic vegetation are key ecological factors for the species.

In more detail:

Reproduction interest: Typical forest 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).

Food ecology: The species feeds mainly on small mammals, birds, reptiles and large flying insects (e.g. grasshoppers, cicadas, etc.) which it hunts in forest clearings, or in nearby farmland and meadows, as well as near the riverbed in riparian vegetation (Gensbol and Thiede 2008).

Main habitats that support the species:

- Alluvial and hydric forests
- Broad-leaved deciduous forests
- Wet meadows
- Mesophilic meadows
- Rivers and streams
- Ground vegetation,

Eagle Heron (*Buteo rufinus*)

The species needs a mosaic of habitats, such as steep cliffs and bare ground or dry steppe grasslands.

In more detail:

Reproduction interest: 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).

Food 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 that support the species:

- Steppes and dry calcareous grasslands
- Steep and rocky coasts
- Heather lands
- Internal flaps

Vulture (*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:

Reproduction interest: The vulture nests in groups of 2-18 pairs always on rocky crags, mainly of limestone substrate (Cramp and Simmons 1980, Donázar 1993), while on the islands several colonies are found on coastal rocks (Xirouchakis and Mylonas 2004, 2005).

Food ecology: Open land species, 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 sub-alpine 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 that support the species:

- Hardwood bushes, garrigue and maquis
- Alpine, sub-alpine and northern temperate grasslands
- Heather lands
- Internal flaps

Crane eagle (*Clanga pomarina*)

The species requires mature trees in lowland stands of deciduous or coniferous species and aquatic ecosystems with watery vegetation and wet meadows where it feeds mainly on reptiles and amphibians.

In more detail:

Reproduction interest: 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).

Food ecology: The species feeds mainly in freshwater wetlands, rivers and streams with aquatic vegetation but also in crops, grasslands and scrublands mainly with reptiles and amphibians but also small mammals and birds. Large insects and more rarely carrion are also part of its diet (Vlachos 1989, Zogaris et al. 2003).

Main habitats that support the species:

- Broad-leaved deciduous forests
- Native coniferous forests
- Wet meadows
- Rivers and streams
- Constant brackish and salt water
- Partridge vegetation
- Lagoons

Common Eagle (*Hieraaetus pennatus*)

The species needs mature trees, in dense stands of deciduous forests with gaps, in shrubs or meadows.

In more detail:

Reproduction interest: 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).

Food ecology: The species forages in inter-forest gaps 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 that support the species:

- Broad-leaved deciduous forests
- Mixed forests
- Habitat of the forest boundaries
- Hardwood bushes, garrigue and maquis
- Thickets
- Mesophilic meadows

Snake eagle (*Circaetus gallicus*)

The species requires mature trees in intact stands of deciduous or coniferous forest to nest and extensive open, dry areas for foraging.

In more detail:

Reproduction interest: 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 buffalo is reported as an important predator of the species.

Main habitats that support the species:

- Broad-leaved deciduous forests
- Broad-leaved evergreen forests
- Mixed forests
- Native coniferous forests
- Hardwood bushes, garrigue and maquis
- Alpine, sub-alpine and northern temperate grasslands
- Dry, siliceous grasslands
- Steppes and dry calcareous grasslands
- Heather lands
- Internal flaps
- Lithones and boulders

Black stork (*Ciconia nigra*)

The species nests in small numbers in Thrace, Macedonia, Epirus, Epirus, North Thessaly and Lesvos, in mature and undisturbed forests or on rocks, while it feeds in shallow rivers and streams, ponds, marshes and wet meadows.

In more detail:

Reproduction interest: Nests solitarily in mature, undisturbed, mixed or undisturbed, deciduous or coniferous forests 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.

Food ecology: It 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, so it is more dependent on water than the white-tailed stork.

Migration habitat: the species migrates through the Bosphorus alone or in small groups and during this period they may also be observed 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 the migration, but only briefly in coastal wetlands. In such locations some individuals overwinter.

Main habitats that support the species:

- Broad-leaved deciduous forests
- Native coniferous forests
- Rivers and streams
- Standing fresh water
- Internal flaps

Golden eagle (*Aquila chrysaetos*)

The presence of rocky outcrops is essential for the species as well as open areas for foraging.

In more detail

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).

Food 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 that support the species:

- Hardwood bushes, garrigue and maquis
- Alpine, sub-alpine and northern temperate grasslands
- Steppes and dry calcareous grasslands
- Heather lands
- Internal flaps

Egyptian vulture (*Neophron percnopterus*)

The species needs rocky formations for foraging, traditional land use and extensive forms of livestock farming. Also, control of the use of poisoned baits is a key factor in its presence.

In more detail:

Reproduction interest: 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. It nests in individual pairs or forms loose colonies (Cramp and Simmons 1980; Tucker and Heath 1994).

Food ecology: The species is almost omnivorous. It feeds on the carcasses of small animals and is very often observed 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 main source of food, 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 migration route is the Bosphorus straits, although several observations suggest that the species also moves through the Aegean and Crete (Handrinos and Akriotis 1997).

Main habitats that support the species:

- Steppes and dry calcareous grasslands

- Heather lands
- Internal flaps

Wasp (*Pernis apivorus*)

Maintaining 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).

Food 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 that support the species:

- Broad-leaved deciduous forests
- Broad-leaved evergreen forests
- Mixed forests
- Native coniferous forests
- Habitat of the forest boundaries

Sea eagle (*Haliaeetus albicilla*)

The species needs mature trees in riparian forests near large wetlands for food (i.e. aquatic populations).

In more detail:

Reproduction interest: The species nests in trees, mainly 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 that support the species:

- Broad-leaved deciduous forests
- Native coniferous forests
- Constant brackish and salt water
- Standing fresh water
- Lagoons
- Salt marshes
- Tidal zone of rivers and tidal waters enclosed

Peregrine *Falcon (Falco peregrinus*)

The species requires the presence of suitable rocks for spawning and good populations of specific species for feeding.

In more detail:

Reproduction interest: The species nests on steep vertical cliffs in canyons and coastal ravines. The nest is located in small cavities or terraces usually with rocky roofs (Newton 1979; Tucker and Heath 1994; Rizzolli et al. 2005).

Food 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 form the species' diet, while on the islands wild pigeons are its main diet. In contrast, in cities it preys mainly on pigeons and decoys (Sielicki and Mizera 2009).

Competition: theoretically the species competes with the golden egret for nesting sites and they do not meet on adjacent rocks.

Main habitats that support the species:

- Hardwood bushes, garrigue and maquis
- Dry, siliceous grasslands
- Steppes and dry calcareous grasslands
- Rocky columns and islands
- Steep and rocky coasts
- Internal flaps

Bubo bubo (*Bubo bubo*)

A very important factor for the species' well-being is the existence of rocks for nesting and open areas rich in food reserves.

In more detail:

<u>Reproduction interest</u>: 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).

<u>Food ecology</u>: It is a species of mainly open areas with rocks, meadows, crops and fallow fields. However, it is also found in scrubland 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 Simmos 1980, Mikkola 1983, Papageorgiou, et al. 1993, Alivizatos et al. 2005).

<u>Main habitats that support the species:</u>

- Hardwood bushes, garrigue and maquis
- Dry, siliceous grasslands
- Mesophilic meadows
- Steppes and dry calcareous grasslands
- Heather lands
- Internal flaps

Great Hornbill (*Falco columbarius*)

<u>Overwintering habitat</u>: it is a species of open areas, frequenting dry crops (mainly cereals), toast and grasslands and wetlands. It feeds mainly on small mammals and insects (Ferguson-Lees and Christie 2001, Gensbol and Thiede 2008).

<u>Main habitats that support the species</u>:

- Hardwood bushes, garrigue and maquis
- Thickets
- Dry, siliceous grasslands

- Mesophilic meadows
- Steppes and dry calcareous grasslands
- Cultivated land

Curcinesis (*Falco naumanni*)

The species requires rocky outcrops and old houses and open areas with low vegetation or bare ground and unirrigated crops.

In more detail:

Reproduction interest: 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).

Food 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 to be predators of the eggs and chicks of the common sandhill crane.

Main habitats that support the species:

- Dry siliceous grasslands
- Cultivated land
- Other urban and industrial areas
- Heather lands

Whistling duck (*Mareca penelope*)

The species does not nest in Greece. It is a common and regular wintering species, found in all types of wetland habitats, natural or artificial. Its population levels in Greece depend on several factors, but mainly on the severity of winters in Northern and Central Europe. The majority of its population is recorded in the large wetlands of northern and central Greece (Evros Delta, Kerkini, Amvrakikos, etc.), but it also winters on some large islands. It feeds on a wide variety of plant food (Cramp 1977, Handrinos and Akriotis 1997).

In more detail:

Overwintering habitat: the species occurs in all types of wetlands, coastal and inland, and is predominantly herbivorous (Cramp 1977, Handrinos and Akriotis 1997).

Competition: not recorded in Greece.

Prey: It often preys on birds of prey or carnivorous mammals, but mainly when injured (by hunters) or in cases of heavy winter.

Migration paths: whistlers do not follow specific migration paths. Typically, they move along the shoreline, particularly from wetland to wetland. In periods of heavy winter they are more widely dispersed.

Main habitats that support the species:

- Wet meadows
- Constant brackish and salt water
- Standing fresh water
- Partridge vegetation
- Artificial landscapes (aquatic)
- Lagoons
- Muddy and sandy fields in the tidal zone
- Salt marshes

Avocet (*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:

Reproduction interest: The species nests exclusively in coastal wetlands, mainly in saltwater lagoons and salt marshes, on islands and dikes with little or no vegetation.

Food ecology: It 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 silverside.

Hunting: hunting of eggs and chicks by terrestrial mammals (rats, skunks, ferrets, weasels, grubs, dogs, cats), silver gulls, predators and crows.

Main habitats that support the species:

- Artificial landscapes (aquatic)
- Lagoons
- Salt marshes
- Tidal zone of rivers and tidal waters enclosed

Dwarf goose (*Anser erythropus*)

Overwintering habitat: it inhabits both inland and coastal wetlands. In the Evros Delta, it feeds almost exclusively on natural grassland, with a variety of grasses, and less frequently on cultivated land, mainly winter cereals.

Competition: no competition with other, related species of wild goose has been observed.

Migration corridors: it does not follow clear corridors.

Main habitats that support the species:

- Wet meadows
- Standing fresh water
- Cultivated land
- Lagoons
- Salt marshes

Gissari (*Aythya ferina*)

The species maintains a small breeding population in Greece. It nests mainly in freshwater wetlands with rich, dense vegetation. It has a much wider distribution in winter, and also feeds on animal food (small crustaceans etc.) (Cramp 1997, Handrinos and Akriotis 1997).

In more detail:

Reproduction interest: Breeds in eutrophic wetlands (mainly lakes and freshwater marshes), with reedbeds or other dense vegetation, less frequently in coastal wetlands with brackish water. It nests on the ground among dense reeds at the margins of shallow waters (Cramp 1977, Handrinos and Akriotis 1997).

Food ecology: The gisari has a broad diet (plant and animal food).

Competition: no competition has been recorded in Greece.

Predation: Chicks of the species are likely to be preyed upon by birds of prey or carnivorous mammals.

Overwintering habitat: the species occurs in all types of wetlands, coastal and inland (Cramp 1977, Handrinos and Akriotis 1997).

Predation during hibernation: geese often become prey for birds of prey or carnivorous mammals, but mainly when they are injured (by hunters) or in cases of heavy winter.

Main habitats that support the species:

- Wet meadows
- Constant brackish and salt water
- Standing fresh water
- Partridge vegetation
- Artificial landscapes (aquatic)
- Lagoons
- Muddy and sandy fields in the tidal zone

Mallard (*Aythya nyroca*)

Local and unusual summer visitor, quite common during migration and very rare in winter. It nests in several wetlands of northern and central Greece, while the bulk of the breeding population in Greece is found in Amvrakikos. It is mainly found in freshwater wetlands with dense vegetation (reedbeds, etc.), both inland and coastal. An omnivorous species, it feeds mainly on plant food, but also on small invertebrates. During the migratory period, it is found in all types of wetlands, both in mainland Greece and on the islands, and often in coastal areas or on the open sea. Few individuals overwinter in southern Greece (Callaghan 1997, Handrinos and Akriotis 1997, Zogaris and Handrinos 2002).

In more detail:

Reproduction interest: Breeds mainly in inland wetlands (lakes and freshwater marshes), but also in coastal wetlands with a mosaic of reedbeds or other dense vegetation. It nests on the ground among dense reeds, at the margins of shallow waters or in floating vegetation (Cramp 1977, Callaghan 1997, Zogaris and Handrinos 2002).

Food ecology: It feeds in shallow waters with rich vegetation either on the surface or by diving at shallow depths (30-100 cm). It is an omnivorous species, although it probably prefers plant food (rhizomes, shoots, etc.), but also feeds on animal species (insect larvae, invertebrates, small molluscs, etc.).

Competition: does not appear to compete with other species.

Predation: Chicks are likely to be preyed upon by birds of prey or carnivorous mammals.

Wintering habitat: in winter it is found in breeding habitats, but is often observed in coastal wetlands (Handrinos and Akriotis 1997).

Migration habitat: similar to wintering habitats, but during migration it is often found on beaches, enclosed bays or in the open sea (Handrinos and Akriotis 1997).

Main habitats that support the species:

- Standing fresh water
- Partridge vegetation
- Lagoons

Crabapple (*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:

Reproduction interest: Nests in mixed colonies with other herons in reedbeds or trees and shrubs, isolated or on islands (Kazantzidis 2005).

Food 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 and 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 is found in small groups. Found in shallow estuarine waters and in coastal waters in general. It feeds in wet or dry meadows, marshes, bogs, swamps, seasonal 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 that support the species:

- Wet meadows
- Mesophilic meadows
- Constant brackish and salt water
- Standing fresh water

- ➢ Artificial landscapes (aquatic)
- ➢ Lagoons

Mustelid (*Chlidonias hybrida*)

The moustachioed glareola nests in Northern Greece mainly in Kerkini, Ismarida, Himaditida, Mikri Prespa and is a fairly widespread migrant. It nests exclusively in freshwater wetlands where it mainly feeds, while during the migration period it also uses coastal brackish or saline wetlands, crops and coastal waters.

In more detail:

<u>Reproduction interest</u>: Nests in loose colonies exclusively in freshwater wetlands, building the nest in water lilies (Nymphaea alba) or other floating vegetation (Trapa natans) in water 60-80 cm deep.

<u>Food ecology</u>: The species prefers freshwater marshes, inland lakes, rivers, fish farms, ponds, flooded salt marshes and stream banks. It feeds on terrestrial and aquatic insects, spiders, frogs and tadpoles, crustaceans, shrimps and small fish.

<u>Hunting</u>: hunting of eggs and chicks by terrestrial mammals (beavers, rats, skunks, ferrets, weasels, foxes, dogs, cats), silver gulls, predators and crows.

<u>Immigration issue</u>: During migration, the species uses freshwater habitats such as marshes, inland lakes, rivers, fish farms, ponds, flooded salt marshes and creek beds, but also brackish or saline wetlands in the coastal zone, as well as drier areas, grain crops and toastlands.

<u>Main habitats that support the species</u>:

- ➢ Acidophilic flat peatlands
- ➢ Constant brackish and salt water
- ➢ Standing fresh water
- ➢ Cultivated land
- ➢ Artificial landscapes (aquatic)
- ➢ Lagoons

Swan (*Cygnus olor*)

The species maintains a small breeding population, while the bulk of the breeding population of the species in Greece is nesting in Kastoria, where it was introduced at the end of the 60s. It mainly nests in freshwater wetlands with rich, dense vegetation.

It has a very wide distribution in winter, although the vast majority of the species is recorded mainly in Thrace and Eastern Macedonia, especially in the Evros Delta.

In more detail:

Reproduction interest: Breeds in eutrophic wetlands (mainly lakes and freshwater marshes), with reedbeds or other dense vegetation, less frequently in coastal wetlands with brackish water. They nest on the ground among dense reeds at the edges of shallow waters (Cramp 1997, Handrinos and Akriotis 1997).

Food ecology: The species is exclusively herbivorous (chicks also feed on animal food).

Competition: no competition has been recorded in Greece.

Overwintering habitat: the species occurs in all types of wetlands, coastal and inland (Cramp 1977, Handrinos and Akriotis 1997).

Main habitats that support the species:

- Wet meadows
- Constant brackish and salt water
- Standing fresh water
- Partridge vegetation
- Artificial landscapes (aquatic)
- Lagoons
- Muddy and sandy fields in the tidal zone
- Salt marshes
- Tidal zone of rivers and tidal waters enclosed

Salamander (*Fulica atra*)

It breeds in many coastal and inland wetlands in almost all of mainland Greece (mainly in Northern and Central Greece) and on some large islands. In winter, the population of the species increases significantly from individuals from more northerly countries. Its distribution and population levels in winter depend on weather conditions (Kazantzidis and Noidou 2008).

The phalarope nest in both coastal (lagoons, river deltas, etc.) and inland (freshwater lakes, etc.) habitats and is a herbivorous species (Cramp 1977; Cramp 1980; Handrinos and Akriotis 1997).

In more detail

Reproduction interest: The species breeds in all types of wetlands, both coastal and inland. It nests in habitats with shallow water and dense vegetation (reedbeds, etc.) (Cramp 1977, Cramp 1980, Handrinos and Akriotis 1997).
Food ecology: The phalarope is predominantly a herbivorous species (Cramp 1977, Cramp 1980, Handrinos and Akriotis 1997). It feeds in shallow water areas, in inland or coastal wetlands, in wet meadows, among dense vegetation (Handrinos and Akriotis 1997).
Prey: Often the chicks become slick for birds of prey and carnivorous mammals.
Main habitats that support the species:

- Wet meadows
- Rivers and streams
- Constant brackish water
- Constant brackish and salt water
- Standing fresh water
- Partridge vegetation
- Cultivated vegetation
- Cultivated land
- Artificial landscapes (aquatic)
- Lagoons
- Muddy and sandy fields in the tidal zone
- Salt marshes

Dwarf gull (***Hydrocoloeus minutus***)

Critical habitats for the species are coastal wetland systems and inland lakes during the migration period and the open sea during the wintering and migration period. Studies suggest that the species uses specific marine feeding grounds associated with hydrographic fronts that create high food availability in these areas.

In more detail:

Overwintering habitat: part of the Western Palearctic population gradually disperses south and west, often along rivers, to winter in the Mediterranean. During the winter period the species feeds on zooplankton, small fish and marine invertebrates, mainly by natural predation - few observations show the species approaching fishing vessels (Schwemmer and Stefan 2006).

Competition: the species typically feeds in small groups with other species of terns or larger gulls. It benefits from the small prey that often becomes available during the feeding of larger species, and prey selection and different capture techniques reduce interspecific competition (Schwemmer and Stefan 2006).

Migration corridors: large populations have been recorded passing through the Dardanelles in August-September, but comparable numbers have not been recorded in the Aegean (Handrinos and Akriotis 1997), perhaps because the birds disperse. There is also an observation of a few thousand in the western Corinthian Sea in December 1988 (Handrinos and Akriotis 1997) suggesting that the passage of birds to Greece lasts for a long period of time. From long-term observations in Germany (Schwemmer and Stefan 2006) under a variety of meteorological conditions, the species seems to migrate very rapidly while using specific sites as main feeding areas. These areas seem to be closely linked to hydrographic fronts and surface foam that collect large amounts of food (zooplankton and drowned insects). It is suggested that, at least during the spring migration, there may also be specific feeding stations in Greece on the high seas, which are extremely important habitats for a long-distance migrant such as the loon.

Main habitats that support the species:

- Constant brackish and salt water
- Standing fresh water
- Open sea

Cephalopod (*Oxyura leucocephala)*

A more widespread species in the past, today it overwinters almost exclusively in the Vistonida River and in a few other wetlands of Thrace, Eastern and Central Macedonia, as well as in Lesvos. It shows a preference for coastal, shallow wetlands with riparian vegetation (lagoons, etc.) and rarely in freshwater lakes. It feeds on benthic microorganisms, but also on plant food (Handrinos 1995, Handrinos and Akriotis 1997).

In more detail:

Overwintering habitat: it winters mainly in coastal and less frequently in inland wetlands. It prefers eutrophic - mesotrophic waters, usually shallow with epiphytic and riparian vegetation (Cramp 1977, Handrinos and Akriotis 1997, Hughes et al. 2006).

In L. Vistonida it was found to feed on benthic microorganisms (polychaetes, larvae of Chironomidae, etc.) but also on plant food.

Competition: not recorded in Greece. The species has occasionally been observed in mixed flocks with other ducks (mainly *Aythya*) and ducklings (*Fulica atra*) (Handrinos and Akriotis 1997).

Main habitats that support the species:

- Constant brackish and salt water
- Lagoons
- Salt marshes

Fish cock (*Plegadis falcinellus*)

The species nests in some large wetlands of Northern and Western Greece in fresh waters 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:

Reproduction interest: Nests in freshwater wetlands with dense aquatic vegetation and reedbeds. It 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.

Food 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 frequently in estuarine waters, salt marshes and coastal lagoons. It feeds in very shallow waters mainly on aquatic insects and larvae, leeches, worms, crustaceans and to a lesser extent on fish, reptiles and amphibians or even bird chicks.

Migratory interest: 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 that support the species:

- Alluvial and hydric forests
- Wet meadows
- Standing fresh water

Crypto chickadee (*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:

<u>Reproduction interest</u>: 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),

<u>Food ecology</u>: It feeds in solitary cover or in small schools in stagnant freshwater, especially small lakes, canals, ditches, etc., with intensive aquatic vegetation. It feeds on insects, amphibians (frogs), spiders, grasshoppers, butterflies, snails and fish (Hancock and Kushlan 1984).

<u>Competition</u>: interspecific competition between heron species has been recorded mainly in foraging areas and 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).

<u>Predation</u>: these and chicks are preyed upon by corals.

<u>Immigration issue</u>: During migration it can also 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).

<u>Refuelling and resting stations and migration corridors</u>: the species migrates in small flocks, on a wide front and can be observed, in suitable habitats, throughout the mainland and on islands, mainly in the coastal zone.

<u>Main habitats that support the species</u>:

- Alluvial and hydric forests
- Wet meadows
- Mesophilic meadows
- Standing fresh water
- Partridge vegetation
- Artificial landscapes (aquatic)

Microgalliandra (*Calandrella brachydactyla*)

The species prefers open areas with bare, sandy or rocky soil in the presence of sparse vegetation, as well as areas with alophytes or low-intensity crops (Handrinos and Akriotis 1997). The density of pairs in suitable habitats ranges from 2 to 5 pairs per hectare, and aggregations of 10 to 20 pairs in one area are quite common (Cramp 1998).

In more detail:

Reproduction interest: The species builds its nest on the ground, usually under or near low vegetation (Cramp 1998). Nest site selection is based on two conflicting patterns. The first relates to the necessity of covering or shading the nest from the sun's rays, which aids optimal rearing of the young and leads to the selection of sites under vegetation. The second relates to the selection of open sites, to avoid nest predation and to allow better adult surveillance of the site (Yanes et al. 1996). The rate of nest predation is particularly high, ranging from 70% to 95%, and is mainly from mammals (e.g.e.g., foxes, cats or dogs) (Suarez, et al. 1993). The species prefers open habitats with bare, sandy or rocky soil in the presence of sparse vegetation, as well as areas with alfalfa or low-intensity crops (Handrinos and Akriotis 1997; Tucker and Heath 1994; Serano and Astrain 2005).

Food ecology: It feeds primarily on insects and fruits during the breeding season, and on fruits the rest of the year (Cramp 1998). It collects its food from the ground, and has been observed feeding on low shrubs (Cramp 1998). Insect availability influences the choice of foraging habitat, and the species usually avoids intensive crops where extensive use of agrochemicals is made (Tucker and Heath).

Main habitats that support the species:

- Dry, siliceous grasslands
- Mesophilic meadows
- Steppes and dry calcareous grasslands
- Cultivated land
- Sand dunes and sandy beaches

Silver pelican (*Pelecanus crispus*)

The main part of the breeding population of the 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:

Reproduction interest: 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).

Food 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 that support the species:

- Constant brackish and salt water
- Standing fresh water
- Partridge vegetation
- Artificial landscapes (aquatic)
- Lagoons
- Muddy and sandy fields in the tidal zone
- Salt marshes

Cinderella (*Lanius minor*)

The species uses habitats that include grasslands and pastures with scattered shrubs and trees, arable land and bare ground. Its diet consists almost exclusively of insects, and low vegetation is essential for locating them. It nests in trees in small breeding groups.

In more detail:

Reproduction interest: The species nests almost exclusively in trees, usually forming small groups of 2-10 pairs (Cramp and Perrins 1993; Tucker and Heath 1994). The type of tree in which the nest is formed depends on the cover provided by the foliage (Wirtisch et al. 2001).

Food ecology: The species feeds almost exclusively on insects (mainly beetles and grasshoppers), using supers from one to six meters high. It uses open warm areas with scattered low shrubs and few trees, grasslands, croplands, vineyards and bare ground (Cramp and Perrins 1993; Tucker and Heath 1994; Guerrieri et al. 1995; Isenmann and Debout 2000; Lepley et al. 2004). The most important habitat type appears to be low vegetation grasslands and bare soils. The critical factor for habitat selection is access to food (insects) (Wirtitsch et al. 2001). The species does not store food and is therefore vulnerable to prolonged periods of cold or rain (Tucker and Heath 1994; Valera et al. 2001).

Competition: population reproductive density has a negative correlation with reproductive timing (Kristin et al. 2008).

Predation: Chicks of this species are often preyed upon by coracoids (e.g., magpies) (Kristin et al. 2000).

Migration habitat: broadly the same habitats are used as in the breeding season.

Refuelling and rest stations: it uses islands and islets in the Aegean as rest stations. It is a frequent prey of black-legged kittiwakes during the autumn migration (Ristow et al. 1986).

Main habitats that support the species:

- Habitat of the forest boundaries
- Hardwood bushes, garrigue and maquis
- Dry, siliceous grasslands
- Mesophilic meadows
- Steppes and dry calcareous grasslands

Black-headed gull (*Larus melanocephalus*)

The species breeds on islands of coastal lagoons and wetlands in northern Greece, overwinters in good numbers in the coastal zone in the Aegean and Ionian seas and migrates along the Aegean coast.

In more detail:

Reproduction interest: The species breeds in dense colonies in coastal lagoons and salt ponds or salt marshes. Typical habitat is islands with low vegetation of alophytic or sandy species, preferably 50-70% vegetation cover (Fasola et al 1993)

Food ecology: The species often feeds on insects (terrestrial arthropods) and even grains in fields, meadows and the sea (Drettakis and Papakonstantinou, 2008).

Competition: according to data from the Evros delta, a correlation has been observed in breeding colonies with nesting *Sterna nilotica* and *Sterna hirundo* (Fasola et al 1993).

Predation: Reported predation of eggs and chicks in breeding colonies by *Larus michachellis* (Karauz et al. 2000)

Wintering habitat: The bulk of the population winters in the Mediterranean (Monbailliu, 2009). In winter the species is attached to the marine environment, common in the coastal zone and avoids wetlands. It feeds superficially in the sea or in large shoals on the coast, also following trawls (Drettakis and Papakonstantinou 2008).

Migration interval: migrates along the Aegean coast from mid-February to the end of May, while large shoals are rarely encountered in autumn as migration is gradual from early July to early October (Handrinos and Akriotis 1997).

Refuelling and rest stations: There are fin-change stations in various coastal wetlands and harbours between early July and September which are poorly known and have not been studied.

Main habitats that support the species:

- Open sea
- Sea coves and coastal formations
- Artificial landscapes (aquatic)
- Lagoons

Microchicken (*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 freshwater, 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:

Reproduction interest: The species prefers freshwater wetlands, marshes, lakes always with dense vegetation of tall reeds and trees such as willows. It nests solitarily but in optimal areas several nests can 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).
Food ecology: Prefers freshwater marshes and swamps with dense vegetation of reeds, shrubs and trees. It feeds solitarily, 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 recorded mainly in foraging areas and 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 kinds 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: the species migrates over a wide front and can be seen throughout the mainland and islands.
Main habitats that support the species:

- Standing fresh water
- Artificial landscapes (aquatic)

Cormorant (*Phalacrocorax carbo*)

An epidemic species, with an almost similar distribution both during the breeding and wintering period. The breeding and wintering population of the cormorant in Greece has been increasing in recent years. The species breeds and winters in both inland and coastal wetlands, nesting in colonies in trees, often together with herons, etc., and feeding on fish. The large increase in the breeding population of cormorants is already creating serious problems of competition with the langoustine for nesting sites, especially in Lake Kerkini (Handrinos and Akriotis 1997, Kazanzidis and Koutrakis 2007).

In more detail:

Reproduction interest: The species breeds both in coastal (lagoons, river deltas, etc.) and inland (freshwater lakes, etc.) wetlands. It nests in colonies, often with various species of heronry, in stands of water-loving trees (willows, poplars, tamarisk, etc.) (Cramp 1997, Handrinos and Akriotis 1997).

Food ecology: The species feeds on fish (Cramp 1997; Handrinos and Akriotis 1997).

Competition: in recent years the large increase in the population of cormorants has created problems of lack of nesting sites for langoustines, especially in Lake Kerkini, where the majority of the cormorant population in Greece breeds. In the same lake, and perhaps elsewhere, there are also likely to be problems of competition for food with silver pelicans.

Wintering habitats: in winter the species is found in many types of wetlands, both inland and coastal, natural or artificial. However, the cormorant prefers open water areas (often found in the sea) and roosts on rocky islets (Cramp 1997, Handrinos and Akriotis 1997).

Competition: Locally, there is likely to be a problem of competition with silver pelicans for food resources.

Main habitats that support the species:

- Rivers and streams
- Constant brackish and salt water
- Standing fresh water
- Partridge vegetation
- Rocky columns and islands
- Artificial landscapes (aquatic)
- Lagoons

Chuliar myrtle (*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:

Reproduction interest: The species nests in extensive shallow (up to 30 cm) fresh brackish or saltwater wetlands with 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.

Food 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 that support the species:

- Alluvial and hydric forests
- Wet meadows
- Standing fresh water
- Partridge vegetation
- Artificial landscapes (aquatic)
- Muddy and sandy fields in the tidal zone
- Tidal zone of rivers and tidal waters enclosed

Leptomycete (*Numenius tenuirostris*)

Extremely rare species all over the world, it has been recorded in Greece 117 times. The last sighting was in 2001 (Evros Delta). Most records come from coastal wetlands (mainly in the Evros Delta and Porto Lagos) and mainly during spring migration. It is usually found in lagoons, salt marshes, mudflats, muddy shores, etc.; less frequently in inland wetlands (lakes, wet meadows, etc.).

Main habitats that support the species:

- Wet meadows
- Constant brackish and salt water
- Standing fresh water
- Lagoons
- Salt water

White-throated stork (*Ciconia ciconia*)

The species breeds mainly in Northern Greece, in the countryside and in urban areas near the 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 crops 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:

Reproduction interest: 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.

Food ecology: It feeds solitarily or in shoals 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 interchange and refuelling and rest stations: During migration, the species is found in open areas with shallow standing water, lagoons, ponds, reservoirs, gullies, swamps, floodplains, wet grasslands, and croplands. 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 upwelling currents over the continents, so it avoids open sea areas and is restricted 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 meadows
- Standing fresh water
- Cultivated land
- Other urban and industrial areas
- Urban parks and gardens
- Artificial landscapes (aquatic)

Phoenicopterus *roseus* (*Phoenicopterus roseus*)

Breeding attempts of the species have been started since the 1990s in various areas of the country, but to date no successful breeding has been confirmed in Greece, probably due to disturbance at the breeding sites. Since the late 1980s, wintering and migratory numbers and the distribution of the species in Greece have increased and today the species is considered a numerous winter visitor and widespread migrant. It is a nomadic species that makes irregular and unpredictable movements depending on habitat availability and food abundance, always having a clear preference for shallow salt lakes, lagoons and salt ponds.

In more detail:

<u>Reproduction interest</u>: Breeding attempts of the species have been initiated since the 1990s in various areas of the country, e.g. Porto Lagos, Aliki Kitros, Alykes Kallonis (Handrinos and Akriotis 1997). To date, no successful breeding of the species has been confirmed in Greece. Among other factors that may be responsible is disturbance at breeding sites.

<u>Wintering habitat</u>: the palm wing is a nomadic species that makes irregular and unpredictable movements depending on habitat availability and food abundance. It prefers shallow (up to 1 m) eutrophic wetlands such as salt ponds, lagoons, shallow bays and salt marshes with pH up to 11. It can also be found in freshwater lakes when they have increased alkalinity due to degradation (as in the case of Koronia), as well as in biological waste treatment ponds and deltas. It visits sites with clean freshwater. Their diet in the Mediterranean includes basically Artemia salina, larvae from Chironomidae, amphipods and diatoms. The species is highly social, feeding and roosting in large shoals.

<u>Immigration issue</u>: During migration it occurs in shallow (up to 1 m) eutrophic wetlands such as salt lakes, lagoons and salt ponds with pH up to 11, but also in brackish habitats, freshwater lakes and seasonal lakes and lagoons on islands.

<u>Main habitats that support the species</u>:

- Constant brackish and salt water
- Artificial landscapes (aquatic)
- Lagoons

Black-bellied sea otter (*Podiceps nigricollis*)

Reproduction interest: The species shows a clear preference for freshwater wetlands (natural or artificial). They nest in eutrophic (mainly) shallow-water ponds with dense epiphytic and riparian vegetation (reeds, fishponds, etc.). They build their nests at the water's edge, among the dense vegetation or by constructing floating nests of grass. Occasionally, it forms loose colonies or nests on the edges of gull or tern colonies (Cramp 1977; Handrinos and Akriotis 1997).

Food ecology: Feeds exclusively on animal food (small arthropods and small fish) (Cramp 1977, Handrinos and Akriotis 1997).

Competition: not recorded in Greece.

Overwintering habitat: it inhabits all types of wetlands, natural or artificial. Large numbers of black-bellied starfish are often observed in shallow marine areas, even in harbours (Handrinos and Akriotis 1997).

Hunting: often hunted mainly by birds of prey.

Main habitats that support the species:

- Rivers and streams
- Constant brackish and salt water
- Standing fresh water
- Partridge vegetation
- Artificial landscapes (aquatic)
- Lagoons
- Muddy and sandy fields in the tidal zone
- Tidal zone of rivers and tidal waters enclosed

Myxos (*Puffinus yelkouan*)

The main factor for the species is the availability of suitable nesting sites in the absence of predators from their colony islands. The abundance of food resources in the wider breeding and nesting area is not so critical since the species travels long distances from their colonies to catch their food.

In more detail:

Reproduction interest: The species nests in deep cavities or rock crevices and often uses rabbit burrows which it improves by digging. The species prefers to nest in wet locations and near the shoreline of islands (Cramp and Simmons 1980; Tucker and Heath 1994).

Food ecology: They feed both day and night on the open sea or on the shorelines of the islands where they nest. Its diet consists mainly of foam fish, cephalopods and crustaceans which it captures near the water surface or by diving (Navaro et al. 2007, Petry et al. 2009).

Predation: the main predator of the species is rats (and cats), which feed on the eggs and chicks, at least during the first weeks of life (Bonnaud et al. 2009).

Migration corridors: the eastern Aegean is considered a migration corridor for the species during its movement towards the Black Sea.

Main habitats that support ∑⇓™|∫:

- Open sea
- Rocky columns and islands

Lesser rhinoceros (*Sternula albifrons*)

The species has a wide breeding distribution with colonies in most coastal wetlands from the Kotychi Lagoon to the Evros Delta and on several large islands. It nests on islands or extensive salt marshes, bare of vegetation and safe from predators and disturbance.

In more detail:

Reproduction interest: The species nests in small loose colonies in nesting habitats that meet the following conditions: a) nearly free from predators and human disturbance; b) bare or nearly bare (less than 15% cover) of vegetation, with gravel, sandy or shell fragments; and c) within 2-3 km of areas of shallow water, mainly lagoons or reservoirs, with fish or crustaceans abundant near the surface.

These conditions are found either on small islands or in extensive salt flats. or on coasts that meet the above conditions (Fasola 1993) and within 3 km of feeding areas. In Greece, these sites are often located on the bottom of seasonally flooded areas such as salt marshes, salt marshes and wet meadows.

Food ecology: Feeds solitarily or in small groups mainly in lagoons and brackish, saltwater lagoons, sparsely on the shore or in fresh or brackish water channels (Fasola 1993). Its diet consists mainly of small fish, crustaceans, insects, worms and molluscs.

Competition: there is competition for nesting sites from the silvery plover and river plover.

Hunting: hunting of eggs and chicks by terrestrial mammals (rats, skunks, ferrets, weasels, foxes, dogs, cats, hedgehogs), silver gulls, predators and crows. and reptiles (lapwing).

Main habitats that support the species:

- Constant brackish and salt water
- Sea coves and coastal formations
- Artificial landscapes (aquatic)
- Lagoons
- Muddy and sandy fields in the tidal zone

Common Duck (*Tadorna ferruginea*)

An epidemic species with a relatively small breeding population in Greece and a local, fragmented distribution, mainly in northeastern Greece. The species shows a more irregular distribution in winter or during the migratory period (Handrinos and Akriotis 1997).

In more detail:

Reproduction interest: The species breeds in coastal wetlands such as lagoons, grasslands, mudflats, salt marshes, etc., very rarely in freshwater wetlands. It nests in holes, earthworks and hollows, sometimes on rocks (Cramp 1977, Handrinos and Akriotis 1997).

Food ecology: The species feeds in shallow, brackish or salt water, lagoons, mudflats, grasslands, etc. Very rarely in freshwater habitats. It feeds mainly on small molluscs, crustaceans, insect larvae, but also on plant food found in shallow waters, mudflats, etc. (Cramp 1977, Handrinos and Akriotis 1997).

Predation: Chicks are often preyed upon by carnivorous mammals (foxes, jackals, etc.)

Hunting during migration: protected species, but subject to poaching.

Main habitats that support the species:

- Constant brackish and salt water
- Standing fresh water
- Artificial landscapes (aquatic)
- Lagoons
- Muddy and sandy fields in the tidal zone
- Salt marshes
- Sand dunes and sandy beaches

- Tidal zone of rivers and tidal waters enclosed

Barbara (*Tadorna tadorna*)

An epidemic species with a relatively small breeding population in Greece and a local, fragmented distribution, mainly in the north-east. Greece and the islands of Lemnos and Lesvos. It is mainly found in coastal wetlands with lagoons, salt marshes and extensive mudflats where it feeds. Rarer in freshwater wetlands. The population of the species increases significantly in winter.

In more detail:

Reproduction interest: The species breeds in coastal wetlands, with lagoons, alpine meadows, mudflats, salt marshes, etc., very rarely freshwater wetlands. It nests in holes, earthworks and hollows, sometimes on rocks (Cramp 1977, Handrinos and Akriotis 1997).

Food ecology: The species feeds in shallow, brackish or salt water, lagoons, mudflats, grasslands, etc. Much rarer in freshwater habitats and generally frequent in drier areas with grasslands, etc. It feeds mainly on small molluscs, crustaceans, insect larvae, but also on plant food found in shallow water, mudflats, etc. (Cramp 1977, Handrinos and Akriotis 1997).

Predation: Chicks are often preyed upon by carnivorous mammals (foxes, jackals, etc.). The species is protected but is often poached.

Main habitats that support the species:

- Constant brackish and salt water
- Standing fresh water
- Artificial landscapes (aquatic)
- Lagoons
- Muddy and sandy fields in the tidal zone
- Salt marshes
- Sand dunes and sandy beaches
- Tidal floodplain and tidal water enclosures

Nano-butterfly (*Tachybaptus ruficollis*)

A common and widely, though rather locally, distributed species in Greece. During the winter period it is found in almost all of mainland Greece and on several large islands, in all types of wetlands, inland or coastal.

In more detail:

Reproduction interest: The species shows a clear preference for freshwater wetlands (natural or artificial). It nests in eutrophic (mainly) shallow-water ponds with dense epiphytic and riparian vegetation (reedbeds, etc.). It builds its nest at the water's edge, among dense vegetation or constructs floating nests from grass (Cramp 1977, Handrinos and Akriotis 1997).

Food ecology: Feeds exclusively on animal food (small orthopods, tadpoles and small fish) (Cramp 1977; Handrinos and Akriotis 1997).

Predation: Chicks are often preyed upon by birds of prey, carnivorous mammals or fish such as turkey (*Essox lucius*).

Main habitats that support the species:

- Rivers and streams
- Constant brackish and salt water
- Standing fresh water
- Partridge vegetation
- Artificial landscapes (aquatic)
- Lagoons
- Muddy and sandy fields in the tidal zone

Spiny-tailed dolphin (*Vanellus spinosus*)

The species maintains a breeding population of 20-50 pairs from Keramoti to the Evros Delta and individual pairs in the Axios-Aliakmon Delta. It is a rare transient visitor in eastern and island Greece and Crete.

In more detail:

Reproduction interest: Nests exclusively in open flat areas of wetlands with minimal vegetation, salt marshes, sandy areas, heathlands, dry banks, etc. (Chandrinos 1992).

Food ecology: Feeds on a wide variety of insects and other small invertebrates, in mudflats and at the edges of wetlands.

Predation: hunting of eggs and chicks by terrestrial mammals (rats, ferrets, ferrets, skunks, foxes, dogs, cats), the silver glider, predators and crows.

Immigration issue: During migration the species occurs solitary or in very small groups in mudflats and heathlands near freshwater marshes, salt marshes, lagoons, lakes, rivers, flooded meadows and salt ponds.

Main habitats that support the species:

- Constant brackish and salt water
- Standing fresh water

Stone turtle (*Burhinus oedicnemus*)

The species nests on sandy or stony ground, in open areas with little vegetation. The presence of low vegetation and bare ground sites, low disturbance from human activities, low predation pressure and the application of grazing on grasslands are important factors that positively influence the species' welfare. Its diet consists mainly of insects and invertebrates.

In more detail:

Reproduction interest: The species nests on sandy or rocky soil in open areas with little vegetation (Cramp 1998). Although in Greece the species is found in large coastal wetlands (sand dunes, alophytes) (Handrinos and Akriotis 1997), it also nests in other habitats such as open olive groves (e.g. Crete), topsoil (e.g. Lesvos), agricultural fields and meadows (e.g. Lemnos). The presence of low vegetation and bare ground sites, low disturbance from human activities, low predation pressure and the application of grazing in grasslands are important factors that positively influence nest site selection (Thompson et al. 2004, Bealey et al. 1999, Green et al. 2000). The population of Lemnos is the most numerous and dense, with an estimated 350-450 pairs breeding on the island. The lack of predators (mammals such as foxes, ferrets, weasels, etc.), the alternation of low-intensity agricultural fields with meadows and areas with topsoil and the intensive grazing of these areas by the wild rabbit create a suitable habitat for the breeding of the species on Lemnos (EEA, 2008). In other areas the species breeds in open areas in places with sparse vegetation (e.g. herbaceous, toadstools, etc.) and has higher densities in natural meadows than in cultivated areas (Green et al. 2000) (with the possible exception of open olive groves in Crete). Territory size averages 30 ha (Green et al. 2000).

Food ecology: The species feeds, mainly in the evening hours, on the ground with invertebrates, insects, etc. (Cramp 1998). The species prefers open areas such as grasslands, dunes and low-intensity crops, as these are particularly rich areas for insects and invertebrates (Giannangeli et al. 2005).

Competition: the population of the species is positively related to the abundance of the wild rabbit. This relationship stems from the species' preference for open areas, with low vegetation, presence of rocky soil, created by grazing and burrows of wild rabbits (Bealey et al. 1999).

Hunting: the species avoids areas with high populations of predators such as foxes. Predation of nests during the rearing stage is an important parameter for the viability of a population in an area (Bealey et al. 1999, Barros and De Juana 1997).

Main habitats that support the species:

- Dry, siliceous grasslands
- Steppes and dry calcareous grasslands
- Sand dunes and sandy areas

The species ***Aegolius funereus*** **is** not mentioned in the above deliverable. The main characteristics of this species, as well as its ecological requirements, have been reported in section 5, in the relevant subsection required.

Subsequently, 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 characterization of the Special Protection Areas of avifauna (Dimalexis 2009), prepared by the Ministry of Environment and Spatial Planning - D / Department of Environmental Planning Department of Natural Environment Management . Table 20 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 20. Categorisation of species of interest into groups according to their ecological requirements.

Category	Kind of
Large predators	*Neophron percnopterus, Buteo rufinus, Gyps fulvus, Haliaaetus albicilla, Hieraaetus pennatus, Aquila chrysaetos, Circaetus gallicus, Clanga pomarina, Accipiter brevipes, Pernis apivorus*
Herodians - Pelican shapes	*Ciconia nigra, Microcarbo pygmaeus, Ciconia ciconia, Phalacrocorax carbo, Ardeola ralloides, Ardea alba, Ixobrychus minutus, Pelecanus crispus, Platalea leucorodia, Plegadis falcinellus*
Cranes	*Falco naumanni, Falco peregrinus, Falco columbarius*
Seabirds	*Puffinus yelkouan*
Glamorous	*Sternula albifrons, Chlidonias hybrida, Larus melanocephalus, Hydrocoloeus minutus*
Paridatia	*Numenius tenuirostris, Phoenicopterus roseus, Vanullus spinosus*
Aquatic	*Cygnus olor, Answer erythropus, Mareca penelope, Aythya ferina, Aythya nyroca, Podiceps nigricollis, Oxyura*

	leucocephala, Tachybaptus ruficollis, Tadorna ferruginea, Tadorna tadorna
Nocturnal	*Aegolius funereus, Bubo bubo*
Interforestry	*Dendrocopos syriacus, Ficedula semitorquata*
Types of agro-pasture ecosystems	*Emberiza hortulana, Lanius minor, Calandrella brachydactyla, Burhinus oedicnemus*

Large predators

In this category, the most used habitats include both open and forested 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

Herodians and Pelicans

This category includes herons, storks, pelicans etc. A common characteristic of the majority of these species, apart from their direct association with the aquatic element, is the fact 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.

Interforestry

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.

Types of agro-pasture ecosystems

This category includes species endemic to open areas (typical Mediterranean landscape species (macaws and toadflaxes) such as *Lanius sp.)* Also included are agricultural species as well as those of alpine grasslands. The main habitats for species in this category are cultivated land, grasslands (mesophilic, dry, alpine), areas with topsoil and long vegetation, scrubland, inland foothills, etc. Most species nest on the ground or in bushes, and this category also includes swallows and ash trees, which use buildings for nesting. The food of these species includes insects, seeds and fruits.

Cranes

Hawks use open areas such as grasslands, scrubland and farmland for feeding. Rocky slopes are their main foraging 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 forested 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.

Aquatic

This is a large category of birds, which includes geese, ducks, ducklings, diving ducks and birds. All these species depend on the aquatic environment and nest mainly in riparian vegetation. They feed in fresh and salt standing water, lagoons, salt marshes, salt marshes, salt marshes, mudflats, salt marshes, salt marshes, etc. with aquatic plant matter, invertebrates, etc. Geese (Answer sp and Branta ruficollis) also feed in wet meadows, but also on arable land. In general, species of this group prefer deeper and more open areas with less vegetation than wading birds and herons. In addition, many duck and goose species of this group visit Greece for wintering.

Glamorous

This category includes gull and tern species. These are species that always breed near water, mainly in coastal environments. The main breeding and feeding habitats include lagoons, stagnant fresh and salt water, salt marshes, bays, etc. They breed in colonies and feed mainly on fish.

Seabirds

This category includes five bird species that are directly linked to the marine environment. These species breed on steep rocky shores on islands and islets in the Aegean and June seas. With the exception of sea crows (*Phalacrocorax aristotelis*), the other species breed in colonies. All species of the category are exclusively piscivorous.

<u>Paridatia</u>

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.

With regard to the species of interest listed in Annex II of Directive 92/43/EEC of the adjacent Bulgarian SPA BG0001032 under study, their ecological requirements have been fully analysed in a previous section of this Special Ecological Assessment, in the relevant subsection required.

The conservation status of the above species and habitat types at national and European level

They have been reported in the respective chapters.

Threats and risks of degradation, destruction or nuisance

This study area does not belong to the Natura 2000 network sites of the EEZ-TCA network and there is no requirement, according to the EIA specifications, for further analysis of habitat types. With regard to the Natura 2000 network sites ZEP GR1130012 (within which the project under study is located) and GR1130010, the threats to the species of interest 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, The threats to the species of interest are then analysed according to 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, Forestry, Environment and

Water Management of the Republic of Cyprus.Environmental Planning Department - Environmental Planning Division, Natural Environment Management Department.

Balkan woodpecker (*Dendrocopos syriacus*)

Threats to breeding habitat: The main threats to the species are related to degradation/loss of critical habitat. This degradation is mainly based on the intensification of forestry with the logging of mature forest stands degrading the species' nesting habitat by reducing the number of suitable trees available (Tucker and Heath 1994). Also, the gradual decline of traditional livestock farming in agroforestry areas is leading to the deforestation of grasslands and clearings, which are important foraging habitats for the species. At the same time, the abandonment and replacement of tree crops (e.g. almond, walnut, mulberry) with other types of crops, and the destruction of stream vegetation in rural landscapes e.g. willows, poplars, greatly reduce the heterogeneity of the topiary, which is required for the establishment of colonies (Tucker and Heath 1994).

Corydalis (*Emberiza hortulana*)

Threats to breeding habitat: Habitat loss due to agricultural intensification and homogenization of rural landscapes is a major threat to the species (Fonderflick et al. 2005, Vepsäläinen et al. 2005). Alteration of natural vegetation, shrubs and logging of forest islands in rural areas and grasslands are agricultural practices that threaten the species (Berg 2008). Serious threats to the species, especially in mountainous areas, is the long-term abandonment of crops (mainly cereals) and the gradual decline of traditional livestock farming, processes that are accelerating the gradual conversion of open land into forests. Finally, residential development may be a factor in the decline of the species' populations at local scales (Tucker and Heath 1994).

Oak woodpecker (*Ficedula semitorquata*)

Threats to breeding habitat: The main threats to the species are related to degradation/loss of critical habitat. This degradation is mainly based on the intensification of forestry, with the felling of mature forest stands and the taking of dead standing trees, threatening the species at the spatial level of its territory. In addition, the construction of forest roads along the streams is altering its habitat. At the spatial level of the landscape, a serious threat is the gradual reduction of the total biomass, particularly of mature forests, through logging operations. In addition, clear-cutting of deciduous forests and the establishment of conifer plantations in them leads to a loss of habitat.

Cinderella (*Lanius minor*)

The main threats to the species are the degradation/loss of critical habitat.

In more detail:

Threats to breeding habitat: The main threats to the species are related to the degradation or loss of critical habitat. Thus, the intensification of agriculture reinforces monocultures, destroying the mosaic of crops and tree stands. Also, the extensive use of pesticides and fertilizers reduces insect populations. Finally, land abandonment and undergrazing lead to the afforestation of open areas, negatively affecting the foraging of the species (Tucker and Heath 1994).

Langonia (*Microcarbo pygmaeus*)

Threats to breeding habitat**:** The species is already showing negative trends, especially 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.

Shark (*Accipiter brevipes*)

Logging of mature trees and destruction of riparian ecosystems, forest fires and intensification of agriculture negatively affect the species.

In detail:

Threats to breeding habitat: Forest destruction and the absence of suitable trees for nesting are the main threats to breeding (Newton 1979).

Threats to foraging habitat: Intensification of agriculture 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).

Wasp (*Pernis apivorus*)

The destruction of mature trees, intra-forest interspaces and the extensive use of insecticides are the main threats facing the species. Also, direct killing by humans during migration is a threat to the species.

In more detail:

Threats to breeding habitat: Forest destruction 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 the foraging habitat of the species are deforestation of clearings and destruction of key food species due to extensive use of insecticides

Black stork (*Ciconia nigra*)

A critical factor is the degradation of the species' nesting habitats 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 include the 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).

Golden eagle (*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., the abandonment of upland crops), and the overexploitation of certain 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.

Direct threats: The main threats to the species are poaching (especially in Crete where for this reason immature individuals are observed in 1/3 of the pairs), while in mainland Greece the uncontrolled and illegal use of poisoned baits for the control of "harmful" carnivorous mammals.

Crane eagle (*Clanga pomarina*)

The destruction of mature trees and the degradation and shrinkage of wetlands are the main causes of the species' population decline.

In more detail:

Threats to breeding habitat: The species is mainly threatened by deforestation and the destruction of mature trees in lowland areas. Also, disturbance due to human activities in lowland forests results 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.

Common Eagle (*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 areas (Martinez et al. 2006).

Snake eagle (*Circaetus gallicus*)

Habitat destruction and abandonment of traditional land use are the main threats to the species.

In more detail:

Threats to breeding habitat: Destruction of mature forests, fires and disturbance due to forest road construction, 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 farming, and intensification of agriculture are the main threats to the species' hunting habitat. Also, the use of insecticides and pesticides reduce the availability of its food.

Direct threats: Poaching is an additional threat, especially during the migration season.

White-throated stork (*Ciconia ciconia*)

Threats to foraging 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 threatened by the placement of poisoned baits for "noxious" mammals and by bumping into power lines or telephones, especially during the migration period.

Sea eagle (*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, pesticide use has negative effects on the species' reproductive success, 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: Leadening from eating injured or dead game species are some of the main causes of additional mortality of the species.

Egyptian vulture (*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 the reproductive success of pairs nesting on low cliffs (Ceballos and Donazar 1989; Tucker and Heath 1994).

Threats to foraging habitat: The intensification of livestock farming 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).

Direct threats: Direct killing by humans and the use of poisons to control pests are considered among the main causes of species decline. The second threat is consistently present throughout its distribution range and is the leading 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).

Eagle Heron (*Buteo rufinus*)

Residential and tourism development as well as land use changes in grasslands and dry grasslands 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 sites.

Threats to foraging habitat: Destruction of forest clearings, intensification of agriculture, and land use change of bare open lands 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).

Vulture (*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 and grazing practices, upland farming 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, with 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).

Peregrine *Falcon (Falco peregrinus*)

Direct killing due to competition with humans for game species (wild pigeons, perches, thrushes, etc.), as well as 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 courses) are the main threats to nesting habitat (Brambilla et al. 2004).

Threats to foraging habitat: Agricultural intensification and extensive use of pesticides are the main threat because pesticide formulations of high toxicity to birds accumulate in the body of higher predators such as peregrine falcon (Ratcliffe 1993, Movalli 2000). At the same time, illegal predation on key food species (e.g. wild pigeons) degrades the hunting habitat of the species.

Threats to competition: Climate change favours the spread of golden egret over peridot, as the former prefers drier, semi-arid regions to peridot.

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.

Great Hornbill (*Falco columbarius*)

Threats to overwintering habitat: Residential and tourism development of coastal areas, degradation of wetland ecosystems and agricultural intensification are the main threats to the species.

Bubo bubo (*Bubo bubo*)

Disturbance near nesting sites and degradation of feeding areas through expansion and intensification of agriculture are the main threats to the species.

In more detail:

Threats to breeding habitat: The main threat during nesting of the species is disturbance during the breeding season. Another threat is the destruction or degradation of 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 maintenance 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.

Direct threats: Poisoning due to the use of rodent and rabbit mycicides and collision with high-voltage power lines, especially near nesting sites.

Curcinesis (*Falco naumanni*)

Threats to the species include the destruction of houses and the intensification of agriculture.

In more detail:

Threats to breeding habitat: Urbanization 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 use of pesticides 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 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).

Whistling duck (*Mareca penelope*)

The warbler faces problems from the lack of management and protection of wetland habitats in Greece (crop expansions, water management, pollution, bazaars, disturbance, etc.). It is huntable, but due to the lack of reliable statistical data, its capture rates from hunting are not known (Kazantzidis and Noidou 2008).

Avocet (*Recurvirostra avosetta*)

Threats to breeding habitat: The intensification of production and the number of interventions in the salt marshes (alteration of water levels in the basins, alteration of microhabitats, widening - asphalting of dikes, 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).

Dwarf goose (*Anser erythropus*)

Although a non-hunted species, the nanny goose, due to its now small population, is threatened by poaching and general disturbance from hunting activity. There is also no specific management plan for the natural grasslands where it feeds.

Crypto chickadee (*Ardeola ralloides*)

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:

<u>Threats to breeding and feeding habitat</u>: 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.

<u>Direct threats</u>: 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 adjacent wetlands (Zogaris et. al. 2003, Rudolini et al. 2005). Finally, the species is often the victim of poaching in wetlands.

Microgalliandra (*Calandrella brachydactyla*)

<u>Threats to breeding habitat</u>: Agricultural intensification is considered the main threat to the species, as it alters its habitat. In particular, the abandonment of traditional extensive agriculture, the decline of mild pastoralism on grasslands, combined with the intensification of crops and the use of agrochemicals (insecticides), negatively affect the species (Tucker and Heath 1994). At the same time, the abandonment of grasslands and their gradual afforestation reduces the amount of suitable habitat for the species. Finally, residential development through the creation of large housing estates has a negative impact in some areas, as it degrades or destroys the species' main habitat.

Stone turtle (*Burhinus oedicnemus*)

Threats and pressures on the species are related to habitat degradation. The abandonment of grazing on grasslands, their gradual afforestation and their conversion to intensive agriculture are the most important factors in the alteration of the species' habitats. In addition, the construction of highways or other transport infrastructure may also adversely affect the species.

In more detail:

Threats to breeding habitat: Habitat degradation and loss is the main threat to the species. The gradual reduction of livestock farming, which contributes to the increase in the height and density of natural vegetation in grasslands, is reducing the species' habitat. In addition, the conversion of barren pastures to intensive farming (use of insecticides) or their afforestation are factors that threaten the species' populations. Also, the species is highly sensitive to various sources of disturbance (human presence, wheeled vehicles, etc.) compared to its related species (Taylor et al. 2007) which limits its habitat and should be taken into account in future conservation actions (Thompson et al. 2004). Finally, agricultural intensification with systematic and intensive use of insecticides especially during the breeding season has a negative impact on the species (Tucker and Heath 1994).

Gissari (*Aythya ferina*)

The species faces general problems from the lack of management and protection of wetland habitats in Greece (crop expansions, water management, pollution, bazaars, disturbance, etc.).

In more detail:

Threats to habitat: The main problem facing the species in Greece is the degradation of freshwater habitats (drainage, water management, pollution, etc.) (Handrinos and Akriotis 1997).

Direct threats: The grizzly faces poaching problems after the end of the hunting season (Kazantzidis and Noidou 2008).

Immediate threats during wintering: the gizzard shark is a predatory species, but there are no reliable catch statistics to investigate possible overharvesting. It is also illegally hunted out of season (Kazantzidis and Noidou 2008).

Mallard (*Aythya nyroca*)

Threats to breeding habitat: The main problems facing the species in Greece are the degradation of freshwater habitats (drainage, water management, pollution, etc.).
Direct threats: In the Amvrakikos Gulf, poaching, even during the breeding season, is a serious threat to the species. The species is also hunted during the migration and wintering period, either through ignorance or deliberately. Locally, several individuals are drowned by accidental entanglement in fishermen's nets (e.g. L. Chimaditida) (Zogaris and Handrinos 2002).

Crabapple (*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.

Mustelid (*Chlidonias hybrida*)

Threats to breeding, feeding and wintering habitat: Threats are recorded as loss/alteration of freshwater wetlands, and disturbance to breeding colonies (BirdLife International 2008).
Direct threats: Nest trampling by cattle and disturbance of breeding colonies by human presence leading to nest abandonment (BirdLife International 2008).

Swan (*Cygnus olor*)

Threats to breeding habitat: The main problems facing the species in Greece are the degradation of freshwater habitats (crop expansions, drainage, water management, pollution, bazaars, disturbance, etc.) (Handrinos and Akriotis 1997).

Immediate threats during wintering: the species (especially juveniles) shows high mortality during periods of severe frost, especially in relation to disturbance from hunting activity.

Salamander (*Fulica atra*)

The species faces general problems from the lack of management and protection of wetland habitats in Greece (crop expansions, water management, pollution, disturbance, bazaars, technical works, cattle grazing, etc.). They are a predatory species, but due to the lack of reliable statistical data, their capture rates by hunting are not known (Kazantzidis and Noidou 2008).

Dwarf gull (***Hydrocoloeus minutus***)

The main threats to the species at sea are related to oil pollution and the development of offshore wind farms.

In more detail:

Threats to overwintering and migration habitat: more frequent than any other species, oil-skinned nanowings have been recorded in the wetlands of southern Greece, especially during spring migration (Bonetti et al. 2000). These incidents may be linked to the species' preference for marine areas with hydrographic fronts and to its feeding habits and hunting techniques (collection of dead insects from the surface).

Direct threats during overwintering and migration: Gulls are among the species with the highest incidence of impact on offshore wind farm turbines (Fox et al. 2007). Observations indicate that gulls continue to use these sites often with the same or greater frequency than before and often perch on the turbines. This is more common for epidemic populations, and it was observed that migratory species such as lesser black-backed gulls avoid these areas more and therefore reduce collision rates in contrast to epidemic gulls, but do not reduce them to zero.

Cephalopod (*Oxyura leucocephala)*

Although it has not been adequately studied in Greece, it seems that the species, due to the fact that it is found essentially only in the L. Vistonida, faces problems of management and mainly water pollution, which negatively affects the benthic species it feeds on. Already in the last 2-3 years, the wintering population of L. Vistonida has decreased dramatically. It is likely to face problems of poaching and cases of accidental entrapment in fishermen's nets.

Red grouse (***Plegadis falcinellus***)

Threats to the steelhead include the degradation of wetland habitats through changes in hydrological regime, especially the drainage of floodplains on the edges 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.

Microchicken (***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 feeding 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 adjacent wetlands (Zogaris et. al. 2003, Rudolini et al. 2005). Finally, the species is often the victim of poaching in wetlands.

Black-headed gull (*Larus melanocephalus*)

Threats to the species in Greece are related to measures or practices that affect the sensitive coastal zone such as hydrological changes, encroachment on wetlands, disturbance of breeding islands and wintering sites, as well as the use of agrochemicals in crops. The species is also considered vulnerable to marine pollution (oil spills and chemicals). As regards offshore wind farms, it may either be at risk of collision or tend to avoid the installation sites. During the breeding season, predation of eggs and chicks by silversides is an additional aggravating factor.

In more detail:

Threats to breeding habitat: The species is considered particularly sensitive to disturbance to nesting areas (Chandrinos 1992), such as habitat loss, changes in hydrological regime, salt marsh management, island erosion and disturbance to breeding islands. The species is also considered vulnerable to marine pollution (oil spills and chemicals) (BirdLife International 2008).

Direct threats: The use of agrochemicals on crops that constitute important feeding habitat for the species may be a factor in the increased mortality of the species (Chandrinos 1992).

Immediate threats during the period of migration: Gulls are among the species with the highest incidence of impact on wind turbines in transboundary wind farms (Fox et al. 2007). Observations indicate that gulls continue to use these sites often with the same or greater frequency than before and often perch on the turbines. However, this is more common for epidemic populations, and migratory species have been observed to avoid these areas more and therefore reduce collision rates in contrast to epidemic gulls, but not to zero (Blew et al. 2007).

Leptomycete (*Numenius tenuirostris*)

Like many waders, it faces problems of mismanagement of water in wetlands (drainage, bazookas, etc.), combined with disturbance, mainly from hunting activity in wetland habitats in winter.

Chuliar myrtle (*Platalea leucorodia*)

A key threat to the species is the loss, shrinkage and alteration of freshwater wetlands, seasonal or permanent, which constitute the species' breeding habitat. 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 through drainage and pollution of water bodies. In some areas, over-harvesting of prey of the species i.e. benthic organisms (bivalves, crustaceans and worms) by humans for food or bait may occur.

Direct threats: The species is often shot at by poachers.

Silver pelican (*Pelecanus crispus*)

Threats to breeding habitat: Populations breeding in L. Mikri 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, browsing, pollution, disturbance, etc.) appear to be causing problems.

Threats to 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.

Cormorant (*Phalacrocorax carbo*)

The large increase in the cormorant population shows that the species is facing problems in Greece. 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.

Phoenicopterus *roseus* (*Phoenicopterus roseus*)

Threats to wintering and migration habitat: Excessive water level declines leading to over-salting of ponds can reduce available food resources and cause gutting. An important aspect for the species is the management of salt marshes in a way that favours it.

Direct threats: The palm civet is frequently shot at by poachers. It is also subject to lead poisoning. Impact with fences and power lines is also recorded as a threat.

Lesser scaup (*Sternula albifrons*)

Threats to breeding habitat: Alteration of breeding habitat due to vegetation growth, erosion of nesting islands. Abandonment of salt marshes or management practices that degrade them as habitat. Flooding of islands due to artificial alteration of the level in salt marshes or salt ponds. Connection of lagoon bathing islands to the mainland. Loss of nesting sites in the coastal zone due to the creation of infrastructure and interventions such as mechanical beach cleaning during the breeding season. (BirdLife Inr2008). Agrochemical pollution of habitats with organochlorinated hydrocarbons and mercury, documented in Axios (Goutner et al, 1996) possibly in other Greek wetlands.

Threats to foraging habitat: Abandonment of salt marshes or management practices that degrade them as habitat.

Direct threats: Disturbance to breeding colonies by human presence, domestic predators (most commonly cats and fishermen's dogs in lagoons) and cattle nest destruction by cattle in salt ponds and along shorelines. Impacts of the species on coastal wind turbines installed near breeding colonies and during migration have been recorded (Joris and Stienen 2009, Krisveld et al. 2009)

Threats to migration habitat: Threats to the species during migration include drainage of seasonal wetlands, habitat loss due to crop expansion or browsing of land peripheral to wetlands.

***Puffinus yelkouan* (*Puffinus yelkouan*)**

The main threats to the species are predation of eggs and chicks by alien introduced species and competition with some native species. Marine pollution and overfishing remain as threats throughout the species' distribution range.

In more detail

Threats to habitat: Tourist development on some islands may alter the species' nesting habitat or result in reduced breeding success due to disturbance (Croxall et al. 1984).

Threats to foraging habitat: Marine pollution remains, as for all seabirds, a potential cause of declining populations and productivity, while overfishing of key food stocks can reduce the reproductive success of colonies (Tucker & Heath 1994; Thalman et al. 2007).

Threats to competition: The introduction of non-native predators or the increase of already natural predators or competitors are key threats to the species

Black-bellied sea otter (*Podiceps nigricollis*)

The species faces the general problems caused by the lack of management and protection of wetland habitats in Greece (crop expansions, water management, bazaars, disturbance, etc.), both during the breeding period and during wintering or migration. Several individuals of the species are drowned each year by accidental entanglement in fishermen's nets, especially in winter.

Common Duck (*Tadorna ferruginea*)

The species faces the general problems caused by the lack of management and protection of wetland habitats in Greece (crop expansions, water management, bazaars, disturbance, cattle grazing, etc.), both during the breeding season and during wintering. Although hunting of the species is not allowed, it is poached (Handrinos and Akriotis 1997).

Nano-butterfly (*Tachybaptus ruficollis*)

The species faces the general problems caused by the lack of management and protection of wetland habitats in Greece (crop expansions, water management, bazaars, disturbance, etc.), both during the breeding period and during wintering or migration. Several individuals of the species are drowned each year by accidental entanglement in fishermen's nets, especially in winter.

Spiny-tailed dolphin (*Vanellus spinosus*)

The species is threatened during the breeding season by the intensification of agriculture and the exploitation of marginal lands, and the loss of small coastal island wetlands, especially shallow floodplains that are migratory stations, from drainage and bazaars.

Direct threats: Nest trampling from uncontrolled cattle grazing.

Barbara (*Tadorna tadorna*)

The species is negatively affected by general interventions in wetlands (bazaars, technical works, crop expansions, disturbance, cattle grazing, etc.) both during the breeding and wintering period. Although hunting of the species is not allowed, it is often poached (Handrinos and Akriotis 1997).

The species ***Aegolius funereus*** **is** not mentioned in the above deliverable. The main characteristics of this species, as well as the pressures and threats to it, 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 is given below, which, as we have seen in the previous sub-chapter, are derived according to their ecological requirements (see Table 20), in accordance with the "*Deliverable 2 Grouping of species according to their ecological requirements*" of the identification of compatible activities in relation to the species of interest in the Special Protection Areas for avifauna (Dimalexis 2009), which was prepared by the Ministry of Agriculture and Forestry.Environmental Planning Department - Environmental Planning Division, Natural Environment Management Department.

Large predators

Large predators are particularly vulnerable species and face many serious threats. It is characteristic that of the 22 species in 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.

Herodians 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 related to the degradation of forest ecosystems are the most important threats to inland forest species. Thus, deforestation and inappropriate forest management are the main causes of degradation of the breeding and feeding habitats of inland forest species.

Types of agro-pasture ecosystems

Threats to these species are almost exclusively linked to the degradation - destruction of breeding and feeding habitats. The most important threats are therefore the abandonment of traditional livestock farming, which leads to the deforestation of open areas. In addition, the intensification of agriculture and the abandonment of traditional farming practices are also degrading the habitat, destroying features of the rural landscape that are important for the ecology of the species, such as hedgerows, scattered trees, dry stone walls and riparian vegetation. Two other threats are linked to modern agricultural practices: reforestation, which alters the rural landscape, and agrochemical pollution. Finally, other important threats include residential and tourist development, especially in coastal areas, hunting - poaching for species such as *Alectoris graeca, Coturnix coturnix, Crex crex* and fires.

Cranes

The intensification of agriculture, residential development, the abandonment of traditional land uses degrade the breeding and feeding habitats of falcons. 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.

Glamorous

The main threats to terns are related to the degradation/destruction of breeding and feeding habitats. As a result, wetland drainage, siltation of streams or shorelines, construction of dams and other land reclamation works cause problems for these species. Disturbance by humans or domestic animals in breeding colonies is also a major problem.

Aquatic

The most important threat is the degradation/destruction of their habitats through drainage, land reclamation works, land filling and water pollution. Also, because many species in this category are huntable, over-exploitation is a threat, and poaching is also found in cases where hunting is prohibited.

Paridatia

Habitat degradation/destruction is the most important 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 refuelling 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.

Seabirds

Tourism infrastructure in coastal and island areas degrades seabird breeding habitats, while disturbance caused by recreational vessels to remote breeding colonies is significant. In addition, marine pollution, such as oil spills, can both degrade habitat and cause direct mortality of these species. Accidental entanglement in fishing gear (longlines, nets) is a particular threat to seabirds and therefore the extent of this problem in the Greek seas needs to be thoroughly investigated. Also, the presence of rats or competing species, such as silversides and currants, may significantly reduce the reproductive success of these species.

With regard to the pressures and threats to the species listed in Annex II of Directive 92/43/EEC in the neighbouring Bulgarian SPA BG0001032, these have been fully analysed in a previous chapter of this SEA. These pressures and threats, according to the IUCN red list (*and also from the Greek Red Book - where these exist*), are listed below.

Barbastelle *(Barbastella barbastellus)*

Threats to the species according to the IUCN are habitat degradation and destruction, especially the loss of old mature forests with old trees with loose bark or crevices that it 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).

Bechstein's myotis (*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).

Winged bat (*Miniopterus schreibersii*)

The threats listed on 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 grilles) can lead to abandonment or declining numbers. 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 *blythii (Myotis blythii)*

The threats listed on the IUCN red list are changes in land management, particularly agricultural pollution, and other agricultural activities that can affect the species' populations. Disturbance to cave and building roosts is also a threat to the species.

Footed myotis (*Myotis capaccinii*)

The threats listed on the IUCN red list are water pollution, dams, and the loss of water bodies and watercourses. In addition, disturbance to cranberry sites within caves may also pose a threat to the species.

Myotis emarginatus* (*Myotis emarginatus)

The threats listed on the IUCN red list are agricultural activities, which can affect the species' populations, as the species is mainly associated with agricultural habitats. Also, disturbance to roosting sites (such as buildings and caves) is a threat.

Traveller's moth *(Myotis myotis*)

The threats listed in 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) 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.

Mesrinophus *euryale (Rhinolophus euryale*)

The 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 (Rhinolophus ferrumequinum)

The threats listed on the IUCN red list are 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 underground 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 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).

Microrhinolophus (*Rhinolophus hipposideros*)

Threats listed on the IUCN red list are disturbance and loss of underground habitats, change in the management regime of agricultural areas (loss of scattered trees and hedgerows due to intensification of agriculture) and fragmentation and isolation of the species' habitats.

Blasius' rhinolophus (*Rhinolophus blasii*)

Threats listed on the IUCN red list are the loss of Mediterranean forests and the loss and destruction of subterranean kurnias (Kryštufek 1999). It is also particularly sensitive to cave disturbances, such as that of cave tourism and the use of caves as wildlife refuges.

Mehely's rhinolophus (*Rhinolophus mehelyi*)

The threats according to the Greek Red Data Book of Endangered Species (Legakis and Marangou 2009) are the degradation and destruction of its refuges. The presence of cavers and other visitors in them during the period of birth and lactation can result in the death of dozens of cubs and the abandonment of the site by the colony. The presence of humans in caves where the species winters also has a negative impact. The tourist management of caves and their subsequent management is often carried out without taking into account the impact on the bats present. In caves of archaeological interest, inappropriate gates are placed in caves or excavations are carried out at the wrong time (e.g. Cyclops Polyphemus Cave, Maroneia), with disastrous results for this and other species of manatee. Finally, blocking the entrance to dangerous caves or mines by various means (doors, rocks, rubble, rubbish) traps bats inside them or prevents them from visiting them at the right time of year. The degradation of habitats where bats forage (e.g. due to fires, overgrazing, use of agrochemicals) is also thought to be a threat, but no data is available on this.

The threats listed in the IUCN red list are disturbance and loss of underground habitats, changes and degradation of foraging habitats, as well as cave tourism, which has an impact beyond disturbance and destruction of caves.

Wolf (*Canis lupus*)

The threats mentioned in the Greek Red Book (Legakis and Maragou 2009) are the following: Anthropogenic mortality, reduction of food availability throughout the species' distribution range due to the reduction of 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 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 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).

Brown Bear (*Ursus arctos*)

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

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 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.

Hare *(Spermophilus citellus)*

The threats to the species according to the Greek Red Data Book are agricultural cultivation on any scale, nomadic livestock farming, abandonment of certain types of agriculture, change of management regime in non-agricultural areas, development of infrastructure (e.g. (Amori 1996; Hoffmann et al. 2003b). Significant losses are also due to mortality from entrapment, collisions with vehicles or even predation by domestic animals such as dogs and cats. Drought and extreme temperatures tend to cause behavioural and foraging dysfunctions (Paraschis 1992). In addition, inbreeding and limited and fragmented dispersal seem to genetically diminish populations, but this is not scientifically documented.

Threats listed on the IUCN red list are the conversion of grasslands and pastures to cultivated fields, the abandonment of pastures and their subsequent reversion to tall grass meadows or shrubby habitats that are not suitable for the species (Kryštufek

1999). Although not a significant threat, some Gypsy communities in Central and Eastern Europe still prey on the species.

Mediterranean turtle (*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 cores.
- 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.

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, 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.

Grey turtle *(Testudo graeca)*

The threats listed in 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.

Oriental lamprey (*Elaphe sauromates*)

According to the IUCN red list there are no significant threats to this species. It is generally persecuted throughout its distribution range, but not to the level that it is a threat to the species. It is significantly declining in Romania, mainly due to habitat loss. The expansion of cultivation in steppes and similar habitats leads to an overall decline in the species' population.

Spotted knotweed (*Vormela peregusna*)

The 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.

Roach myomaxus (*Myomimus roachi*)

The threats listed on the IUCN red list are the conversion of the species' habitats to intensive cultivation. In the European part of Turkey, most of the species' habitat has been converted to agricultural land. Despite intensive surveys, the species has not been found in the last five years. It is clear that the range of the species is shrinking.

Their national and European importance for the conservation of biodiversity

The importance of the species for the conservation of biodiversity at national and European level is commented on individually in the subchapters describing each species important for the area.

The overall coherence of the NATURA 2000 network

The overall coherence of the Natura 2000 network of the wider study area is considered satisfactory. The project under study is located within the SPA GR1130012.

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

The specific project site is located outside of protected areas of the Natura 2000 network classified as EEZs, TKS, and therefore there is no mapping of important habitat types.

For species listed in Annex II of Directive 92/43/EC:

This area does not belong to the Natura 2000 network areas that are classified as EEZs, TKS. However, during the preparation of this Special Ecological Assessment, and due to the proximity of the project site to the Bulgarian Natura 2000 network site EEZ BG0001032, the project site was examined for its potential impact on the species listed in Annex II of Directive 92/43/EEC, which are listed in the site's TAPs, and in particular 12 species of arthropods which, because of the distances they can travel to meet their daily needs, may be affected by the installation and operation of the project, five species of mammals (other than arthropods) (*Canis lupus*, *Ursus arctos*, *Myomimus roachi*, *Spermophilus citellus*, *Vormela peregusna*) and three species of reptiles (*Testudo graeca*, *Testudo hermanni*, *Elaphe sauromates*), which are either species with a large area of endemism (e.g.In the following, all the information concerning the conservation status of the important fauna species listed in Annex II of Directive 92/43/EC (as selected by the study team) is presented, which are either species with a large area of endemicity (e.g. *Canis lupus*, *Ursus arctos*) or which may be affected by the project due to the proximity of the site of the project to the boundaries of the EEZ.

Table 21. Part of the Standard data forms of the BG0001032 area (End 2018_15/03/2019), showing the species of Annex II of Directive 2009/174/EC of the area, listed in it and the conservation status of their areas.
(http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0001032)

Natura code		Code	Scientific name	S	NP	T	Size		Unit	Cat	D.qual	A|B|C|D	A|B|C		
							Min	Max				Pop	Con	Big	Glo
BG0001032	M	1308	*Barbastella barbastellus*			p	725	1146	i	V	M	B	B	C	B
BG0001032	M	1352	*canis lupus*			p	25	30	i		G	B	A	C	A

Natura code		Code	Scientific name	S	NP	T	Size		Unit	Cat	D.qual	A|B|C|D	A|B|C		
							Min	Max				Pop	Con	Big	Glo
BG0001032	M	1310	*Miniopterus schreibersii*			r	2000	3500	i	C	G	B	B	C	B
BG0001032	M	1310	*Miniopterus schreibersii*			w	250	500	i	R	G	C	B	C	C
BG0001032	M	2617	*Myomimus roachi*			p	0	2	locali ties	V	P	B	B	B	B
BG0001032	M	1323	*Myotis bechsteinii*			p	973	1947	i	R	M	B	B	C	B
BG0001032	M	1307	*Myotis blythii*			p	3000	4500	i	C	G	A	A	C	A
BG0001032	M	1316	*Myotis capaccinii*			w	11	50	i	V	G	C	B	C	C
BG0001032	M	1316	*myotis capaccinii*			r	2000	3500	i	R	G	A	B	C	A
BG0001032	M	1321	*Myotis emarginatus*			r	6000	10000	i	R	G	A	B	C	A
BG0001032	M	1324	*Myotis myotis*			r	3500	5000	i	C	G	A	B	C	A
BG0001032	M	1324	*Myotis myotis*			w	51	100	i	C	G	C	B	C	C
BG0001032	M	1306	*Rhinolophus blasii*			w	1000	1500	i	R	G	A	B	C	A
BG0001032	M	1306	*Rhinolophus blasii*			r	800	1200	i	R	G	A	B	C	A
BG0001032	M	1305	*Rhinolophus euryale*			w	101	250	i	V	G	C	B	C	C
BG0001032	M	1305	*Rhinolophus euryale*			r	500	1000	i	C	G	B	B	C	B
BG0001032	M	1304	*Rhinolophus ferrumequinum*			p	2000	3000	i	C	G	A	B	C	A
BG0001032	M	1303	*Rhinolophus hipposideros*			p	250	500	i	C	G	B	B	C	B
BG0001032	M	1302	*Rhinolophus mehelyi*			p	250	500	i	R	G	B	B	C	B
BG0001032	M	1335	*Spermophilus citellus*			p	11	11	colo nies	R	G	C	C	C	B
BG0001032	M	1354	*Ursus arctos*			p	1	2	i		G	C	B	B	B
BG0001032	M	2635	*Pre-melon peregusna*			p	2	2	locali ties	R	M	C	B	C	A
BG0001032	R	5194	*Elaphe sauromates*			p	1	1	locali ties	V	P	B	A	B	A
BG0001032	R	1219	*Testudo graeca*			p	136	136	locali ties	C	G	B	A	C	A
BG0001032	R	1217	*Testudo hermanni*			p	162	162	locali ties	C	G	B	A	C	A

The analysis of the above table, for the neighbouring Bulgarian EEZ BG0001032, shows that:

Barbastelle barbastellus (*Barbastella barbastellus*) is a resident species in the study area and numbers at least 725 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 with a wide distribution, and the overall conservation value of the site is good.

The **wolf (*Canis lupus*)** is a resident species in the study area and numbers at least 25 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.

The **winged bat (*Miniopterus schreibersii*)** is a species that breeds in the study area and numbers at least 2,000 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. The species also winters in the study area. In this category of the species' relationship with Natura (overwintering) the data given are of good quality and based on field data, and the species numbers at least 250 individuals in the area. The conservation status reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery is assigned a B criterion, 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.

Roach myotis (*Myomimus roachi*) is a resident species in the study area and is observed at up to two locations in the area. The data given are of poor quality and based on a rough estimate. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated as B, 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.

Bechstein's **myotis *bechsteinii* (*Myotis bechsteinii*)** is a resident species in the study area and numbers at least 973 individuals in the area. The data provided are of moderate quality and are based on both field data and partial modeling of the species' distribution. 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.

The **micromyotid (*Myotis blythii*)** is a resident species in the study area and numbers at least 3,000 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, 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.

The **footed myotis (*Myotis capaccinii*)** is a species that breeds in the study area and numbers at least 2,000 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 excellent. The species also winters in the study area. In this category of the species' relationship with Natura (overwintering) the data given are of good quality and based on field data, and the species has at least 11 individuals in the area. The conservation status reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery is assigned a B criterion, 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.

***Myotis emarginatus* (*Myotis emarginatus*)** is a species that breeds in the study area and numbers at least 6,000 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 excellent.

***Myotis* myotis (*Myotis myotis*)** is a breeding species in the study area and numbers at least 3,500 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 excellent. The species also winters in the study area. In this category of the species' relationship with Natura (overwintering) the data given are of good quality and based on field data, and the species has at least 51 individuals in the area. The conservation status reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery is assigned a B criterion, 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.

Blasius' rhinolophus **(*Rhinolophus blasii*)** is a species that breeds in the study area and numbers at least 800 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 excellent. The species also winters in the study area. In this category of the species' relationship with Natura (overwintering) the data given are of good quality and based on field data, and the species numbers at least 1,000 individuals in the area. The conservation status reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery is assigned a B criterion, 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 excellent.

***Rhinolophus euryale* (*Rhinolophus euryale*)** is a species that breeds in the study area and numbers at least 500 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. The species also winters in the study area. In this category of the species' relationship with Natura (overwintering) the data given are of good quality and based on field data, and the species has at least 101 individuals in the area. The conservation status reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery is assigned a B criterion, 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.

***Rhinolophus ferrumequinum* (*Rhinolophus ferrumequinum*)** is a resident species in the study area and numbers at least 2,000 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 excellent.

Micro-nosed *Rhinolophus hipposideros* (*Rhinolophus hipposideros*) is a resident species in the study area and numbers at least 250 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.

Mehely's *rhinolophus* (*Rhinolophus mehelyi*) is a resident species in the study area and numbers at least 250 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.

***Spermophilus citellus* (*Spermophilus citellus*)** is a resident species in the study area and is observed in at least 11 locations 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 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.

The **brown bear (*Ursus arctos*)** is a resident species 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 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.

Spotted knotweed (*Vormela peregusna*) is a resident species in the study area and is observed in at least two locations in the area. The data provided are of moderate quality and are based on both field data and partial modelling of the species' distribution. 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 excellent.

The **eastern wolverine (*Elaphe sauromates*)** is a resident species in the study area and is observed at at least one site in the area. The data provided are of poor quality and based on a rough estimate. 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 not isolated but within the range boundary, and the overall conservation value of the site is excellent.

The **Mediterranean tortoise (*Testudo hermanni*)** is a resident species in the study area and is observed at at least 136 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, meaning 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.

The **gray turtle (*Testudo graeca*)** is a resident species in the study area and is observed in at least 162 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 not isolated but is located within the range boundary, and the overall conservation value of the site is excellent.

As regards the species of avifauna listed in Annex I of Directive 2009/147 and migratory species with significant presence

The 50 species of interest (avifauna) selected, as well as all the information on them, which are reported in the respective TADs of the studied SPAs GR1130012 and GR1130010, are shown in Table 22 below, which also shows in detail the conservation status, reflecting the degree of protection of the habitat that is important for each species and the likelihood of its recovery. With regard to the species *Vanellus spinosus*, *Sternula albifrons* and *Tachybaptus ruficollis*, which are within the selected 50 species of interest, they are not listed in the TADs of the studied SPA GR1130010, although they are species of conservation concern.

Table 22. Section of the Standard Data Forms of Natura site GR1130012 (End 2018_15/03/2019) and Natura site GR1130010 (End 2021_07/02/2022), showing the species of interest of the sites listed in it and the conservation status of the sites. (http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1130012) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1130010)

Natura code	G	Code	Scientific name	S	NP	T	Size		Unit	Cat.	D.qual.	A|B|C|D	A|B|C		
							Min	Max				Pop.	Con.	Big	Glo.
GR1130012	B	A402	*Accipiter brevipes*			r				P	DD	C	A	B	B
GR1130012	B	A223	*Aegolius funereus*			p				P	DD	C	A	C	C
GR1130012	B	A091	*Aquila chrysaetos*			p				P	DD	C	B	C	B
GR1130012	B	A089	*aquila pomarina*			r				P	DD	C	B	B	B
GR1130012	B	A215	*bubo bubo*			p				P	DD	C	A	C	B
GR1130012	B	A403	*Buteo rufinus*			p				P	DD	C	B	B	B
GR1130012	B	A030	*Ciconia nigra*			c				P	DD	C	B	B	B
GR1130012	B	A030	*Ciconia nigra*			r	1	1	p		G	C	B	B	B
GR1130012	B	A080	*Circaetus gallicus*			r				P	DD	C	A	C	A
GR1130012	B	A429	*Dendrocopos syriacus*			p				P	DD	C	A	B	B
GR1130012	B	A379	*Emberiza hortulana*			r				P	DD	C	B	B	B
GR1130012	B	A098	*Falco columbarius*			w				P	DD	C	B	C	B
GR1130012	B	A095	*Brown Falco*			r	3	3	p		M		B		
GR1130012	B	A709	*falco peregrinus*			p				P	DD	C	A	C	B
GR1130012	B	A442	*Ficedula semitorquata*			r				R	DD	B	B	C	A
GR1130012	B	A078	*Gyps fulvus*			p	5	8	p		G	B	B	C	B
GR1130012	B	A075	*Haliaeetus albicilla*			p	1	1	p		G	A	B	B	B
GR1130012	B	A092	*Hieraetus pennatus*			r				P	DD	C	B	C	B
GR1130012	B	A339	*Lanius minor*			r				P	DD	C	B	C	B
GR1130012	B	A077	*Neophron percnopterus*			r	1	1	p		M	C	B	C	B
GR1130012	B	A072	*Pernis apivorus*			r				P	DD	C	A	C	B
GR1130012	B	A393	*Phalacrocorax pygmaeus*			w				C	DD	B	B	C	A
GR1130010	B	A402	*Accipiter brevipes*			r	10	15		P		C	B	B	B
GR1130010	B	A050	*Anas penelope*			w	2000	8240	i		G	B	B	C	B
GR1130010	B	A042	*Anser erythropus*			w	0	1	i		G	A	B	B	B
GR1130010	B	A635	*ardeola ralloides*			r	2	2	i		G	C	B	C	B
GR1130010	B	A059	*Aythya ferina*			r	2	21	p						
GR1130010	B	A059	*Aythya ferina*			w	960	3630	i		G	B	B	C	B
GR1130010	B	A060	*Aythya nyroca*			r	2	24	p	P		A	B	C	B
GR1130010	B	A060	*Aythya nyroca*			w	2	7	i	P		A	B	C	B

Natura code	G	Code	Scientific name	S	NP	T	Size		Unit	Cat.	D.qual.	A|B|C|D	A|B|C		
							Min	Max				Pop.	Con.	Big	Glo.
GR1130010	B	A215	*bubo bubo*			w	1	1	i	P		C	B	C	B
GR1130010	B	A133	*Burhinus oedicnemus*			r	1	10	p	P		C	B	C	B
GR1130010		A403	*Buteo rufinus*			c				P		C	B	B	B
GR1130010	B	A403	*Buteo rufinus*			w	1	3	i	P		C	B	B	B
GR1130010	B	A243	*Calandrella brachydactyla*			r				P		C	B	C	B
GR1130010	B	A698	*Egretta alba*			w	90	240	i		G	A	B	B	B
GR1130010	B	A734	*hybrid chlidonias*			r	200		p	P		C	B	C	B
GR1130010	B	A667	*Ciconia ciconia*			r	80	130	i		G	C	B	C	B
GR1130010	B	A030	*Ciconia nigra*			r	2	2	p		G	B	B	B	B
GR1130010	B	A080	*Circaetus gallicus*			r	3	3	p	P		C	B	C	B
GR1130010	B	A036	*cygnus olor*			r	2	49	p						
GR1130010	B	A036	*cygnus olor*			w	50	690	i		G	B	B	C	B
GR1130010	B	A429	*Dendrocopos syriacus*			p	30	30	p	P		C	B	B	B
GR1130010	B	A098	*Falco columbarius*			w	1	4	i	P		C	B	C	B
GR1130010	B	A709	*falco peregrinus*			c				P		C	B	C	B
GR1130010	B	A709	*Falco peregrinus*			w	2	3	i	P		C	B	C	B
GR1130010	B	A442	*Ficedula semitorquata*			c				P		C	B	C	B
GR1130010	B	A723	*Fulica atra*			r				P		B	B	C	B
GR1130010	B	A723	*Fulica atra*			w	1900	8260	i		G	B	B	C	B
GR1130010	B	A078	*Gyps fulvus*			c				P		C	B	C	B
GR1130010	B	A075	*Haliaeetus albicilla*			c	1	4	i		G	A	B	B	B
GR1130010	B	A075	*Haliaeetus albicilla*			r	2	2	p		G	A	B	B	B
GR1130010	B	A092	*Hieraetus pennatus*			c				P		C	B	C	B
GR1130010	B	A339	*Lanius minor*			r				P		C	B	C	B
GR1130010	B	A176	*Larus melanocephalus*			c					G	A	B	C	B
GR1130010	B	A177	*Larus minutus*			c	13	13	i	P		C	B	C	B
GR1130010	B	A617	*Ixobrychus minutus*			r	1	9	p		G	B	B	C	B
GR1130010	B	A077	*Neophron percnopterus*			c				P		C	B	C	B
GR1130010	B	A159	*Numenius tenuirostris*			c	1	1	i		G	A	B	B	B
GR1130010	B	A071	*Oxyura leucocephala*			w	1	103	i		G	A	B	B	B
GR1130010	B	A020	*Pelecanus crispus*			c	250	700	i		G	A	B	B	B
GR1130010	B	A020	*Pelecanus crispus*			w	300	1200	i		G	A	B	B	B
GR1130010	B	A391	*Phalacrocorax carbo*			w	1200	10500	i		G	B	B	C	B
GR1130010	B	A393	*Phalacrocorax pygmaeus*			w	10	1270	i		G	A	B	B	B
GR1130010	B	A072	*Pernis apivorus*			r	1	1	p	P	G	C	B	C	B
GR1130010	B	A663	*Phoenicopterus roseus*			c	2000	5500	i		G	A	B	C	B
GR1130010	B	A663	*Phoenicopterus roseus*			w	1280	4100	i		G	A	B	C	B
GR1130010	B	A607	*Platalea leucorodia*			w	9	25	i		G	B	B	C	B
GR1130010	B	A700	*Plegadis falcinellus*			c	300	600	i		G	B	B	C	B
GR1130010	B	A692	*Podiceps nigricollis*			r	2	5	p		G				
GR1130010	B	A692	*Podiceps nigricollis*			w	50	240	i		G	B	B	C	B
GR1130010	B	A464	*Puffinus yelkouan*			w	700	1000	i		G	B	B	B	B
GR1130010	B	A397	*tadorna ferruginea*			w	30	30	i		G	B	B	B	B
GR1130010	B	A048	*Tadorna tadorna*			r	3	80	p	P		B	B	C	B
GR1130010	B	A048	*Tadorna tadorna*			w	860	2430	i		G	B	B	C	B

The analysis of the above table shows that:

As regards the GR1130012 ZEP GR1130012

The **shrews (*Accipiter brevipes*)** 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 given are classified as aneropic. Conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is assigned a conservation criterion of A, meaning excellent conservation. The population of the species is classified as non-isolated but within the limits of its range, and the overall conservation value of the site is good.

Aegolius *funereus* (*Aegolius funereus*) 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 adequate.

The **golden eagle (*Aquila chrysaetos*)** 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 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.

The **Crabeater (*Clanga pomarina*)** 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 classified as 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.

The **bubo bubo (*Bubo bubo*)** is a resident 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 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 good.

Eagle Heron (***Buteo rufinus***) is a resident 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 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.

The **Black-backed Stork (*Ciconia nigra*)** 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 not isolated but within the range boundary, and the overall conservation value of the site is good. The species is also found in concentration in the study area. In this category of the species' relationship with Natura (in concentration) 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 classified as 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.

Snake eagle (*Circaetus gallicus*) 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 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 excellent.

The **Balkan woodpecker (*Dendrocopos syriacus*)** is a resident 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 habitat protection important to the species and the likelihood of recovery, is given a conservation criterion of A, which means excellent conservation. The population of the species is classified as not isolated but within the range boundary, and the overall conservation value of the site is good.

Emberiza hortulana **(*Emberiza hortulana*)** is a species that breeds 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 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.

The **Nano Hornbill (*Falco columbarius*)** is a wintering 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 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.

Falco naumanni **(*Falco naumanni*)** is a breeding species in the study area and there are at least three pairs in the area. The data provided are of moderate quality and are based on both field data and partial modelling of the species' distribution. 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. No assessment was made of the parameters relating to the isolation of the species' population and the overall conservation value of the site.

The **Peregrine *Falcon* (*Falco peregrinus*)** is a resident 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 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 **oak leaf miner (*Ficedula semitorquata*)** is a resident species in the study area, with its population in the study area accounting for 2 - 15 % of the national population (population criterion B). 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 excellent.

The **vulture (*Gyps fulvus*)** is a resident 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 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.

The **sea eagle (*Haliaeetus albicilla*)** 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 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.

The **hawk eagle (*Hieraaetus pennatus*)** is a species that breeds 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 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.

Cinderella (*Lanius minor*) is a species that breeds 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 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.

The **Egyptian vulture (*Neophron percnopterus*)** 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 of moderate quality and are based on both field data and partial modelling of the species' distribution. 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.

The **wasp (*Pernis apivorus*)** is a species that breeds 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 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.

The **langoustine (*Microcarbo pygmaeus*)** is a wintering species in the study area, with its population in the study area representing 2-15% of the national population (population criterion B). 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 excellent.

As regards the GR1130010 SPA

The **Common Shark (*Accipiter brevipes*)** is a wintering species in the study area and there are at least ten pairs in the area. 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 but within the limits of its range, and the overall conservation value of the site is good.

The **whistling duck (*Mareca penelope*)** is a species that winters in the study area and numbers at least 2,000 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.

The **Nanaqua (*Answer erythropus*)** is a species that winters 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, 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.

The **Cryptic Cicada (*Ardeola ralloides*)** is a species that breeds in the study area and has at least two 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 good.

The **gisari (*Aythya ferina*)** is a species that winters in the study area and numbers up to 960 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 species population is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good. The species also breeds in the study area. In this category of the species' relationship with Natura (in breeding), there are up to two pairs in the area, and no assessment was made of the parameters related to the conservation status of the species, the isolation of the population and the overall value of the area concerning its conservation.

The **Swamp Duck (*Aythya nyroca*)** is a breeding species in the study area and numbers up to two pairs in the area. 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. The species also winters in the study area. In this category of the species' relationship with Natura (overwintering), it has at least two individuals in the area. The conservation status, which reflects 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.

The **bubo bubo (*Bubo bubo*)** is a species that winters 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 non-isolated with a wide distribution, and the overall conservation value of the site is good.

The **stonechat (*Burhinus oedicnemus*)** is a species that breeds in the study area and numbers at least one pair in the area. 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, in terms of conservation, is good.

The **Eagle** Heron **(*Buteo rufinus*)** is a wintering species in the study area, with at least one individual in the area. 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 is good. The species is also found in concentration in the area. In this category of the species' relationship with Natura (in concentration), the population of the species in the site corresponds to 0-2% of the national population (population criterion C). The conservation status, which reflects 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 not isolated but within the range boundary, and the overall conservation value of the site is good.

***Calandrella brachydactyla* (*Calandrella brachydactyla*)** is a species that breeds in the study area, with its population in the study area corresponding to 0-2% of the national population (population criterion C). 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 good.

The **silver tit (*Ardea alba*)** is a species that winters in the study area and numbers at least 90 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 within the range boundary, and the overall conservation value of the site, which is relevant to the conservation of the species, is good.

Chlidonias hybrida is a species that breeds in the study area and numbers up to 200 pairs in the area. 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.

The **White-throated** Stork **(*Ciconia ciconia*)** is a species that breeds in the study area and numbers at least 80 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.

The **Black-backed Stork (*Ciconia nigra*)** is a species that breeds in the study area and numbers 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 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.

Snake eagle (*Circaetus gallicus*) is a species that breeds in the study area and has 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.

The **swan (*Cygnus olor*)** is a breeding species in the study area, and there are at least two pairs in the area. No assessment was made of the conservation status of the species, population isolation and the overall conservation value of the site. The species also winters in the study area and numbers at least 50 individuals in the area. In this category of the species' relationship with Natura (overwintering), the information provided is of good quality and 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 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.

The **Balkan woodpecker (*Dendrocopos syriacus*)** is a resident species in the study area and there are at least 30 pairs in the area. 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 but within the limits of its range, and the overall conservation value of the site is good.

The **Nano Hornbill (*Falco columbarius*)** is a species that winters in the study area and has at least one individual in the area. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of its 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.

The **Peregrine** Falcon **(*Falco peregrinus*)** is a wintering species in the study area, with at least two individuals in the area. 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 good. The species is also concentrated in the study area, with its population in the study area representing 0-2% of the national population (population criterion C). In this category of the species' relationship with Natura (in concentration), the conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is assigned a criterion 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.

The **oak leaf miner (*Ficedula semitorquata*)** is a species that is concentrated in the study area, with its population in the study area corresponding to 0-2% of the national population (population criterion C). 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 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.

***Fulica atra* (*Fulica atra*)** is a species that breeds in the study area, with its population in the study area representing 2-15% of the national population (population criterion B). 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. The species also winters in the study area and numbers at least 1,900 individuals in the area. In this category of the species' relationship with Natura (overwintering) the data provided are of good quality and based on field data. The conservation status, reflecting the degree of protection of the habitat important for 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.

Vulture (*Gyps fulvus*) is a species that is concentrated in the study area, with its population in the study area representing 0-2% of the national population (population criterion C). 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.

The **White-throated Stork (*Ciconia ciconia*)** is a species that breeds in the study area and has 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 adequate.

The **sea eagle (*Haliaeetus albicilla*)** 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 not isolated but within the range boundary, and the overall conservation value of the site is good. The species is also found in concentration in the study area and has at least one individual in the area. In this category of the species' relationship with Natura (in concentration) the data given are of good quality and 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 assigned a B criterion, 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 is good.

The **hawk eagle (*Hieraaetus pennatus*)** is a species that is concentrated in the study area, with its population in the study area corresponding to 0-2% of the national population (population criterion C). The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is classified as 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.

The **black-headed gull (*Larus melanocephalus*)** is a species that is concentrated in the study area, with its population in the study area representing more than 15% of the national population (population criterion A). 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 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.

The **ash cephalopod (*Lanius minor*)** is a breeding species in the study area, with its population in the study area corresponding to 0-2% of the national population (population criterion C). 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.

The **nannogel (*Hydrocoloeus minutus*)** is a species that is concentrated in the study area and numbers at least 13 individuals in the area. 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 good.

The **micro chickadee (*Ixobrychus minutus*)** 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 good.

The **Egyptian vulture (*Neophron percnopterus*)** is a species that is concentrated in the study area, with its population in the study area representing 0-2%

of the national population (population criterion C). 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.

The **leptomyta (*Numenius tenuirostris*)** is a species that is concentrated 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 is good.

The headcheese **(*Oxyura leucocephala*)** is a species that winters in the study area and has at least 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 is good.

The **Silver** pelican **(*Pelecanus crispus*)** is a wintering species in the study area, with at least 300 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 within the range boundary, and the overall conservation value of the site is good. The species is also found in concentration in the study area and has at least 250 individuals in the area. In this category of the species' relationship with Natura (in concentration) 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 classified as 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 is good.

Cormorant (*Phalacrocorax carbo*) is a wintering species in the study area and numbers at least 1,200 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.

The **langoustine (*Microcarbo pygmaeus*)** is a species that winters in the study area and numbers at least 10 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 located within the range boundary, and the overall conservation value of the site is good.

The **wasp (*Pernis apivorus*)** 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 good.

The **palm warbler (*Phoenicopterus roseus*)** is a wintering species in the study area and numbers at least 1,280 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 species population is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good. In addition, the species is concentrated in the study area and numbers at least 2,000 individuals in the area. In this category of the species' relationship with Natura (in concentration) the data provided are of good quality and are based on field data. The conservation status, reflecting the degree of protection of the habitat that is important for 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.

Platalea leucorodia **(*Platalea leucorodia*)** is a wintering species in the study area and has at least nine 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 good.

Steelhead (*Plegadis falcinellus*) is a species that is concentrated in the study area and numbers at least 300 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.

The **Black-bellied Dipper (*Podiceps nigricollis*)** 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 based on field data. No assessment was made of the conservation status of the species, the isolation of its population and the overall conservation value of the area. Furthermore, the species winters in the study area and numbers at least 50 individuals in the area. In this category of the species' relationship with Natura (overwintering), the information provided is of good quality and 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 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.

***Puffinus yelkouan* (*Puffinus yelkouan*)** is a wintering species in the study area and numbers at least 700 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 located within the range boundary, and the overall conservation value of the site is good.

***Tadorna ferruginea* (*Tadorna ferruginea*)** is a wintering species in the study area and numbers at least 30 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 located within the range boundary, and the overall conservation value of the site is good.

Tadorna tadorna is a breeding species in the study area and there are at least three pairs of 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 good. The species also winters in the study area and has at least 860 individuals in the area. In this category of the species' relationship with Natura (overwintering) the data provided are of good quality and 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 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.

As mentioned above, the species *Vanellus spinosus*, *Sternula albifrons* and *Tachybaptus ruficollis*, which are among the selected 50 species of interest, are not listed in the TADs of the study area GR1130010, although they are species of interest. However, *Sternula albifrons* and *Tachybaptus ruficollis are* listed in Table 3.3 - *Other important flora and fauna species* as present in the study area.

The existing baseline conditions, if defined, shall be

For the specific Natura 2000 sites under study (GR1130012, GR1130010 and BG0001032), as mentioned above, a Management Plan has not been prepared and conservation objectives have not been defined on the basis of it. The objective of this EIA is to assess the potential impacts of the project location on the important species, conservation objectives and integrity of the Natura 2000 study sites. Since no Management Plan has been prepared and the conservation objectives for the study area and satisfactory reference values for the species have not been established on the basis of the above mentioned Management Plan, the general conservation objective for the SPAs is taken into account as the maintenance or restoration to a satisfactory conservation status for the important species of Community interest of the sites, based on the content of the Standard data forms for these SPAs. With regard to the adjacent Bulgarian SPA BG0001032, the following is taken into account

In the excerpt of the table below, the columns concerning the population data of the species of interest of the Natura 2000 SPAs under study, which are also considered as the desired reference values, have been isolated (Table 23).

Table 23. Section of the Standard Data Forms of Natura sites GR11300012 (End 2018_15/03/2019) and GR1130010 (End 2018_15/03/2019), in which the population data of the species of interest are listed

Natura code	G	Code	Scientific name	T	Size		Unit	Cat.	A|B|C|D
					Min	Max			Pop.
GR1130012	B	A402	*Accipiter brevipes*	r				P	C
GR1130012	B	A223	*Aegolius funereus*	p				P	C
GR1130012	B	A091	*Aquila chrysaetos*	p				P	C
GR1130012	B	A089	*aquila pomarina*	r				P	C
GR1130012	B	A215	*bubo bubo*	p				P	C
GR1130012	B	A403	*Buteo rufinus*	p				P	C
GR1130012	B	A030	*Ciconia nigra*	c				P	C
GR1130012	B	A030	*Ciconia nigra*	r	1	1	p		C
GR1130012	B	A080	*Circaetus gallicus*	r				P	C
GR1130012	B	A429	*Dendrocopos syriacus*	p				P	C
GR1130012	B	A379	*Emberiza hortulana*	r				P	C
GR1130012	B	A098	*Falco columbarius*	w				P	C
GR1130012	B	A095	*Brown Falco*	r	3	3	p		
GR1130012	B	A709	*falco peregrinus*	p				P	C
GR1130012	B	A442	*Ficedula semitorquata*	r				R	B
GR1130012	B	A078	*Gyps fulvus*	p	5	8	p		B
GR1130012	B	A075	*Haliaeetus albicilla*	p	1	1	p		A
GR1130012	B	A092	*Hieraetus pennatus*	r				P	C
GR1130012	B	A339	*Lanius minor*	r				P	C
GR1130012	B	A077	*Neophron percnopterus*	r	1	1	p		C
GR1130012	B	A072	*Pernis apivorus*	r				P	C
GR1130012	B	A393	*Phalacrocorax pygmaeus*	w				C	B
GR1130010	B	A402	*Accipiter brevipes*	r	10	15		P	C
GR1130010	B	A050	*Anas penelope*	w	2000	8240	i		B
GR1130010	B	A042	*Anser erythropus*	w	0	1	i		A
GR1130010	B	A635	*ardeola ralloides*	r	2	2	i		C
GR1130010	B	A059	*Aythya ferina*	r	2	21	p		
GR1130010	B	A059	*Aythya ferina*	w	960	3630	i		B
GR1130010	B	A060	*Aythya nyroca*	r	2	24	p	P	A
GR1130010	B	A060	*Aythya nyroca*	w	2	7	i	P	A
GR1130010	B	A215	*bubo bubo*	w	1	1	i	P	C
GR1130010	B	A133	*Burhinus oedicnemus*	r	1	10	p	P	C
GR1130010		A403	*Buteo rufinus*	c				P	C
GR1130010	B	A403	*Buteo rufinus*	w	1	3	i	P	C
GR1130010	B	A243	*Calandrella brachydactyla*	r				P	C
GR1130010	B	A698	*Egretta alba*	w	90	240	i		A
GR1130010	B	A734	*hybrid chlidonias*	r	200		p	P	C
GR1130010	B	A667	*Ciconia ciconia*	r	80	130	i		C
GR1130010	B	A030	*Ciconia nigra*	r	2	2	p		B
GR1130010	B	A080	*Circaetus gallicus*	r	3	3	p	P	C
GR1130010	B	A036	*cygnus olor*	r	2	49	p		
GR1130010	B	A036	*cygnus olor*	w	50	690	i		B
GR1130010	B	A429	*Dendrocopos syriacus*	p	30	30	p	P	C
GR1130010	B	A098	*Falco columbarius*	w	1	4	i	P	C
GR1130010	B	A709	*falco peregrinus*	c				P	C
GR1130010	B	A709	*falco peregrinus*	w	2	3	i	P	C
GR1130010	B	A442	*Ficedula semitorquata*	c				P	C
GR1130010	B	A723	*Fulica atra*	r				P	B
GR1130010	B	A723	*Fulica atra*	w	1900	8260	i		B

Natura code	G	Code	Scientific name	T	Size		Unit	Cat.	A|B|C|D
					Min	Max			Pop.
GR1130010	B	A078	*Gyps fulvus*	c				P	C
GR1130010	B	A075	*Haliaeetus albicilla*	c	1	4	i		A
GR1130010	B	A075	*Haliaeetus albicilla*	r	2	2	p		A
GR1130010	B	A092	*Hieraetus pennatus*	c				P	C
GR1130010	B	A339	*Lanius minor*	r				P	C
GR1130010	B	A176	*Larus melanocephalus*	c					A
GR1130010	B	A177	*Larus minutus*	c	13	13	i	P	C
GR1130010	B	A617	*Ixobrychus minutus*	r	1	9	p		B
GR1130010	B	A077	*Neophron percnopterus*	c				P	C
GR1130010	B	A159	*Numenius tenuirostris*	c	1	1	i		A
GR1130010	B	A071	*Oxyura leucocephala*	w	1	103	i		A
GR1130010	B	A020	*Pelecanus crispus*	c	250	700	i		A
GR1130010	B	A020	*Pelecanus crispus*	w	300	1200	i		A
GR1130010	B	A391	*Phalacrocorax carbo*	w	1200	10500	i		B
GR1130010	B	A393	*Phalacrocorax pygmaeus*	w	10	1270	i		A
GR1130010	B	A072	*Pernis apivorus*	r	1	1	p	P	C
GR1130010	B	A663	*Phoenicopterus roseus*	c	2000	5500	i		A
GR1130010	B	A663	*Phoenicopterus roseus*	w	1280	4100	i		A
GR1130010	B	A607	*Platalea leucorodia*	w	9	25	i		B
GR1130010	B	A700	*Plegadis falcinellus*	c	300	600	i		B
GR1130010	B	A692	*Podiceps nigricollis*	r	2	5	p		
GR1130010	B	A692	*Podiceps nigricollis*	w	50	240	i		B
GR1130010	B	A464	*Puffinus yelkouan*	w	700	1000	i		B
GR1130010	B	A397	*tadorna ferruginea*	w	30	30	i		B
GR1130010	B	A048	*Tadorna tadorna*	r	3	80	p	P	B
GR1130010	B	A048	*Tadorna tadorna*	w	860	2430	i		B

In the excerpt of the table below, the columns concerning the population data of the species of Annex II of Directive 92/43/EEC (*as selected by the study team of this EOA*) of the neighbouring Bulgarian BG0001032, which are also considered as the desired reference values (Table 24), have been isolated.

Table 24. Part of the standard data forms of the BG0001032 area (End 2021_07/02/2022), showing the Annex II species of handicrafts of the area according to Annex II of Directive 2009/174/EC, as well as the species *Canis lupus*, *Ursus arctos*, *Myomimus roachi*, *Elaphe sauromates*, *Spermophilus citellus*, *Vormela peregusna*, *Testudo hermanni*, *Testudo graeca*, listed therein and the conservation status of their ranges.

Natura code		Code	Scientific name	T	Size		Unit	Cat	A|B|C|D
					Min	Max			Pop.
BG0001032	M	1308	*Barbastella barbastellus*	p	725	1146	i	V	B
BG0001032	M	1352	*canis lupus*	p	25	30	i		B

Natura code		Code	Scientific name	T	Size		Unit	Cat	A|B|C|D
					Min	Max			Pop.
BG0001032	M	1310	*Miniopterus schreibersii*	r	2000	3500	i	C	B
BG0001032	M	1310	*Miniopterus schreibersii*	w	250	500	i	R	C
BG0001032	M	2617	*Myomimus roachi*	p	0	2	localiti es	V	B
BG0001032	M	1323	*Myotis bechsteinii*	p	973	1947	i	R	B
BG0001032	M	1307	*Myotis blythii*	p	3000	4500	i	C	A
BG0001032	M	1316	*myotis capaccinii*	w	11	50	i	V	C
BG0001032	M	1316	*myotis capaccinii*	r	2000	3500	i	R	A
BG0001032	M	1321	*Myotis emarginatus*	r	6000	10000	i	R	A
BG0001032	M	1324	*Myotis myotis*	r	3500	5000	i	C	A
BG0001032	M	1324	*Myotis myotis*	w	51	100	i	C	C
BG0001032	M	1306	*Rhinolophus blasii*	w	1000	1500	i	R	A
BG0001032	M	1306	*Rhinolophus blasii*	r	800	1200	i	R	A
BG0001032	M	1305	*Rhinolophus euryale*	w	101	250	i	V	C
BG0001032	M	1305	*Rhinolophus euryale*	r	500	1000	i	C	B
BG0001032	M	1304	*Rhinolophus ferrumequinum*	p	2000	3000	i	C	A
BG0001032	M	1303	*Rhinolophus hipposideros*	p	250	500	i	C	B
BG0001032	M	1302	*Rhinolophus mehelyi*	p	250	500	i	R	B
BG0001032	M	1335	*Spermophilus citellus*	p	11	11	colonie s	R	C
BG0001032	M	1354	*Ursus arctos*	p	1	2	i		C
BG0001032	M	2635	*Pre-melon peregusna*	p	2	2	localiti es	R	C
BG0001032	R	5194	*Elaphe sauromates*	p	1	1	localiti es	V	B
BG0001032	R	1219	*Testudo graeca*	p	136	136	localiti es	C	B
BG0001032	R	1217	*Testudo hermanni*	p	162	162	localiti es	C	B

Main pressures and threats they face

The pressures and threats to species of interest listed in Annex I of Directive 2009/147/EC, as well as to important species listed in Annex II of Directive 92/43/EEC, have been fully analysed in previous chapters of this Special Ecological Assessment. Also, 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 EIA (see Tables 5, 6 and 7 respectively). In the same chapter, the pressures and threats of the RIS GR009 have also been reported.

Ecological functions

The wider study area is a deep valley with dense riparian forest in places, surrounded by hills covered with broadleaf deciduous forest (mainly mature oak woodland that is freely grazed), scrub and grassland. It is one of the most well-preserved natural areas in Greece, where traditional forms of agriculture and extensive livestock farming continue to take place. The main human activity is animal husbandry. The area is very important for breeding and migratory birds of prey. 28 species of diurnal raptors have been observed in the area, of which 17 are nesting, making the area the second richest in raptor species in Greece after Dadia. The valley is particularly important for the conservation of three species of vultures. The area offers suitable conditions for the feeding of vultures (large livestock population, significant population of wild horses, sparse unlogged oak forest, geographical isolation of the area). The whole project is located within the Important Bird Area of Greece (Birds of Greece) with code GR009 and within the Natura 2000 network area with code GR1130012 and name 'Koimsatou Valley'. Furthermore, the wider area where the project is to be approved is located on the border between Greece and Bulgaria (Eastern Rhodopes). Almost all of the production permit polygons of the project under study are located within hardwood vegetation and transitional forest and shrubland, with a very small part of broadleaf forest covering the northern production permit polygon of the project.

Trends in the development of the Research Area

The special landscape of the area, which has been characterized as Thracian Meteora, combined with the rich birdlife, mainly of large birds of prey, has been a pole of attraction for mountaineers and nature lovers in recent years, while ecotourism infrastructure (paths, signage, etc.) has already been created.

The study area is located within an area of high wind potential and therefore there are many applications for wind farms, which are considered on a case-by-case basis and are only implemented if they are 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 study 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. APPROPRIATE IMPACT ASSESSMENT - ANALYSIS AND EVALUATION OF IMPACTS

In the previous sections the tables with the species recorded in the field survey area have already been presented, the important species of both the protected areas of the Natura 2000 network ZEP GR1130012 and GR1130010, and EEZ BG0001032, as well as the species of the SPA GR009, their protection status, their ecological requirements, threats etc.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 assessed as not likely to harm the integrity and conservation status of the area.

Impact assessment methodology/framework

In order to assess and evaluate the potential impacts of the proposed ESDP on the above mentioned species of avifauna important for the area, the ecological sensitivity of the species will be taken into account, the sensitivity to impacts from wind farm siting and other threats to these species and the estimated magnitude of each impact, based on field surveys and analyses (spatial distribution, height and behaviour of movements, critical nesting, roosting and feeding habitats, etc.)etc.).

On the basis of 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 their conservation status or the effort to restore them. As there are no satisfactory values or baseline values for the study area that can be derived from a Management Plan for the protected area, the values listed for some of the important species on the standard inventory forms can be defined as such.

As already mentioned, the potential impacts of the installation and operation of wind turbines on avifauna 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 the energy transmission network is assessed, and *direct habitat loss*, which concerns both the construction and operation phases of the project and essentially assesses the magnitude of the impact of direct habitat loss.

In view of the above, and given that the ESDP project under study will be installed in a small area (35.5 ha, see also in detail in the EIS), within habitat types that are abundant in the area, it is estimated a priori that the most significant potential impact to be investigated relates to impact mortality. No direct habitat loss is not expected to occur as the availability of similar habitat to existing habitat in the wider area is high in the area of the ADF site. In addition, the RAP foresees the horticultural restoration of the impact areas.

Similarly, the impact from disturbance and movement barriers is considered negligible as the EIA and the present proposals foresee the cessation of the installation of the W/F during the breeding season of birds, and the high availability of corresponding habitat types in the area and the small size of the intervention area preclude habitat fragmentation and habitat discontinuity. As mentioned above, the intervention within the production licence blocks of the studied wind farm will be much smaller than their total area, since only the areas within the blocks used for the installation of each wind turbine (foundation of the wind turbine, infrastructure works, etc.) will be affected.etc.), while the opening of access roads will be limited due to the existing existing road network in the wider installation area and will essentially be limited to sections of new pavements to connect the existing network to the turbine sites. Finally, the wider project area is not fenced off and disturbance, during the construction phase, will be of short duration and intensity and ultimately reversible after the end of the construction works.

Synergistic effects

ηςFor the assessment and evaluation of the effects on bird populations of the project under consideration, the synergistic effects of existing, approved or planned projects are also taken into account, 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 noted above in the impact assessment methodology, the impact categories that will be considered are impact *mortality due to impact, direct habitat loss,* and *disturbance and displacement due to barrier creation.*

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 (approved or planned) and mainly concern 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 for this is that in the first case the project in question may be small in size with little or no impact, mainly 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, regardless of the assessment of the project in question, numerous projects, regardless of the size of the impact, may be located within a larger radius and multiply the impact of the project under consideration. It is considered that the most worthy of reference and examination are the NPPs 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 area of the project, which as mentioned above is located within the GR1130012 and GR009 SPA, there are no installed wind farms (operating license) (Source: P.A.E., available on 20/10/2022). The nearest wind farm with an operating license is located at an average distance (in a straight line) of more than 16 km (outside the protected areas under study), southwest of the production license blocks of the project under study.

There are no wind farms with an installation permit in the wider project area and within a radius of 10 km (Source: R.A.E., available on 20/10/2022). The nearest wind farm with an installation permit is located at an average distance (in a straight line) of more than 200 km.

In the wider area of the project under study, and within a radius of 10 km, there are nine NPPs that have been granted a production license (Source: P.A.E. available on 20/10/2022), which have a total capacity of 345.4 MW, occupy a total area of

2,880.73 ha (total area of the nine NPPs' production license blocks) and consist of 71 wind turbines. It is worth noting here that, as shown in Map 110, the MOSSIS, KIARA, AMOREMA - GLYFADA and ANGELIKOULA wind farms are partially located within the 10 km radius area.

In more detail:

- Of the MOSSIS wind farm, which covers an area of 1,774.31 ha, which as shown in Table 12 above, has a total capacity of 198 MW and consists of 33 wind turbines (the individual capacity of each wind turbine of this wind farm is 6 MW), only 577.33 ha are located within the 10 km radius area and only 11 wind turbines are located within it.
- Out of the wind farm of 192.53 ha, which has a total capacity of 35 MW and consists of 7 wind turbines (the individual capacity of each wind turbine of this wind farm is 5 MW), only 3.95 ha are located within the 10 km radius area, while none of the 7 wind turbines of this wind farm are located within the 10 km radius area.
- Of the AMOREMA - GLYFADA, which covers an area of 54.33 ha, has a total capacity of 3 MW and consists of one wind turbine, only 30.21 ha are located within the 10 km radius area.
- Of the 32.36 ha KIAARA wind farm, which has a total capacity of 3 MW and consists of one wind turbine, only 5.59 ha are located within the 10 km radius area, while the only wind turbine of this wind farm is located outside the area.

Therefore, the total area of the production licence blocks of the nine GISPs located within the 10 km radius area amounts to 1 632,87 ha, while the total number of wind turbines of the nine GISPs located within the 10 km radius area amounts to 41 wind turbines, resulting in a total MW of 175,4 MW within the 10 km radius area. Furthermore, of the nine wind turbines located within the 10 km radius area, four are located outside the protected areas under study (GR1130012 and GR009), while two are partially located within the protected areas.

Of the nine NPPs licensed for production and located within the 10 km radius area, two are less than 5 km away (4.06 and 4.20 km respectively - *see Table 12 and Map 110*), while the other seven are between 5 and 10 km away.

With regard to the main protected areas under study, within which the project is located, ZEP GR1130012 and SPA GR009, given the differentiation of their boundaries and the location of some of the AESEs only within one of the above protected areas, in order to better address the synergistic impacts of the project under study, the study team of the present Special Ecological Assessment chose to take into account the wider boundaries of the entire area enclosed within the two above areas. Also, given the ecological importance of the above areas and given the location of some of the ESIAs outside the boundaries of the whole area enclosed within the two areas under study, but within a very short distance around the perimeter of these areas, it was chosen by the study team of this SEA to take into account, in order to better control the synergistic effects on the protected areas concerned, a peripheral zone of 2 km around the perimeter of the whole area enclosed within these areas. Therefore, the area resulting from the combination of the boundaries of the two above-mentioned areas together with the 2 km peripheral zone will henceforth be referred to as the 'synergistic impact study area' (PIA) (Map 111).

Therefore, within the P.M.S.E., there are 21 NPPs (including the one under study) in the licensing stage under production (production license) (Map 112). At this point it is worth noting, due to the fact that of all the above NPPs, some of them are partially located within or on the boundaries of the synergistic impact study area, both the area of the production license blocks of the above NPPs located within the PPA will be counted in the analysis and assessment of synergistic impacts, and the total number of wind turbines located within it. Thus, out of the total of 4,705.65 ha, an area which constitutes the total of the production licence blocks of the 21 wind turbines (including the one under study) sited either within, or partially within, or within the boundaries of the synergistic impact study area, only 2.464,48 ha are located within the study area, while of the total of 136 wind turbines, which make up the above mentioned wind turbines (together with the 24 wind turbines of the project under study), only 85 are located within the synergistic impact study area.

Although the number of wind turbines to be installed is relatively high for the region, all of these are for wind farms that are in the production license and as mentioned in the previous section, they 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 impacts compared 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 measures to address potential impacts are proposed in the following section, based on the new technologies provided, which in most of the existing parks in the region, do not exist.

Mortality due to impact

As already mentioned, the risk of birds colliding with wind turbines is the most significant direct risk due to the operation of wind turbines. The species most at risk are the corpse-eating - large predatory species that mainly exploit 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 damaging 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 population replacement). Therefore, the risk of impact for these species can have a significant impact at the level of the population and at the level of the population. Among the species at high risk of impact are, 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 during 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 crash incidents that have been recorded 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 in the developing or already established LEPs. Most mortality incidences occur in the scavenging black vulture and vulture species.

According to the impact victim search programme in 9 existing wind turbines 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. Taking these estimates into account, with respect to the 24 turbines under license (under production) of the project under study within the "synergistic impact study area", since, as noted above, there are no installed turbines (licensed) within the "synergistic impact study area", the annual mortality rates are 3.65 and 4.15 for raptors and vultures, respectively. In the case of the scenario, under which all of the GHPs under licensing will be licensed (this assessment is the worst case scenario), within the "synergistic impact study area" there will be 85 wind turbines (under production licensing), the estimated mortality rates will be 12.92 and 14.71 for raptors and vultures respectively. The above reported rates are 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, actual mortality within the entire "synergistic impact study area" may differ significantly (estimated to be much lower) as the above estimates on which are based refer to a wider geographic area with a significantly higher presence of cadaveric and predator species.

In conclusion, regarding the project under study, the contribution that its construction may have on the overall cumulative impact due to impact on energy infrastructure of the species of interest (with emphasis on scavengers - large predators, but also on other large species of interest, such as e.g.e.g. black-bellied kingfisher, silver pelican, roseate pelican) is initially estimated to be relatively high in relation to all existing (there are no installed ESUs within the synergistic impact study area) and under-licensing energy infrastructure, as demonstrated above. However, the above should take into account that the installed wind farms surveyed that yielded the adjusted raptor mortality rates (0.152 and 0.173 for raptors and vultures, respectively) were located in a wider geographic area with significantly higher scavenger and raptor species presence, and were operating with virtually no mitigation measures to address potential negative impacts, and a plethora of corresponding Therefore, the **contribution that** the **construction may have on the overall cumulative impact due to collision with** energy infrastructure of the species of interest (with emphasis on scavengers - large predators, but also other large species of interest, such as e.g. black-backed gull, silver pelican, roseate pelican) **is estimated to be low.**

Habitat loss and degradation

All of the installed wind farms and their accompanying projects may limit 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 polygons of the APEs, although associated projects such as access roads may extend for several kilometres outside of them. 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 the new RES-EES are located, are not easy to separate in terms of their impact from those parts of the road network that are also used as access roads to RES-EES.

In order to carry out the assessment of this paragraph, a number of assumptions were used, such as that all of the land within the polygons of the licensed LPAs 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 less than this as the encroachment within the LPAs' occupation polygons will be much less (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 ESDP for the increase in road density (as it is no longer known which alignment will be followed for each planned ESDP, whether this will follow existing road construction or new road construction, etc.).

Table 25. Calculation of habitat loss (in ha), in case of approval of all licensed LULUCFs (licensing stage under production), within the considered overall synergistic impact study area (worst case scenario)

Explanation of Corine land cover 2018 codes	Corine land cover 2018 codes	Area of coverage in the whole synergistic study area (ha)	Extent of habitat coverage of all polygons of the under license (under production) within the total synergistic impact study area (ha)	Estimated percentage of area likely to be affected by habitat loss (% of each habitat of the total synergistic impact study area)
Discontinuous urban fabric	112	274,11	-	-

Explanation of Corine land cover 2018 codes	Corine land cover 2018 codes	Area of coverage in the whole synergistic study area (ha)	Extent of habitat coverage of all polygons of the under license (under production) within the total synergistic impact study area (ha)	Estimated percentage of area likely to be affected by habitat loss (% of each habitat of the total synergistic impact study area)
Road and rail networks	122	182,61	-	-
Non-irrigated arable land	211	1.403,64	-	-
Permanently irrigated arable land	212	1.547,05	14,08	0,91
Meadows	231	124,41	-	-
Composite crops	242	823,89	-	-
Land used mainly for agriculture together with significant parts of natural vegetation	243	2.113,61	59,89	2,83
Broadleaf forest	311	12.216,91	813,22	6,66
Coniferous forest	312	180,67	-	-
Mixed forest	313	1.781,54	44,21	2,48
Natural pastures	321	969,67	108,77	11,22
Hardwood vegetation	323	14.603,87	953,88	6,53
Transitional woodland and scrubland	324	6.882,29	470,44	6,84
Beaches, dunes, sandy beaches	331	161,27	-	-
Areas with sparse vegetation	333	272,20	-	-
Swamps in the hinterland	411	85,47	-	-
Watercurrents	511	91,36	-	-

Table 26. Calculation of habitat loss (in ha), in the case that out of all of the LULUCF (under production), only the project under study within the considered synergistic impact study area receives a permit (best case scenario)

Explanation of Corine land cover 2018 codes	Corine land cover 2018 codes	Area of coverage in the whole synergistic impact study area (ha)	Extent of habitat coverage of all polygons of the project under study within the total synergistic impact study area (ha)	Estimated percentage of area likely to be affected by habitat loss (% of each habitat of the total synergistic impact study area)
Discontinuous urban fabric	112	274,11	-	-
Road and rail networks	122	182,61	-	-
Non-irrigated arable land	211	1.403,64	-	-

Explanation of Corine land cover 2018 codes	Corine land cover 2018 codes	Area of coverage in the whole synergistic impact study area (ha)	Extent of habitat coverage of all polygons of the project under study within the total synergistic impact study area (ha)	Estimated percentage of area likely to be affected by habitat loss (% of each habitat of the total synergistic impact study area)
Permanently irrigated arable land	212	1.547,05	-	-
Meadows	231	124,41	-	-
Composite crops	242	823,89	-	-
Land used mainly for agriculture together with significant parts of natural vegetation	243	2.113,61	-	-
Broadleaf forest	311	12.216,91	28,16	0,23
Coniferous forest	312	180,67	-	-
Mixed forest	313	1.781,54	-	-
Natural pastures	321	969,67	-	-
Hardwood vegetation	323	14.603,87	323,97	2,22
Transitional woodland and scrubland	324	6.882,29	308,76	4,49
Beaches, dunes, sandy beaches	331	161,27	-	-
Areas with sparse vegetation	333	272,20	-	-
Swamps in the hinterland	411	85,47	-	-
Watercurrents	511	91,36	-	-

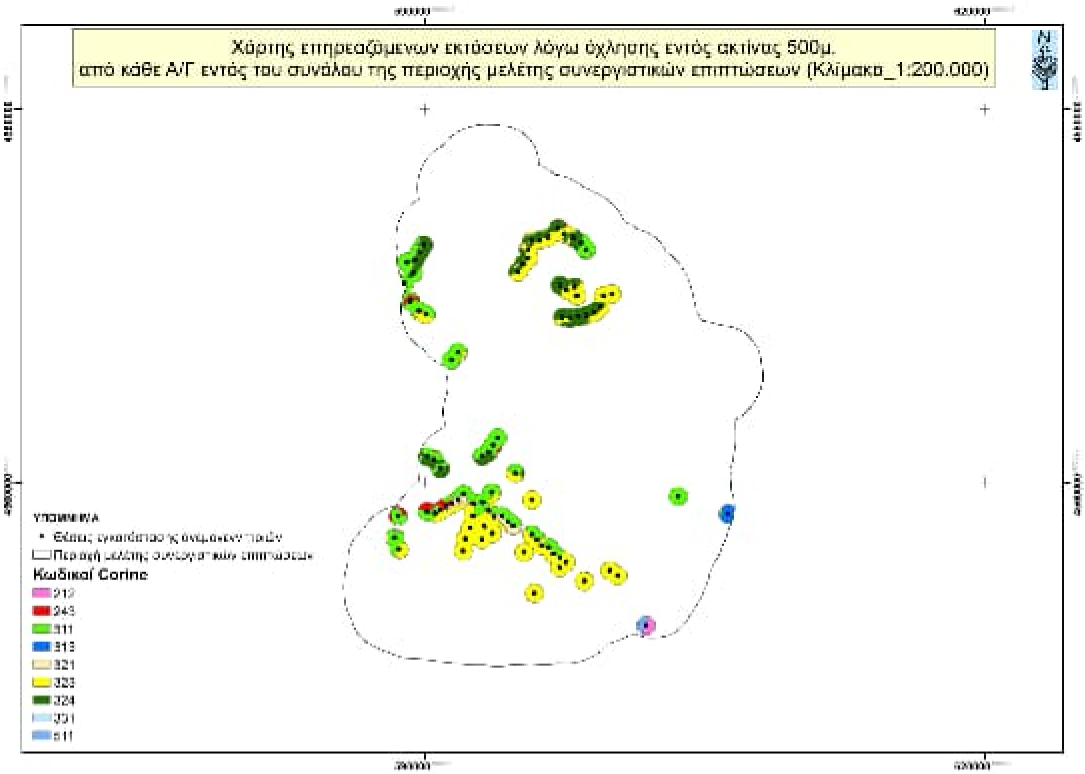
From the percentages calculated in Table 25 above, in the case that all of the licensed RESEs (licensing stage under production) will be licensed (worst case scenario), as there are no existing RESEs within the synergistic impact study area, the estimated losses in descending order are in the following habitats: natural grassland, transitional woodland and scrub, broadleaf forest, hardwood forest, land used mainly for agriculture together with significant parts of natural vegetation, mixed forest and permanently irrigated arable land. The above habitats dominate according to the land cover database and mapping (Corine land cover 2018) reflected in the documentation maps (see Map 7), covering a total of more than 91% (212: 3.54%, 243: 4.84%, 311: 27.95%, 313: 4.08%, 321: 2.22%, 323: 33.41%, 324: 15.74%) the area of the synergistic impact study area, while study habitats also abound outside of it.

However, according to Table 26 above and the percentages calculated therein, in the case that out of the total number of LULUCFs under licensing (licensing stage under production), only the project under study is licensed (best case scenario), the estimated habitat losses are minimal and concern, in descending order, the following habitats: transitional woodland and scrub, hardwood and broadleaf forest. The above habitats dominate, according to the land cover database and mapping (Corine land cover 2018) reflected on the documentation maps (see Map 7), totalling over 77% of the synergistic impact study area. Therefore, due to the fact that the study project is located within habitats that are abundant throughout (and outside of) the synergistic impact study area, due to the fact that the contribution of this project to cumulative/co-occurring impacts is small (there are no installed wind farms within the synergistic impact study area, but also not in the vicinity), it is considered that this project will have very little impact on habitat loss/degradation in the study area and the wider

Nuisance, displacement and barrier creation

The expected cumulative impacts due to disturbance during both the construction and operational phases of the ESPOs are related to the construction works of the ESPOs and their accompanying infrastructure, as well as the operation of the ESPOs and the use of the accompanying works (e.g. roads), which as a whole have been associated with the displacement of species due to disturbance and avoidance efforts. With regard to the construction phase, the impact of disturbance will last for a limited period of time, therefore any potential impact will be short term, non-transient and reversible.

The assessment of cumulative impacts due to displacement, either as an indirect effect of disturbance or for avoidance of the wind turbine and its associated works that may be encountered by bird species, was carried out on the assumption that the total activity of the species is halved within 500 m of the wind turbine installation sites from the wind turbines. Based on this, the total area within which a halving of the activity of species of interest is expected to occur was calculated, which was assumed to include areas with scattered patches of necessary resources for avifauna, such as suitable nesting, cover, roosting, foraging, 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 would not be a complete cessation of activity for avian species, and therefore there is no question of loss of all such habitat (Map 135, Tables 27 and 28).



Map 135. Map of affected habitat area due to disturbance within a 500 m radius of each W/T, in the case of approval of all the licensed W/Ts (licensing stage under production), within the considered synergistic impact study area (worst case scenario).

Table 27. Calculation of the affected area (in ha) of nuisance degradation within 500 m radius of each W/T, in the case of approval of all the licensed AOCs (licensing stage under production), within the considered synergistic impact study area (worst case scenario)

Explanation of Corine land cover 2018 codes	Corine land cover 2018 codes	Area of coverage in the whole synergistic study area (ha)	Estimated area of affected habitat of species of interest around the perimeter of the entire permitting area W/T (500 m radius) within the total synergistic impact study area (ha)	Estimated percentage of area likely to be affected by disturbance (% of each habitat in the synergistic impact study area)
Discontinuous urban fabric	112	274,11	-	-
Road and rail networks	122	182,61	-	-
Non-irrigated arable land	211	1.403,64	-	-
Permanently irrigated arable land	212	1.547,05	43,22	2,79
Meadows	231	124,41	-	-
Composite crops	242	823,89	-	-
Land used mainly for agriculture together with significant parts of natural vegetation	243	2.113,61	118,69	5,62
Broadleaf forest	311	12.216,91	1.423,94	11,66
Coniferous forest	312	180,67	-	-
Mixed forest	313	1.781,54	59,22	3,32
Natural pastures	321	969,67	119,46	12,32
Hardwood vegetation	323	14.603,87	1.966,32	13,46

Explanation of Corine land cover 2018 codes	Corine land cover 2018 codes	Area of coverage in the whole synergistic study area (ha)	Estimated area of affected habitat of species of interest around the perimeter of the entire permitting area W/T (500 m radius) within the total synergistic impact study area (ha)	Estimated percentage of area likely to be affected by disturbance (% of each habitat in the synergistic impact study area)
Transitional woodland and scrubland	324	6.882,29	795,26	11,56
Beaches, dunes, sandy beaches	331	161,27	4,32	2,68
Areas with sparse vegetation	333	272,20	-	-
Swamps in the hinterland	411	85,47	-	-
Watercurrents	511	91,36	30,97	33,90

The percentages of the areas calculated in Table 27 above, and depicted in Map 135, refer to the case where all of the licensed RES-E under license (licensing stage under production) will be licensed (worst case scenario). The habitats experiencing losses due to displacement, relative to the total available suitable habitat within the synergistic impact study area, in descending order, are: Watercourses, hardwood vegetation, natural grassland, broadleaf forest, transitional woodland and scrub, land used primarily for agriculture together with significant portions of natural vegetation, mixed forest, permanently irrigated arable land and beaches, dunes, sand dunes. The above habitats dominate according to the land cover database and mapping (Corine land cover 2018) reflected in the documentation maps (see map 18), covering in total more than 92% (212: 3.54%, 243: 4.84%, 311: 27.95%, 313: 4.08%, 321: 2.22%, 323: 33.41%, 324: 15.74%, 511: 0.21, 331: 0.37) the area of the synergistic impact study area, and abound outside of this area.

Table 28. Calculation of the affected area (in ha) of degradation due to disturbance within 500 m radius of each W/T, in case of approval of only the project under study, within the synergistic impact study area (best case scenario).

Explanation of Corine land cover 2018 codes	Corine land cover 2018 codes	Area of coverage in the whole of the protected area (ha)	Estimated area of affected habitat of species of interest around the perimeter of the licensed W/T of the project under study (500 m radius) (ha)	Estimated percentage of area likely to be affected by disturbance (% of each habitat in the synergistic impact study area)
Discontinuous urban fabric	112	274,11		
Road and rail networks	122	182,61		
Non-irrigated arable land	211	1.403,64		

Explanation of Corine land cover 2018 codes	Corine land cover 2018 codes	Area of coverage in the whole of the protected area (ha)	Estimated area of affected habitat of species of interest around the perimeter of the licensed W/T of the project under study (500 m radius) (ha)	Estimated percentage of area likely to be affected by disturbance (% of each habitat in the synergistic impact study area)
Permanently irrigated arable land	212	1.547,05		
Meadows	231	124,41		
Composite crops	242	823,89		
Land used mainly for agriculture together with significant parts of natural vegetation	243	2.113,61	4,09	0,19
Broadleaf forest	311	12.216,91	84,01	0,69
Coniferous forest	312	180,67		
Mixed forest	313	1.781,54		
Natural pastures	321	969,67		
Hardwood vegetation	323	14.603,87	582,42	3,99
Transitional woodland and scrubland	324	6.882,29	526,19	7,65
Beaches, dunes, sandy beaches	331	161,27		
Areas with sparse vegetation	333	272,20		
Swamps in the hinterland	411	85,47		
Watercurrents	511	91,36		

However, according to Table 28 above, and the percentages calculated therein, in the event that out of the total number of LULUCFs under licensing (licensing stage under installation and under production), only the project under study is licensed (best case scenario), the estimated habitat losses due to displacement in relation to the total available suitable habitat within the whole protected area, where a reduction of the activity of the species of interest by half (50%) is expected, is minimal and relates to a decreasingly low level of habitat loss. The above habitats dominate, according to the database and land cover mapping (Corine land cover 2018) reflected on the documentation maps (see Map 7), covering a total of more than 81% of the synergistic impact study area. Therefore, due to the fact that the project under study is located within habitats that are abundant throughout (and outside of) the synergistic impact study area, due to the fact that the contribution of this project to cumulative/collateral impacts is small (there are no installed wind farms within the synergistic impact study area, nor in the vicinity), it is considered that this project will have zero impact on disturbance and displacement of important habitats for species of interest in the study area and the wider area.

According to the above percentages of areas where a reduction in the activity of avifauna species is expected, the activity of each species recorded through field survey and their sensitivity to disturbance and displacement, the species that are expected to face minor impacts on the populations operating within the study area, **should all of the licensed LWRs be** licensed and installed, are large raptors-scavengers, as well as other species with

Given all the above mentioned information, it is concluded that there are no significant synergistic impacts from the installation and operation of the project under study in relation to the existing ones in the wider area, as there are no installed RES-EEs in the wider study area, as mentioned above. Also, in the theoretical case that the worst case scenario of the installation of all the licensed wind turbines is verified, although the synergistic effects are expected to be relatively high, the additive effect of the total of 24 wind turbines of the study project, based on the above analysis, is not expected to be of such an extent that it would negatively affect the protected objects of the protected areas concerned, their conservation status, conservation objectives, etc., given that, in the above direction, the project would help to reduce the negative impact of the wind turbines on the protected areas, their conservation status, conservation objectives, etc. The potential impacts of the installation and operation of the project under study are analysed below.

Analysis of records of important bird species (species listed in Table 29) - Impact risk assessment

Table 29 below records, for the important raptor and other large species observed in the area, the number of transits, the number of transits per hour of raptor (and other large bird) sightings, 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 shall be the time during which field observers were at the observation positions at the raptor point observation stations from monitoring sites. 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 of these points - routes were recorded and counted in the table below**, these were considered as random (***not random passages of raptors, but random sightings of raptors***) 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, referred to as raptor observation time. The result of this more rigorous approach by the study team is that a higher number of raptor crossings of individuals per raptor observation hour occurs, i.e. an overestimation of the above indicator, which was considered preferable to any underestimation of it (if the recording time of other avian species was included as recording time), in this ecologically important area for raptors.

The total minutes of raptor observation during the field recordings, based on the above, was 42,242 (or 704.03 hours). Three proximity zones related to the project under study were defined based on the turbine installation locations. 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 the potential for disturbance and impact increases. 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 between 50 and 220 metres, which is the height at which the blades of the turbines rotate, and is considered to be 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 predator species of the ADFE. Scottish Natural Heritage reports a methodology for the overall estimate of the 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 that a particular species will impact when passing, without performing an avoidance effort, through the rotor surface. The number of passes of the species through the virtual rotor 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 ASPHE (risk window) is used and extrapolated to the total surface area defined by the rotors (in the one-dimensional version of the model which is simply passes perpendicular to the axis of the ASPHE). 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 for the calculation of impacts:

A) Impact risk

For some of the species to be analysed, the choice of the model involving simple passages of individuals through the risk window (no extensive use of the site, e.g. foraging, etc.) was used since it was estimated based on their flight frequency and behaviour that this best simulates the observed flights and behaviour of the specific recorded species in the area (Scaup, Scaup, Peregrine Falcon, Cormorant, Hawk Eagle). However, for the assessment of the impact risk of black-headed gull, vulture, hornbill, golden eagle, black-headed eagle and black-crowned nightjar, in this study, the version of the model that takes into account the volume of the area within which the species operate (in three dimensions) was applied, since these species appear 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 data of the model of the wind turbines to be used in the wind farm. 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 passes by rotors per year

The calculation of the number of passes by the rotors 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 ASPHE, and height equal to the maximum height covered by the passes Hmax = wing length + tower height). The number of all passages that intersected the axis joining the turbines at the risk window surface were taken into account.

So:

$Aw\ (m^2) = W \times H_{max}$

Similarly, the area covered by the rotors (AR) is calculated on the basis of the number of rotors (N) and the area covered by the rotors, i.e:

$AR\ (m^2) = N \times \Pi R^2$

Where:
R is the length of the blade

Based on the number of observed passages through the risk window, a reduction was made to a period of one year (taking into account the period in 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 observed passes
L = total hours of observations of raptors in the ESU
M = number of months the species has been 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 rotor surface 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 on the basis of the passages per year T, and the impact risk: C= T x F

The above estimated number was corrected based on an internationally accepted avoidance rate value of 98% (Eichhorn et al. 2012, Vasilakis et al. 2016), so we obtain the final estimate. However, given that Band's model has been criticized mainly as the predetermined and fixed avoidance rate of wind turbines for each species, and the fact that the above avoidance rate has been derived for ideal visibility conditions with good weather conditions, the study team preferred for the specific area in which the site appears to be used by the hornbill, black-headed eagle, black-crowned grebe, vulture, golden eagle and black-crowned kingfisher, but also used by simple passages of other important predators, due to the general sensitivity of the area and the adverse weather conditions that may seasonally prevail in the area, limiting the visibility of the species and hence their degree of avoidance, given the site's location close to the Komsato River and its tributaries, in addition to the widely used avoidance rate of 98%, the much stricter avoidance rate of 95% should be used. The study team considered that the use of the above avoidance rate is sufficient to avoid the underestimated likelihood of collision of the above species and did not proceed to use an even stricter rate as in any case the proposed mitigation measures that follow in subsequent sections of this paper even suggest the shutdown of wind turbines when adverse weather conditions prevail that cause a restriction of bird visibility (e.g.e.g. wind farm shutdown in conditions of limited visibility due to cloud cover and extremely adverse weather conditions, etc.).

Table 29. Data from the flight analysis of important predators in the area

Kind of	Number of individual crossings	Individual passages per hour of predator observation	Crossings within Zone A (Outside Direct Effect Zone)	Transits within Zone B	Transits within Zone C	Crossings within the Direct Effect Zone
Accipiter brevipes	2	0,002840788	1	1		
Aegypius monachus	18	0,025567092	6	6	1	4
Aquila chrysaetos	27	0,038350638	6	14	2	5
Ciconia nigra	37	0,052539653	8	17	3	7
Circaetus gallicus	72	0,102239325	14	38	4	16
Circus aeruginosus	3	0,004261182	1	2		
Circus cyaneus	1	0,001420394		1		
Circus pygargus	1	0,001420394		1		
clanga pomarina	1	0,001420394		1		
Falco eleonorae	2	0,002840788		2		
Falco peregrinus	3	0,004261182	1	2		
Gyps fulvus	50	0,071019700	13	22	5	7
Hieraetus pennatus	13	0,018465122	2	3	4	4
Milvus migrans	1	0,001420394		1		
Pandion haliaetus	2	0,002840788	1	1		
Pelecanus cripsus	7	0,009942758	2	4	1	
Pelecanus onocrotalus	4	0,005681576			1	
Pernis apivorus	59	0,083803247	22	24	6	7
Phalacrocorax carbo	37	0,052554578	14	21		2

**One individual passage of Aegypius monachus took place outside the impact zones with the wind turbines of the studied AEGIE (distance greater than 2 km).*

***One flight of Ciconia nigra, which involved the passage of two individuals, took place outside the impact zones with the wind turbines of the studied wind farm (distance of more than 2 km).*

****Two flights of Gyps fulvus, one of which involved a two-person crossing (hence three individual crossings), took place outside the zones of influence with the wind turbines of the studied wind farm (distance of more than 2 km).*

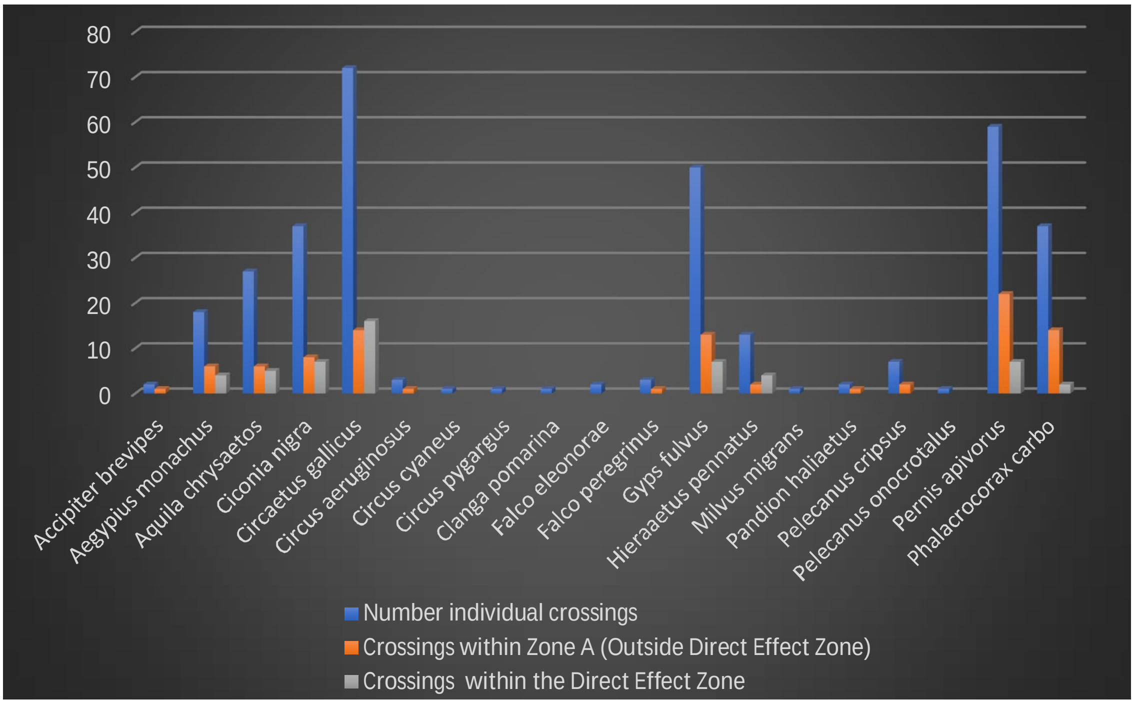


Figure 1: Total number of movements of important predators and movements in zone A and in the zone of direct influence of the ESDP

Black vulture (*Aegypius monachus*)

As mentioned in the previous section, the species was recorded 14 times (a total of 18 individuals) in the study area during observations in November 2021, January 2022, March 2022, May 2022, July 2022, August 2022 and September 2022, with four of the total records involving two individuals per flight. Of these four recordings involving two person crossings per flight, one took place within Zone A (distance less than 250 m from the location of the nearest wind turbine of the wind turbine under study), two took place within Zone B (distance between 250 to 1.000 metres from the location of the nearest wind turbine of the wind turbine under study) and the fourth was carried out within the Direct Impact Zone (distance of less than 100 metres from the location of the nearest wind turbine of the wind turbine under study, but with a flight altitude of more than 50 metres and less than 220 metres). Of the remaining ten single records (one person crossing per flight), two were made within the Direct Effect Zone, four were made within Zone A, two were made within Zone B, one was made within Zone C (distance between 1.000 to 2 000 m from the location of the nearest wind turbine of the wind turbine under study) and the last one was carried out outside the zones of influence with the wind turbine (distance of more than 2 km from the location of the nearest wind turbine).

According to the most recent data and the literature review resulting from Xirouhakis (2019) and the deliverable of the LIFE16 IPE/GR/000002 project [*Action*

Plan for three scavenging species of avifauna (vultures): Vulture (Gypaetus barbatus), Vulture (Gyps fulvus), Black Vulture (Aegypius monachus)] "*the Black Vulture in Greece has never been a widespread species, probably due to its dependence on forest ecosystems (with clusters of specific forest species with large, mature trees suitable for breeding), which have low availability at the national level. In the 1970s the species maintained three isolated subpopulations, in the forest of Dadia in Evros with 15 pairs, in Olympus with 2 pairs and in Parnassos and Giona with the presence of mature individuals (Map 3.3-4). At the same time there were observations of wandering individuals on the northern border of the country with Bulgaria and North Macedonia (Hallmann 1985; Handrinos 1985; Grubač 1997). Until the 1990s the population of the species had a strong downward trend (Map 3.3-3). The colony of Dadia by 1979 had declined to 4-5 pairs and to no more than 26 individuals, while the small breeding core of Olympus disappeared by 1988 (Xirouchakis and Tsiakiris 2009). Thus, the last and only breeding population of the species in southeastern Europe remained in Evros. In the period 1987-2005, thanks to targeted management actions, led by the provision of food, the species began to recover. In particular, after the establishment and operation of the first raptor feeding station in Greece in 1987, the population reached 20 pairs and 68 individuals in 1994 (Poirazidis et al. 1997, Vlachos et al. 1999, Skartsi et al. 2008). This increasing trend was interrupted by incidents of mass poisoning of mature birds in 1995 and in the period 1995-2000 it showed a characteristic population stagnation, with 19-22 pairs. Today the population of the species is estimated at 28-35 pairs based on the breeding behaviour of adults or 120-130 individuals based on counts at the feeding site of Dadia (Skartsi and Poirasidis 2002; Skartsi et al. 2010; BirdLife 2017; Bakaloudis pros. comm.).*"

The European population of the species is estimated at 2,900-3,400 pairs (5,800-6,700 mature individuals), while in the EU28, according to the IUCN red list, the population is estimated at 2,600-2,700 pairs (5,200-5,400 mature individuals). The Greek population of the species is estimated to number 30-35 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 the IUCN at European level 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 II).

In Europe, as in Greece, its population has been increasing in recent years. At the European level, due to its wide range and the increasing population trend in recent years, the species is classified as "Least Concern", while at the global level its conservation status has been updated from "Threatened" (1988) to "Near Threatened" (2004 and onwards) (BirdLife International 2018).

It is a species that nests solitarily and with obvious fidelity to the nesting sites. Compared to the cow vulture, it makes short movements, especially in the non-breeding age. It frequents wooded semi-mountainous and mountainous areas and nests in mature pine trees surrounded by small openings or low vegetation on very steep slopes. Its feeding areas are characterised by pine forests, oak forests, beech forests with forest clearings, meadows and small fields. It feeds on small and medium-sized mammal carcasses, choosing hard body parts such as skin, flesh and even small bones that it can swallow whole. It is often observed in the Dadias National Park to steal from the ground the turtles that are snatched and broken by the golden eagle (Skartsis and Poirazidis 2002). The breeding season lasts from mid-January to mid-March, with the majority of nesting occurring in late March. It lays an egg that incubates for 50-55 days, with the chick hatching after about 100 days. The reproductive success of the species in the period 1994-2005 averaged 72% (feathered chicks/spawning pairs).

Secondary poisoning is the most serious threat to the species (Goutner et al. 2011), and the siting of wind farms in foraging areas is an additional source of mortality. Land-use changes and animal encroachment degrade foraging habitat.

A protected species, the entire breeding population in Greece is found in the National Park of Dadia, where most nests are located within the Strict Protection Zone. The long-term supplementary feeding carried out in the Dadia Nature Reserve has made a very positive contribution to the survival of the population, especially the juveniles. A significant part of the feeding sites outside the Dadia Nature Reserve is also found in areas of the SPA/Natura 2000 network.

Strict control of the illegal use of poisoned baits, enhancement of free grazing and improvement of ungulate populations within and outside the boundaries of the National Park of Dadia is needed. The correct siting of wind farms in the feeding areas outside the PDO can reduce the incidents of impacts on wind turbines and their accompanying works. Supplemental feeding should continue unless the current parameters that shape natural food levels and threat intensity change. Permanent monitoring of population parameters, movements and threats to the species is essential to evaluate the implementation of any proposed conservation measures.

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

- Forest plantations for wood production
- Intensive and stabled livestock farming
- Residential development, urban or extra-urban, legal or arbitrary
- Renewable energy: Wind farms
- Construction of all categories of roads and railways
- Transmission lines (electricity, telephone), oil and gas pipelines
- Illegal use of poisoned baits to control "harmful" mammals
- Persecution of specific users as harmful
- Improper forest management
- Activities causing disturbance (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 interventions, irrigation networks
- Abandonment of traditional agricultural practices and land use, including the abandonment of extensive farming and livestock farming
- Changes in the extent and distribution of habitats due to climate change

The threats listed on the IUCN red list are direct human-induced mortality (accidental or deliberate) and reduced food availability. The use of poisoned baits to kill 'noxious' predators, poaching and nest destruction are additional threats to the species. In Europe, the reduced availability of food stocks was previously caused by European Union legislation on carcass disposal. However, recently adopted regulations will allow the operation of feeding stations (feeders). In Eastern Europe, particularly in the former Soviet Union, changes in agricultural practices and human migration from rural to urban areas have significantly reduced the number of domestic animals. In Georgia and Armenia, the reductions may be related to the loss of subsidies for sheep farming in the post-Soviet era. In addition, there have been sharp declines in many wild ungulate populations that provide an important food source for the species. Habitat loss is also considered significant (Anon. 2004). Outside Europe, the majority of birth losses occur during the incubation period and it is suspected that this may be due in part to low and fluctuating temperatures (Batbayar et al. 2006), so changes in air temperatures resulting from climate change may be a potential future threat to the species.

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

- Research to determine population trends of the species in breeding areas outside Europe, as well as in wintering areas.
- Research on threats to the species, particularly the decline in the abundance of its prey.
- Carry out reintroductions to link the western and eastern range of the species, following the recommendations of the IUCN and the Foundation for the Conservation of the Black-backed Woodpecker.
- Development of a captive breeding program and future reintroduction efforts.
- Restoration of wild rabbit (*Oryctolagus cuniculus*) populations in the Iberian Peninsula and the Balearic Islands, as this may help increase food availability, particularly during the breeding season.
- Promote cooperation and information exchange between people and organisations working on the species, both nationally and internationally.
- Strengthen legislation regulating trade in poisons used to poison meat baits.
- Prosecutions and further toughening of penalties for illegal poisoning.

The activity of the species and the intensity of crossings per hour of observation (and even with the strictest estimate of this which refers only to the hours of raptor recording) in the whole field survey area of the W/F was very low (0.026 crossings per hour) and is below the lower limit of the range of the corresponding measurements at other viewpoints and W/Fs in the Thrace region (Carcamo et al. 2011) which is from 0.07 to 0.44 crossings per hour approximately. The comparison is indicative as the above range of values refers to installed ESUs, 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 twice the reported value.

The impact risk for the black-winged blackbird, for flight speeds from 5.45 m/sec to 15.4 m/sec, ranges between 8.6% and 23.3%, while the rotor passes per year are 8.58 passes/year. Therefore, the expected impacts (without avoidance) are from 0.738 to 1.999 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 **0.015 to 0.040 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 **0.037 to 0.100 impacts per year.** At this point it is worth noting that the study team used the most stringent criteria to derive the above results, such as that all of the recorded species flights involved site use and not simply passing through the site. The strict way of evaluating impact estimates described above, although it increases the final estimate of impacts of this species per year, was considered by the study team to be more appropriate to use and derive the results in this way because of the ecological importance of the study area, preferring to overestimate the values, but in no way underestimating them.

In the following, we present the visualization of the activity of the species using Kernal density algorithms 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 distance from the wind turbines to be installed.

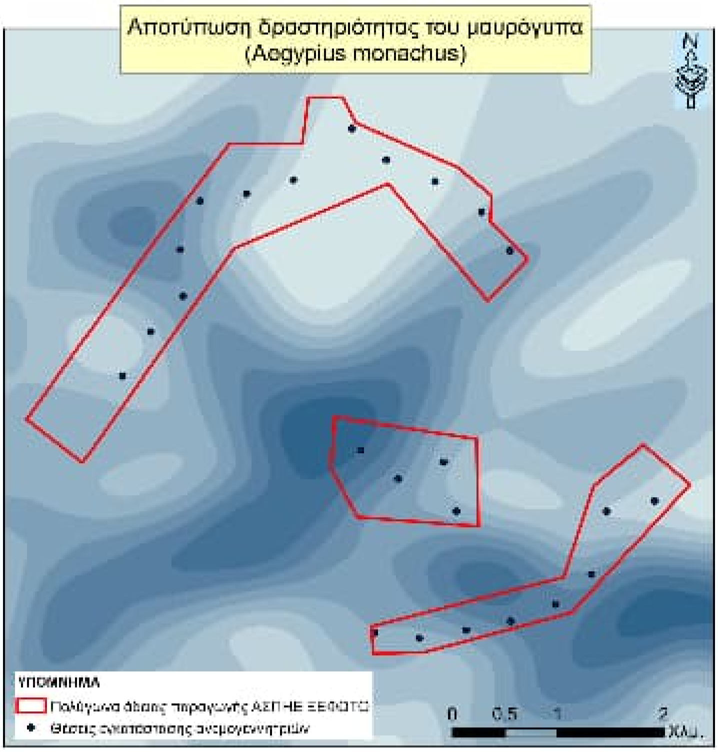


Figure 2: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Golden eagle (*Aquila chrysaetos*)

As mentioned in the previous section, the species was recorded 17 times (a total of 27 individuals) in the study area during the observations in February 2022, April

2022, May 2022, June 2022 and July 2022, with ten of the total number of records being two individuals per flight. Of these ten records involving two persons passing per flight, two occurred within the Direct Effect Zone, two occurred within Zone A (with one of the two also occurring at a distance of less than 100 metres but with a flight altitude of more than 300 metres, and therefore this flight is not classified as a Direct Effect Zone), five occurred within Zone B and the last occurred within Zone C. Of the remaining seven single recordings (one person crossing per flight), one took place within the Direct Effect Zone, two took place within Zone A and four took place within Zone B.

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 even with the strictest estimate of that which refers only to the hours of raptor recording) in the whole field survey area of the W/F was very low (0.038 crossings per hour) and is within the lower limits of the range of values reported in other sighting sites and W/F (in the Thrace area according to Carcamo et al. 2011 taking into account combined data from Tables 7 and 37 of this study) which is from about 0 to 0.1 crossings per hour. However, the comparison is indicative as the above range of values refers to installed LWDs, 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 impact risk for the golden eagle, for flight speeds from 5.9 m/sec to 22.5 m/sec, ranges between 5.7% and 19.9%, while the rotor passes per year are 8.58 passes/year. Therefore, the expected impacts (without avoidance) are from 0.489 to 1.708 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 **0.010 to 0.034 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 **0.024to 0.085 impacts per year.** At this point it is worth noting that the study team used the most stringent criteria to derive the above results, namely that all recorded flights of the species involved site use and not simply passing through the site. The strict way of evaluating impact estimates described above, although it increases the final estimate of impacts of this species per year, was considered by the study team to be more appropriate to use and derive the results in this way because of the ecological importance of the study area, preferring to overestimate the values, but in no way underestimating them.

In the following, we present the visualization of the activity of the species using Kernal density algorithms 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 distance from the wind turbines to be installed.

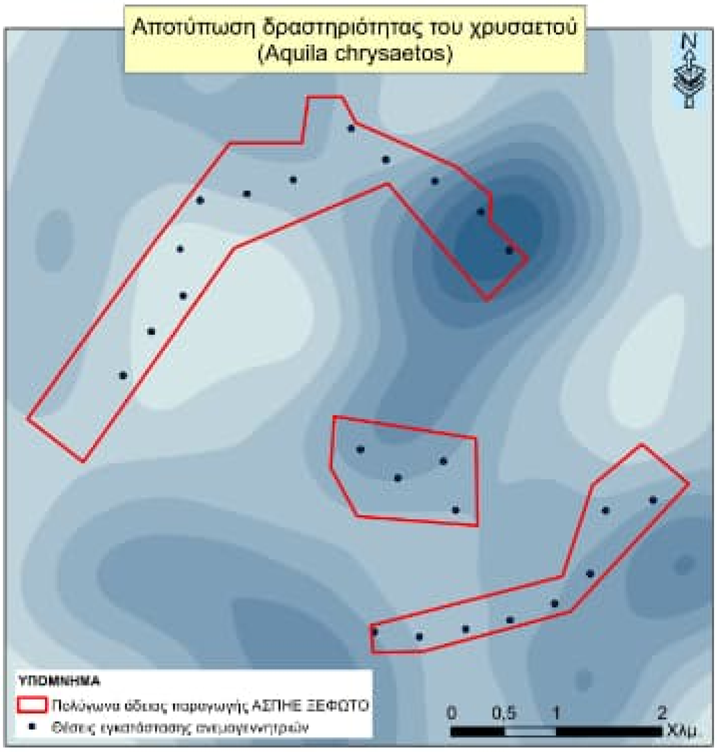


Figure 3: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Peregrine *Falcon (Falco peregrinus*)

As mentioned in the previous section, the species was recorded three times (three individuals) in the study area during observations in April 2022 and June 2022, with one flight taking place within Zone A and the other two taking place within Zone B.

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 even with the strictest estimate of that for the hours of predator recording only) in the whole field survey area of the W/F was very low (0.004 crossings per hour).

The impact risk for the peregrine, for flight speeds from 10.5 m/sec to 19.5 m/sec, ranges between 1.2% and 2.0%, while the rotor surface passes per year are 1.43 passes/year. Therefore, the expected impacts (without avoidance) are from 0.17 to 0.29 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 **up to 0.0006 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 **up to 0.0014 impacts per year.**

The following is a visualization of the activity of the species using Kernal density algorithms based on the total number of 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.

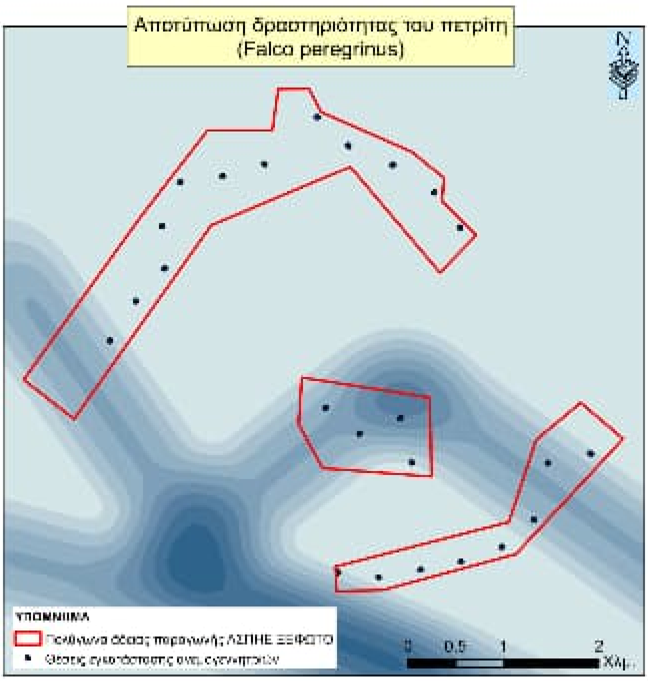


Figure 4: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Snake eagle *(Circaetus galicus)*

As mentioned in the previous section, the species was recorded 57 times (a total of 72 individuals) in the study area during the observations in April 2022, May 2022, June 2022, July 2022, August 2022 and September 2022, with three of these records involving the passage of three individuals per flight, two of which occurred within Zone B and the third within Zone A. Also, of the total number of recordings, nine involved the transit of two persons per flight. Of these nine records involving two persons per flight, two occurred within the Direct Effect Zone, one occurred within Zone A and six occurred within Zone B. Of the remaining 45 odd records (one person crossing per flight), 12 occurred within the Direct Effect Zone, nine occurred within Zone A (with three of the nine also occurring at a distance of less than 100 metres but with a flight altitude of more than 400 and 250 metres - two and one respectively - and therefore these flights are not classified in the Direct Effect Zone), 20 occurred within Zone B and four occurred within Zone C. From the field observations, no snake nests were detected within the field survey area, nor were any behaviours directly indicative of its presence (branch-carrying flights or food transport). However, it is possible that a snake nest may be present in the wider area of the W/F, outside the field survey area, and therefore most of the above flights may involve the same individuals using the open areas of the wider area as part of their foraging area. As discussed in section "3. Institutional Context" the snake darter is not included in the species for which there is a requirement to designate an additional perimeter exclusion zone from a nest of the species, however, as stated above, no nest of the species was found within the field survey area.

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 required.

The activity of the species and the intensity of crossings per hour of observation (and even with the strictest estimation of this that refers only to the hours of raptor recording) in the whole field survey area of the W/F was present (0.10 crossings per hour) and is within the range of values reported in other sighting sites and W/F (in the Thrace area according to Carcamo et al. 2011 considering combined data from Tables 7 and 37 of this study) which are from about 0 to 0.12 crossings per hour and 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 ASPs, 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 snake eagle, for flight speeds from 7.0 m/sec to 17.7 m/sec, ranges between 6.4% and 15.4%, while the rotor surface passes per year are 16.68 passes/year. Therefore, the expected impacts (without avoidance) are from 1,068 to 2,569 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 **0.021 to 0.051 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 **0.053 to 0.128 impacts per year.** At this point it is worth noting that the study team used the most stringent criteria to derive the above results, namely that all of the recorded species flights involved site use and not just site passes. The strict way of evaluating impact estimates described above, although it increases the final estimate of impacts of this species per year, was considered by the study team to be more appropriate to use and derive the results in this way because of the ecological importance of the study area, preferring to overestimate the values, but in no way underestimating them.

In the following, we present the visualization of the activity of the species using Kernal density algorithms 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 distance from the wind turbines to be installed.

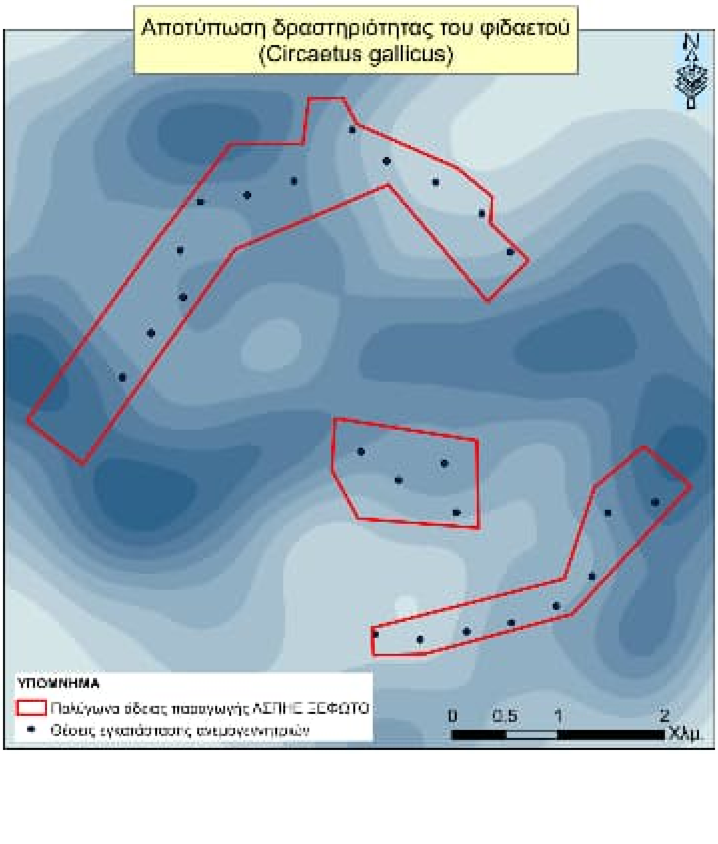


Figure 5: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Black-backed Gull (*Falco eleonorae*)

As mentioned in the previous section, the species was recorded twice (two individuals) in the study area during observations in July 2022. Both of these transits occurred within Zone B.

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 also 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 Madagascar, 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 for 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 (Dimalexis 2009), the reported threats to the species are:

- Intensification of perennial crops (vines, orchards, olive groves, etc.)
- Tourism - recreation infrastructures (ski resorts, 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

The threats listed on the IUCN red list are historically 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 for the protection of coastal areas and carry out Environmental Impact Assessments (EIAs) on 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
- Investigation of the ecological requirements and threats of the wintering areas and their protection.
- Increase public awareness of the species (Barov and Derhe 2010).

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 W/F was very low (0.003 crossings per hour) .

The only evidence that can be presented for the species is then listed again, which relates to its flight record, 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 using 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 wind turbines is zero.

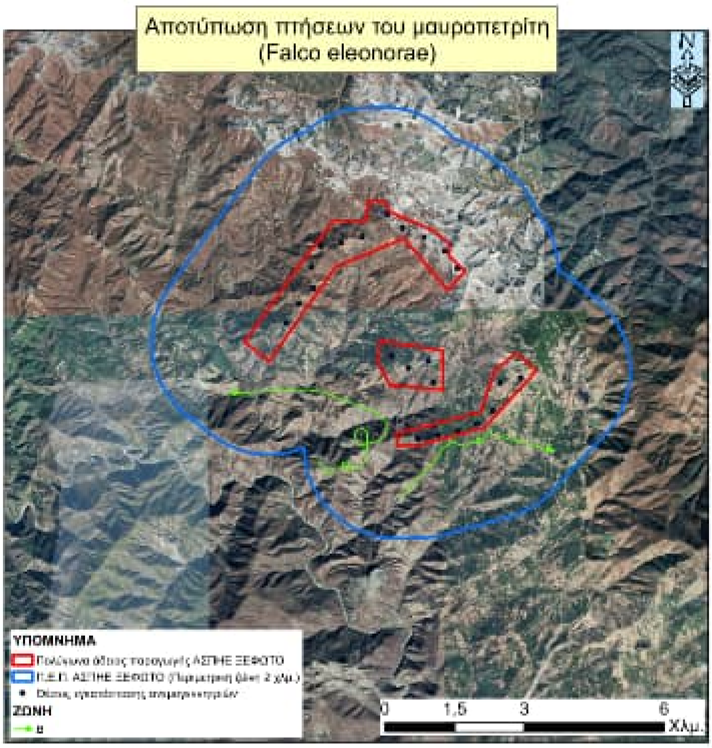


Figure 6: Illustration of the species' activity based on the records made in the field survey area

Black stork (*Ciconia nigra*)

As mentioned in the previous section, the species was recorded 29 times (a total of 37 individuals) in the study area during the observations in March 2022, April 2022, May 2022, June 2022, July 2022 and August 2022, with one of these records involving the passage of four individuals occurring within Zone B. Also, of the total number of records, five involved the passage of two individuals per flight. Of these five recordings involving two persons per flight, one took place within the direct impact zone, two took place within Zone A, one took place within Zone B and the last one took place outside the impact zones with the wind turbines of the wind farm under study. Of the remaining 23 single records (one person crossing per flight), five took place within the Direct Effect Zone, four took place within Zone A (with one of the four also taking place at a distance of less than 100 m but with a flight altitude greater than 250 m, and for this reason this flight is not classified as a Direct Effect Zone), 11 took place within Zone B and three took place within Zone C.

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 required.

The activity of the species and the intensity of crossings per hour of observation (and even with the strictest estimation of that which refers only to the hours of raptor recording) in the whole field survey area of the W/F was very low (0.053 crossings per hour) and is within the range of values reported at other viewpoints and W/Fs (e.g.e.g. in the Thrace area according to Carcamo et al. 2011 considering combined data from Tables 7 and 37 of this study) which are between 0 and 0.078 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 ASPs, 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 black-tailed godwit, for flight speeds from 11.3 m/sec to 20.2 m/sec, ranges between 6.5% and 11.0%, while the rotor passes per year are 5.84 passes/year. Therefore, the expected impacts (without avoidance) are from 0.380 to 0.642 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 **0.008 to 0.013 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 **0.019 to 0.032 impacts per year.** At this point it is worth noting that the most stringent criteria were used by the study team to derive the above results, namely that all of the recorded species flights involved site use and not simply passing through the site. The strict way of evaluating impact estimates described above, although it increases the final estimate of impacts of this species per year, was considered by the study team to be more appropriate to use and derive the results in this way because of the ecological importance of the study area, preferring to overestimate the values, but in no way underestimating them.

In the following, we present the visualization of the activity of the species using Kernal density algorithms 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 distance from the wind turbines to be installed.

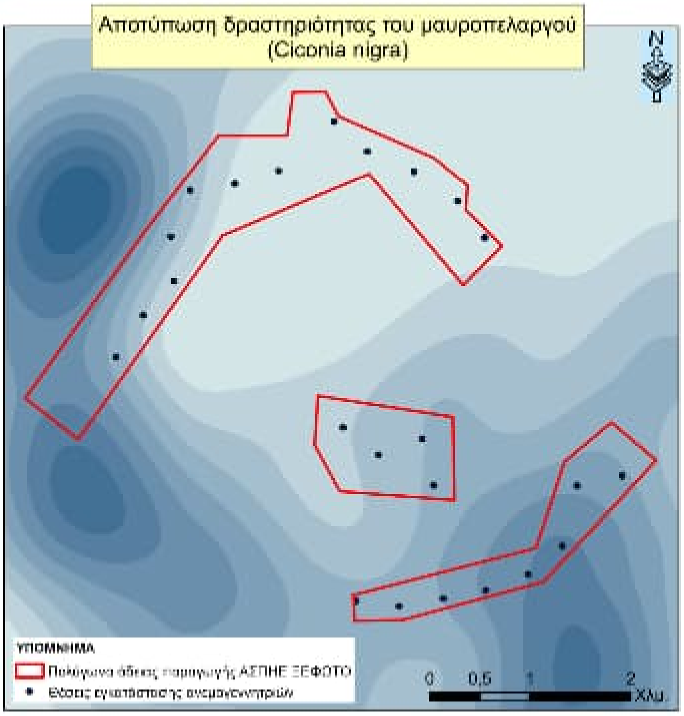


Figure 7: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Squid (*Circus aeruginosus*)

As mentioned in the previous section, the species was recorded three times (three individuals) in the study area during observations in March 2022 and April 2022, with one flight occurring within Zone A and the other two occurring within Zone B.

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 a threatened species (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).

According to Poirazidi (2017), the number of the species' territories in the National Park of Dadia - Lefkimi - Soufli in 2012 was 3.

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 and 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, mainly in lowland areas (Orta et al. 2020), up to 400 m altitude (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 threats recorded in the list of threats to the species (Dimalexis 2009), the reported threats to the species are:

- Illegal use of poisoned baits to control "harmful" mammals
- Lead shot molybdenum
- Changes in the frequency and intensity of forest fires (increase or decrease)
- Wetland drainage and other land reclamation works
- erosion control works, cleaning of the bed of streams, embankments of the seashore and stream beds and the filling of soils, streams
- Filling of soils, streams, 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 wetland habitats of the species, with their legal protection, and restoration of already degraded wetlands.
- Avoid disturbance around nesting areas during agricultural operations until the chicks are fledged.

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 W/F was very low (0.004 crossings per hour).

The risk of impact for the scaup, for flight speeds from 7.6 m/sec to 16.8 m/sec, ranges between 1.5% and 3.0%, while the rotor passes per year are 1.43 passes/year. Therefore, the expected impacts (without avoidance) are from 0.021 to 0.043impacts per year. Correcting the above expected non-avoidance impacts with the **98%** avoidance rate, the final estimate for species-specific impacts per year is **up to 0.0009 impacts per year,** while correcting the above expected non-avoidance impacts with the much more stringent **95%** avoidance rate, the final estimate for species-specific impacts per year is **from 0.001 to 0.002 impacts per year.**

In the following, we present the visualization of the activity of the species using Kernal density algorithms 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 distance from the wind turbines to be installed.

Figure 8: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Winter squirrel (*Circus cyaneus*)

As mentioned in the previous section, the species was recorded once (one individual) in the study area during the observations in March 2022, with this passage occurring within Zone B.

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 Petrel does not nest and occurs only 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 found throughout the mainland and 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 threats recorded in the list of threats to the species (Dimalexis 2009), the reported threats to the species are:

- Wetland drainage and other land reclamation works
- 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 the abandonment of extensive farming and livestock farming
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receptors.

The threats listed in the IUCN red list are: habitat destruction and shrinkage due to intensive agriculture, drainage of marshes and swamps and deforestation. The species is also threatened by poaching in Central and Eastern Europe (Tucker and Heath 1994). The proposed conservation actions, according to the IUCN, are:

- Maintain large open areas such as steppes, wet grasslands and low grazing intensity grasslands.
- Afforestation of heath and upland shrubland should be prohibited in areas where these habitats are threatened.
- Prohibition of poaching.

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 predator recording) throughout the project field survey area was very low (0.001 crossings per hour). Recording of the species in the area is considered incidental and its association with the project site is considered negligible due to its very low frequency of occurrence. Similarly low was the presence of the species in other viewpoints and AISPs (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 from 0 to 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 ASPs, 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 evidence that can be presented for the species is then presented again, which concerns its 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 using 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 wind turbines is zero.

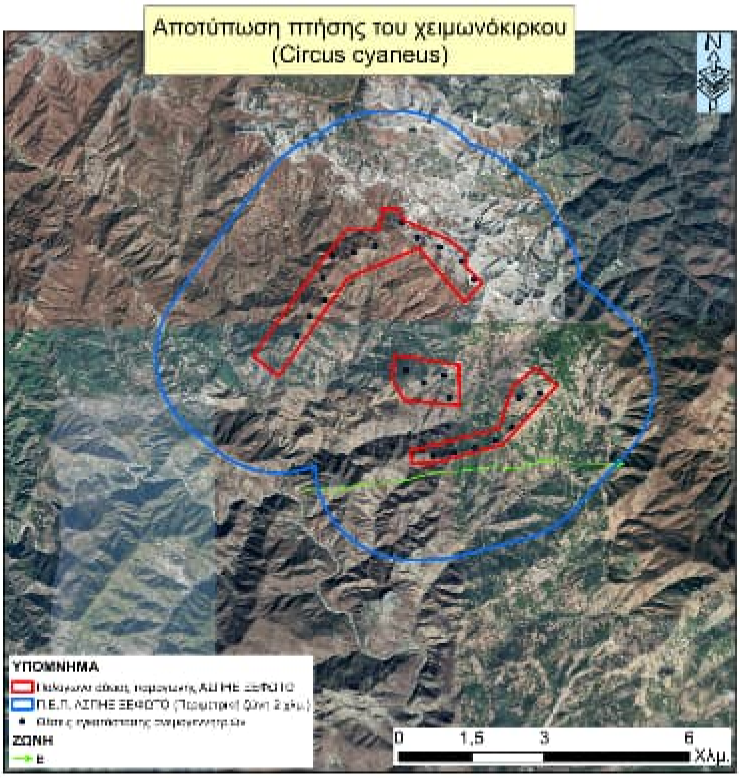


Figure 9: Illustration of the species' activity based on the records made in the field survey area

Common Cormorant (*Circus pygargus)*

As mentioned in the previous section, the species was recorded once (one individual) in the study area during the observations in May 2022, with this passage occurring within Zone B.

The European population of the species is estimated at 69,700 - 110,000 breeding females (139,000 - 219,000 mature individuals), 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 mature individuals). 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 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 (Dimalexis 2009), the reported threats to the species are:

- Extension - intensification of annual crops
- Illegal use of poisoned baits to control "harmful" mammals
- Abandonment of traditional agricultural practices and land use, including the abandonment of extensive farming and livestock farming
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters

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 chick mortality rates are high when agricultural operations are taking place.
- Key management actions include moving nests to safe places during harvesting of agricultural products, and no agricultural work should be done around nesting sites.
- Research on migration corridors and the locations of stopover and wintering grounds of the species would result in better development of conservation measures (Trierweiler 2010).

The activity of the species and the intensity of crossings per hour of observation (and even with the strictest estimate of that for only the hours of raptor recording) throughout the entire field survey area of the W/F was very low (0.001 crossings per hour).

The only evidence that can be presented for the species is then presented again, which concerns its 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 using 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 wind turbines is zero.

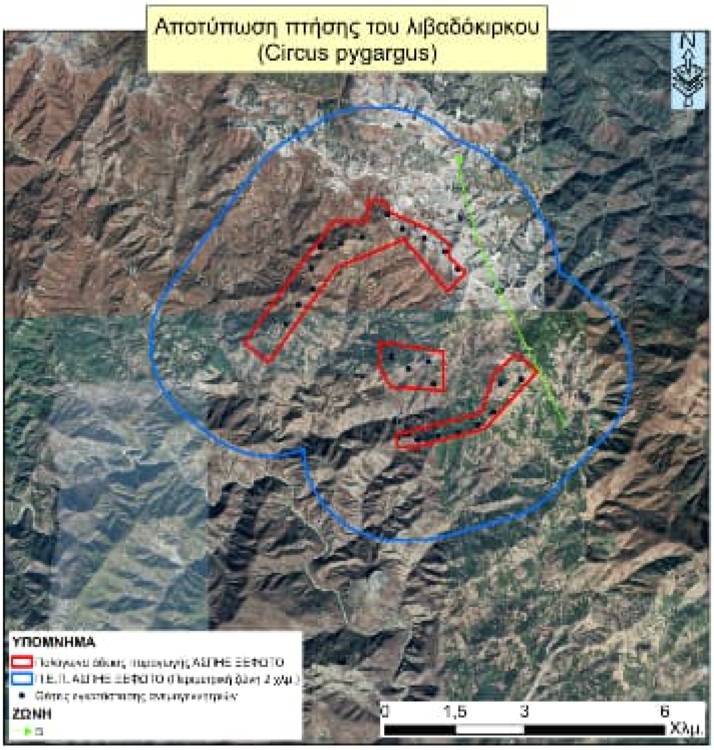


Figure 10: Illustration of the species' activity based on the records made in the field survey area

Crane eagle (*Clanga pomarina*)

As mentioned in the previous section, the species was recorded once (one individual) in the study area during the observations in May 2022, with this passage occurring within Zone B.

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 required.

The activity of the species and the intensity of crossings per hour of observation (and even with the strictest estimation of that which refers only to the hours of raptor recording) in the whole field survey area of the W/F was very low (0.001 crossings per hour) and is within the lower limits of the range of values reported at other viewpoints and W/F (e.g.e.g. in the Thrace region according to Carcamo et al. 2011 considering combined data from Tables 7 and 37 of this study) which are between 0 and 0.010 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 ASPs, 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 evidence that can be presented for the species is then presented again, which concerns its 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 using 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 wind turbines is zero.

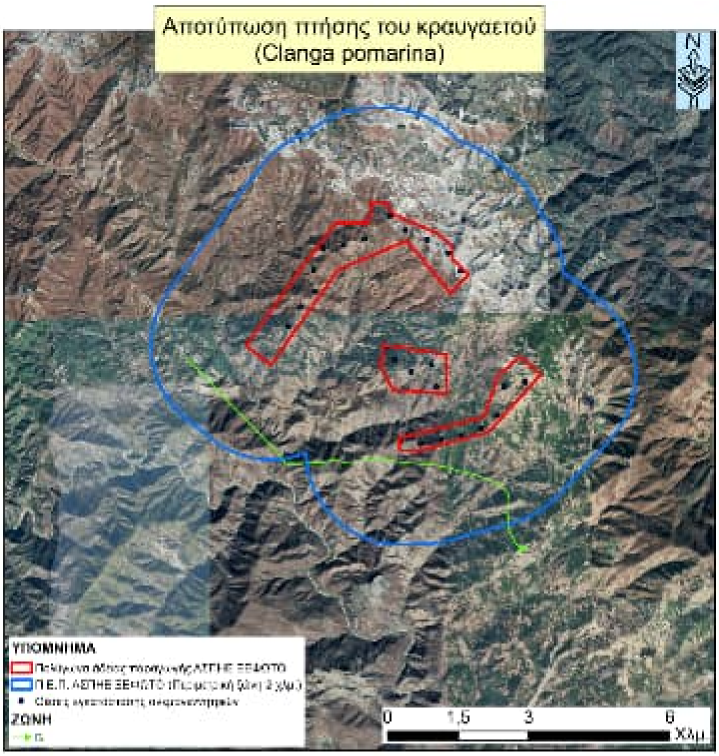


Figure 11: Illustration of the species' activity based on the records made in the field survey area

Cheetah (*Milvus migrans*)

As mentioned in the previous section, the species was recorded once (one individual) in the study area during the observations in April 2022, with this passage taking place within Zone B.

The European population of the species 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 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).

Although the species was never 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, and 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 individuals ringed in Germany were found in Laconia, Kythera and Pyrgos Ilia (Akriotis and Chandrinos 2004).

The species is found in a wide range of habitats such as dry and open areas, fragmented forest areas, lakes and rivers adjacent to sparsely wooded forests. 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 threats recorded in the list of threats to the species (Dimalexis 2009), the reported threats to the species are:

- Intensive and stabled livestock farming
- Illegal use of poisoned baits to control "harmful" mammals
- Changes in the frequency and intensity of forest fires (increase or decrease)
- Abandonment of traditional agricultural practices and land use, including the 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 poisoning, poaching and water pollution from pesticides and other chemicals (Orta et. al. 2020). Poisoning and water pollution continue to cause declines in the species' populations in Europe. Although it has adapted to the presence of humans and inhabits habitats close to urban areas, particularly as far as its diet is concerned, urban modernization has been accepted as reducing its available foraging habitat (Ferguson-Lees and Christie 2001). 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:

- Develop and implement stronger legislation against poisoning, poaching and pollution.
- Appropriate assessments of the impacts of wind energy development.

The activity of the species and the intensity of crossings per hour of observation (and even with the strictest estimate of that for only the hours of raptor recording) throughout the entire field survey area of the W/F was very low (0.001 crossings per hour).

The only evidence that can be presented for the species is then listed again, which relates to its 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 using 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 wind turbines is zero.

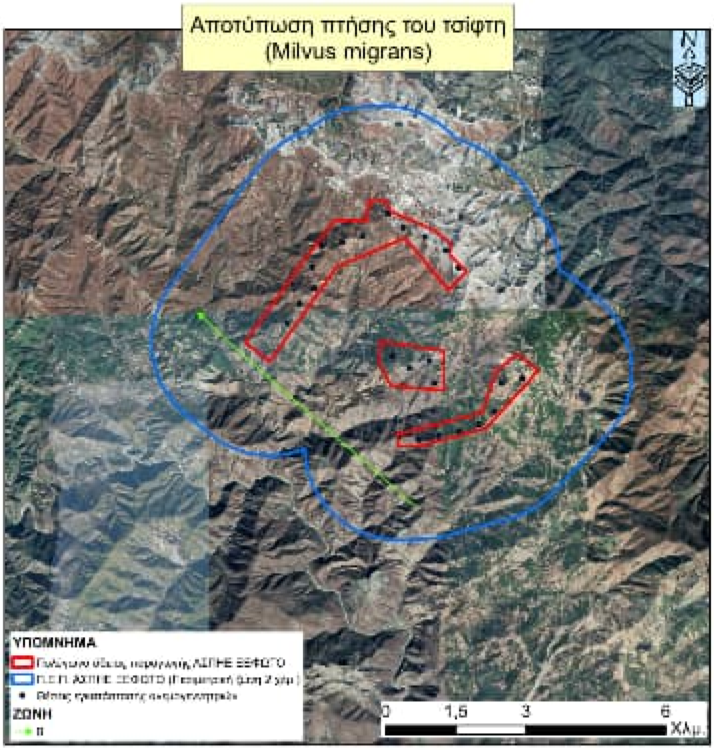


Figure 12: Illustration of the species' activity based on the records made in the field survey area

Common Eagle (*Hieraaetus pennatus*)

As mentioned in the previous section, the species was recorded 12 times (13 individuals in total) in the study area during the observations in May 2022, June 2022, July 2022 and August 2022, with one of these flights involving the passage of two individuals occurring within the Direct Effect Zone. Of the remaining 11 single recordings, two occurred within the Direct Impact Zone, two occurred within Zone A, three occurred within Zone B, and four occurred within Zone C.

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 required.

The activity of the species and the intensity of crossings per hour of observation (and even with the strictest estimate of that which refers only to the hours of raptor recording) in the whole field survey area of the W/F was very low (0.018 crossings per hour) and is within the range of values reported at other viewpoints and W/Fs 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 ASPHE, 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 hawk eagle, for flight speeds from 6.1 m/sec to 19.5 m/sec, ranges between 1.2% and 3.6%, while rotor passes per year are 1.67 passes/year. Therefore, the expected impacts (without avoidance) are from 0.020 to 0.060 impacts per year. Correcting the above expected non-avoidance impacts with the **98%** avoidance rate, the final estimate for species-specific impacts per year is **up to 0.001 impacts per year,** while correcting the above expected non-avoidance impacts with the much more stringent **95%** avoidance rate, the final estimate for species-specific impacts per year is **from 0.001 to 0.003 impacts per year.**

Next, we present the visualization of species activity using Kernal density algorithms based on all records made in the field survey area (darker shading indicates stronger activity).

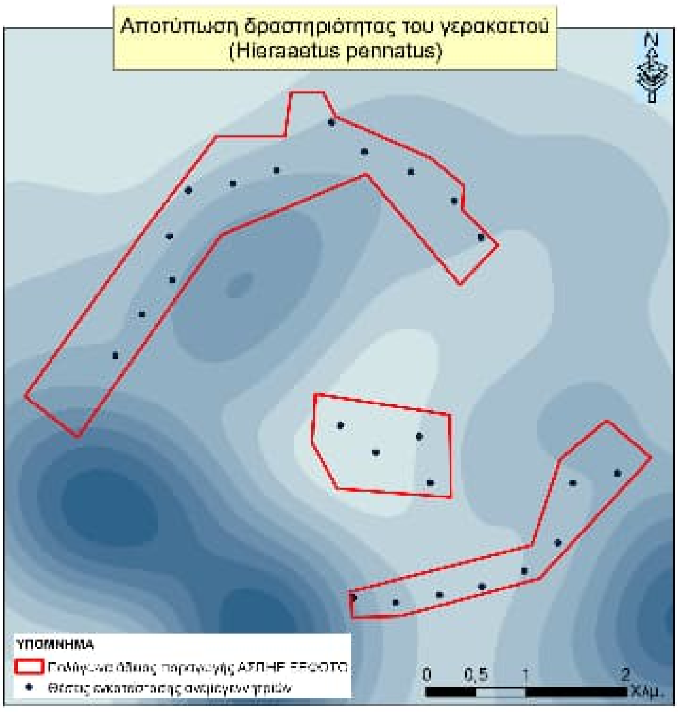


Figure 13: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Wasp (*Pernis apivorus)*

As mentioned in the previous section, the species was recorded 52 times (a total of 59 individuals) in the study area during the observations in April 2022, May 2022, June 2022, July 2022 and August 2022, with seven of these records involving the passage of two individuals per flight. Of these seven records involving two persons per flight, one occurred within the Direct Effect Zone, four occurred within Zone A and two occurred within Zone B. Of the remaining 45 odd recordings (one person crossing per flight), five were made within the Direct Effect Zone, 14 were made within Zone A, 20 were made within Zone B and six were made within Zone C. From the field observations, as noted above for the snake eagle, no wasp nests were detected within the field survey area, nor were any behaviors directly indicative of its presence (branch-carrying flights or food transport). However, it is possible that a wasp nest may be present in the wider area of the W/F, outside the field survey area, and therefore most of the above flights may be of the same individuals using the woodland and forest gaps in the wider area as part of their foraging area. As discussed in section "3. Institutional Context" the horned owl is not included in the species for which there is a requirement to establish an additional perimeter exclusion zone from a nest of the species, however, as noted above, no nest of the species was found within the field survey area.

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 even with the strictest estimate of that for only the hours of raptor recording) throughout the entire field survey area of the W/F was present (0.083 crossings per hour).

The impact risk for the wasp, for flight speeds from 5.3 m/sec to 19.6 m/sec, ranges between 5.6% and 19.3%, while the rotor surface passes per year are 15.02 passes/year. Therefore, the expected impacts (without avoidance) are from 0.841 to 2.898 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 **0.017 to 0.058 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 **0.042 to 0.145 impacts per year.** At this point it is worth noting that the study team used the most stringent criteria to derive the above results, namely that all of the recorded species flights involved site use and not just site passes. The strict way of evaluating impact estimates described above, although it increases the final estimate of impacts of this species per year, was considered by the study team to be more appropriate to use and derive the results in this way because of the ecological importance of the study area, preferring to overestimate the values, but in no way underestimating them.

The following is a visualization of the activity of the species using Kernal density algorithms based on the total number of 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.

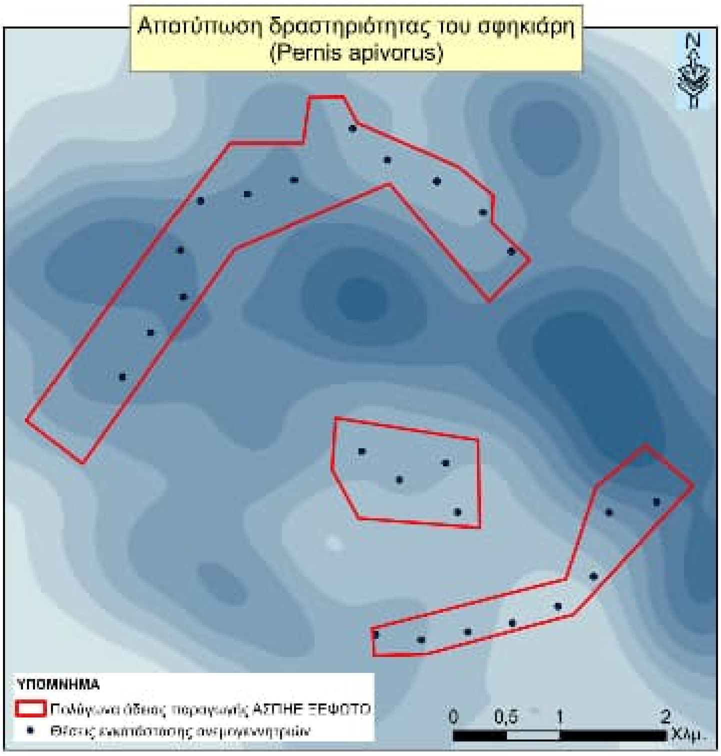


Figure 14: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Vulture *(Gyps fulvus)*

As mentioned in the previous section, the species was recorded 30 times (a total of 50 individuals) in the study area, throughout the duration of the observations except for the month of March 2022, with one of the total records being a passage of eight individuals and taking place within Zone B. In addition, of the total records, two involved the passage of three individuals per flight and occurred within Zone A (with one of the two also occurring at a distance of less than 100 metres but with a flight altitude greater than 300 metres, and for this reason this flight is not classified in the Direct Effect Zone). Also, of the total number of records, nine involved the transit of two persons per flight. Of these nine recordings involving two persons per flight, one took place within the direct impact zone, one took place within Zone A, four took place within Zone B, two took place within Zone C and the last one took place outside the impact zones with the VFRS. Finally, of the remaining 18 single records (one person crossing per flight), five were made within the direct impact zone, five were made within Zone A (with one of the five being made at a distance of less than 100 m but with a flight altitude of more than 500 m), and for this reason this flight is not classified as a direct impact zone), six took place within Zone B, one took place within Zone C and the last one took place outside the impact zones with the wind turbines of the wind farm under study.

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 even with the strictest estimate of that for the hours of raptor recording only) in the whole field survey area of the W/F was low (0.071 crossings per hour), and is outside the lower limits of the range of corresponding measurements at other viewpoints and W/Fs in the Thrace region (Carcamo et al. 2011 considering combined data from Tables 7 and 37 of this study) which is from approximately 0.08 to 0.69 crossings per hour, with the value being less than half of the maximum reported above for other sites. The comparison is indicative as the above range of values refers to installed ASWPs, 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 impact risk for the vulture, for flight speeds from 5.64 m/sec to 15.8 m/sec, ranges between 8.2% and 22.1%, while the rotor surface passes per year are 17.16 passes/year. Therefore, the expected impacts (without avoidance) are from 1,407 to 3,793 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 **0.028**

to 0.076 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 **0.070 to 0.190 impacts per year.** At this point it is worth noting that the study team used the most stringent criteria to derive the above results, namely that all of the recorded species flights involved site use and not simply site passes. The strict way of evaluating impact estimates described above, although it increases the final estimate of impacts of this species per year, was considered by the study team to be more appropriate to use and derive the results in this way because of the ecological importance of the study area, preferring to overestimate the values, but in no way underestimating them.

In the following, we present the visualization of the activity of the species using Kernal density algorithms 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 distance from the wind turbines to be installed.

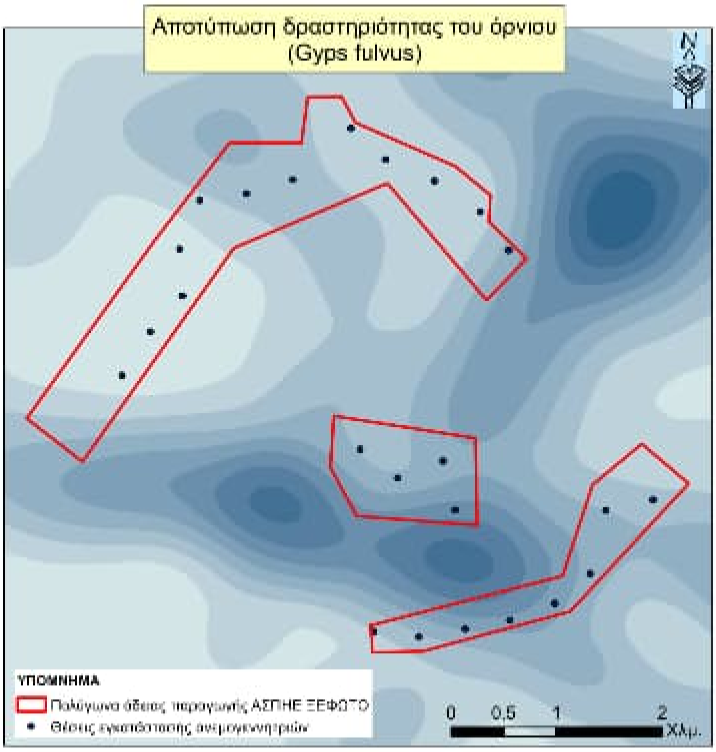


Figure 15: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Shark (*Accipiter brevipes*)

As mentioned in the previous section, the species was recorded twice (two individuals) in the study area during the observations in June 2022 and August 2022, with one of these flights taking place within Zone A and the second within Zone B.

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 required.

The activity of the species and the intensity of crossings per hour of observation (and even with the strictest estimate of that which refers only to the hours of raptor recording) in the whole field survey area of the W/F was very low (0.003 crossings per hour) and is outside the limits of the range of values reported in other viewpoints and W/F e.g.e.g. in the Thrace region (Carcamo et al. 2021 taking the combined data of Tables 7 and 37 of this study) which are between 0 and 0.14 crossings per hour approximately. The comparison is indicative as the above range of values refers to installed LWDs, 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. Also, for this species, and given its similarity to the xeroptera, and the consequent great difficulty in identifying it during its usually fast flight, it should be noted in the above study that there are still 16 records of individuals, which were identified only to the genus Accipiter and not to their species. Therefore the above value given by the study of Carcamo et al. (2011) is completely indicative for this species and certainly underestimated.

The impact risk for the shark, for flight speeds from 6.3 m/sec to 20.2 m/sec, ranges between 0.8% and 2.5%, while the rotor surface passes per year are 0.83 passes/year. Therefore, the expected impacts (without avoidance) are from 0.007 to 0.021 impacts per year. Correcting the above expected non-avoidance impacts with the **98%** avoidance rate, the final estimate for species-specific impacts per year is **up to 0.0004 impacts per year,** while correcting the above expected non-avoidance impacts with the much more stringent **95%** avoidance rate, the final estimate for species-specific impacts per year is **from 0.0003 to 0.0010 impacts per year.**

The only data that can be presented for the species is the flight record, as it is not possible to present a record of activity using Kernal density algorithms (more than two records are required).

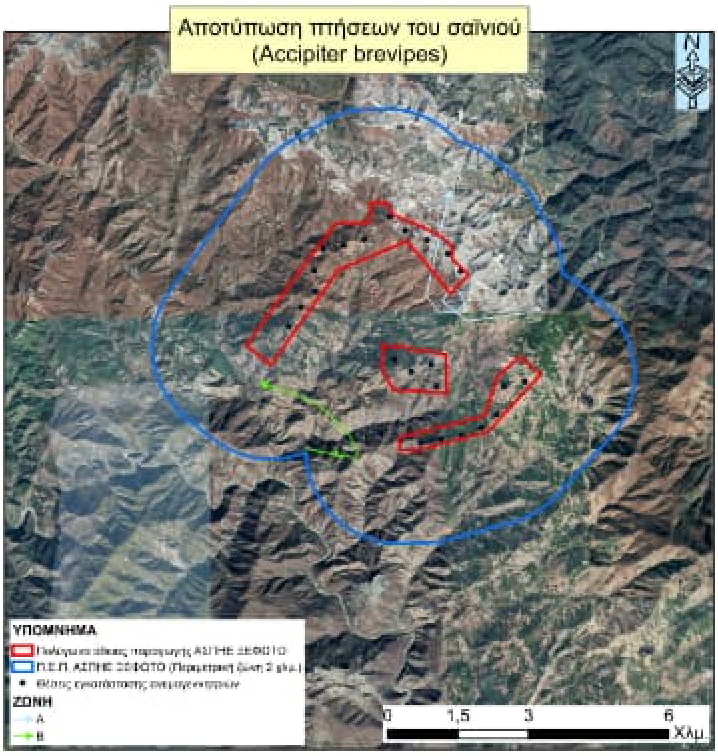


Figure 16: Illustration of the species' activity based on the records made in the field survey area

Silver pelican (*Pelecanus crispus)*

As mentioned in the previous section, the species was recorded three times (a total of seven individuals) in the study area during observations in November 2021, February 2022 and May 2022. One of the three flights involved the passage of four individuals and occurred within Zone B. The second flight of the three involved the transit of two individuals and took place within Zone A (this flight also took place at a distance of less than 100 metres but with a flight altitude of more than 300 metres, and therefore this flight is not classified as a Direct Effect Zone). The third and final flight was a single person crossing and took place within Zone C.

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 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 W/F was low (0.010 crossings per hour).

In the following, we present the visualization of the activity of the species using Kernal density algorithms 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 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.

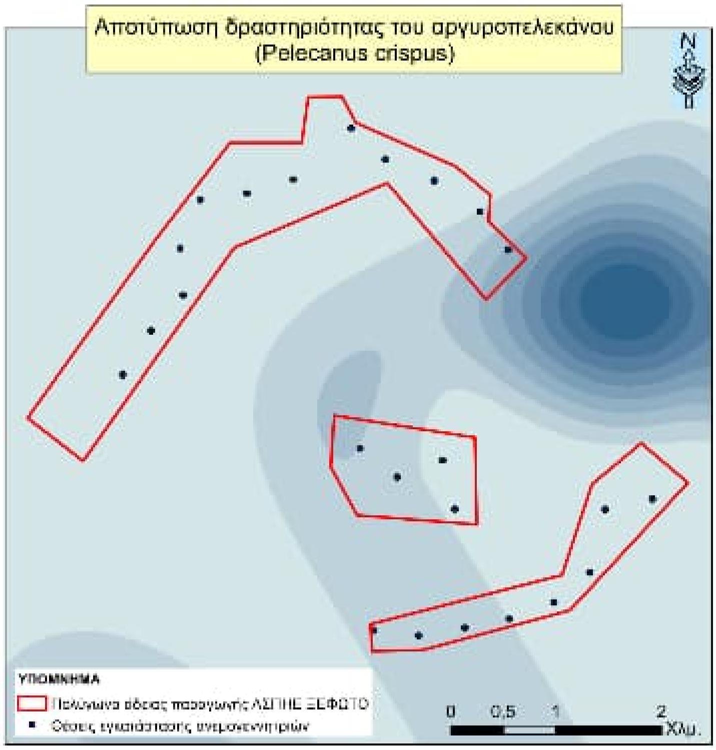


Figure 17: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Roseate pelican (*Pelecanus onocrotalus)*

As mentioned in the previous section, the species was recorded once (a total of four individuals) in the study area during the observations in May 2022. This flight involved the passage of four individuals and occurred within Zone B.

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

The European population of the species is estimated at 9,300 - 20,400 pairs (18,700 - 40,700 adults), while in the EU28 the population is estimated at 8,600 - 19,000 pairs (17,200 - 37,900 adults). 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 the 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 unusual summer visitor and migrant passing through Greece. It was recorded for the first time nesting in Greece in the mid-1960s, on the L. Mikri Prespa, which since then remains 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 Marangou 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 species' habitat 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 takes place in the early 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.

The threats mentioned in the Greek Red Book (Legakis and Marangou 2009) are the low reproductive success of the species and the decreasing numbers of breeding pairs due to disturbance by fishermen and visitors, a phenomenon that has nowadays disappeared. 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 NRC, the conservation measures required are the following: 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 threats recorded in the list of threats to the species (Dimalexis 2009), the reported threats to the species are:

- Extensive aquaculture
- Intensive aquaculture
- Renewable energy: Wind farms
- Persecution of specific users as harmful
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Wetland drainage and other land reclamation works
- 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 the destruction of the species' habitat through drainage, the 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 proposed conservation actions, according to the IUCN, are:

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

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) across the entire field survey area of the W/F was low (0.006 crossings per hour).

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.

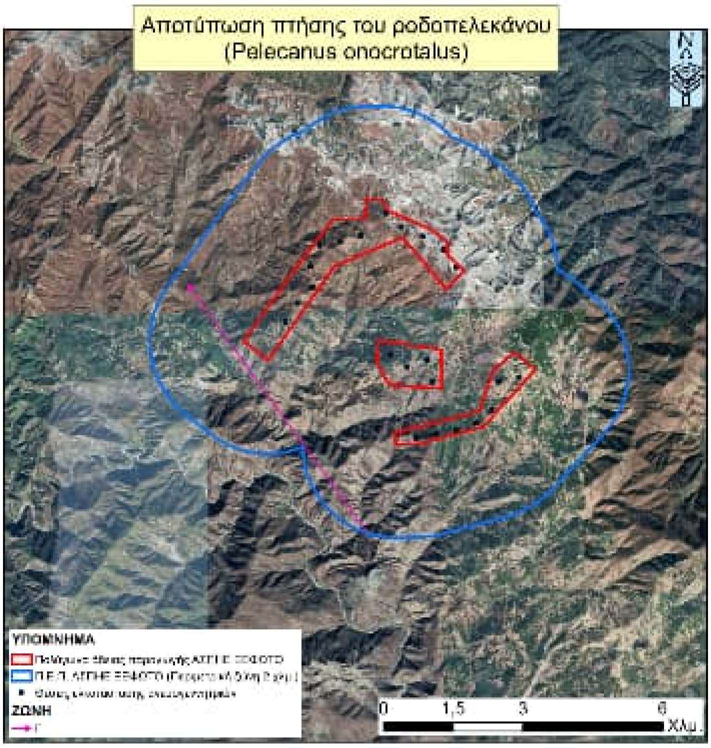


Figure 18: Illustration of the species' activity based on the records made in the field survey area

Osprey *(Pandion haliaeuts)*

As mentioned in the previous section, the species was recorded twice (two individuals) in the study area during observations in March 2022 and May 2022, with one of these crossings occurring within Zone A and the second crossing occurring within Zone B.

The European population of the species is estimated at 9,600 - 13,600 pairs (19,200 - 27,100 mature individuals), while in the EU28 the population is estimated at 6,000 - 7,800 pairs (12,100 - 15,500 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 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 is a transient visitor in Greece and is observed during migration in coastal wetlands and islands and not so much in inland waters or rivers. In Crete it is often observed at high altitude crossing the large mountain ranges of the island (Handrinos and Akriotis 1997).

The species occurs in a wide variety of habitats. The presence of water near nesting sites is essential for finding food. It nests near shores, lagoons, river deltas and lakes. It breeds from late May to early September and most pairs are monogamous. The nest is placed in trees (up to 30 m from the ground) and on cliffs. It lays 1-4 eggs. The diet consists almost entirely of fish (Billerman et al. 2020). The species migrates over long distances and does not depend on stopovers during migration (Snow and Perrins 1998; Ferguson-Lees and Christie 2001). Migratory birds begin their migration at lower latitudes from August to October, and return during March to April. (Ferguson-Lees and Christie 2001).

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

- Tourism-recreation infrastructure (ski resorts, golf course, camps)
- Persecution of specific users as harmful
- Improper forest management
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Deforestation logging
- Wetland drainage and other land reclamation works
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters

The threats listed on the IUCN red list are the historical human persecution that has been prevalent since the 18^{o} - 20^{o} century (Ferguson-Lees and Christie 2001). A combination of deforestation and the collection of eggs and live birds led to the species becoming extinct in Azerbaijan (Billerman et al. 2020). The species' population declined from 1950-1970 as a result of pesticide use, although it is now recovering and this threat is not considered significant. In Scotland the species was extirpated by collecting and hunting, but is now recovering (Poole et al. 2014, Ferguson-Lees and Christie 2001). The species is very vulnerable to the impacts of potential wind energy development (Strix 2012).

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

➢ Reduction of disturbance of nesting sites by creating protective zones with a radius of 200-300 meters around them.

➢ Providing artificial nesting sites where possible would help reproductive success.

➢ Reduction of water pollution.

The activity of the species and the intensity of crossings per hour of observation (and even with the strictest estimate of that for only the hours of raptor recording) throughout the project field survey area was very low (0.003 crossings per hour). Flight of the species from the study area is considered an incidental movement.

The only data that can be presented for the species is the flight record of the species, as it is not possible to present the activity using the Kernal density algorithms (more than two records are required) nor the 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 wind is zero.

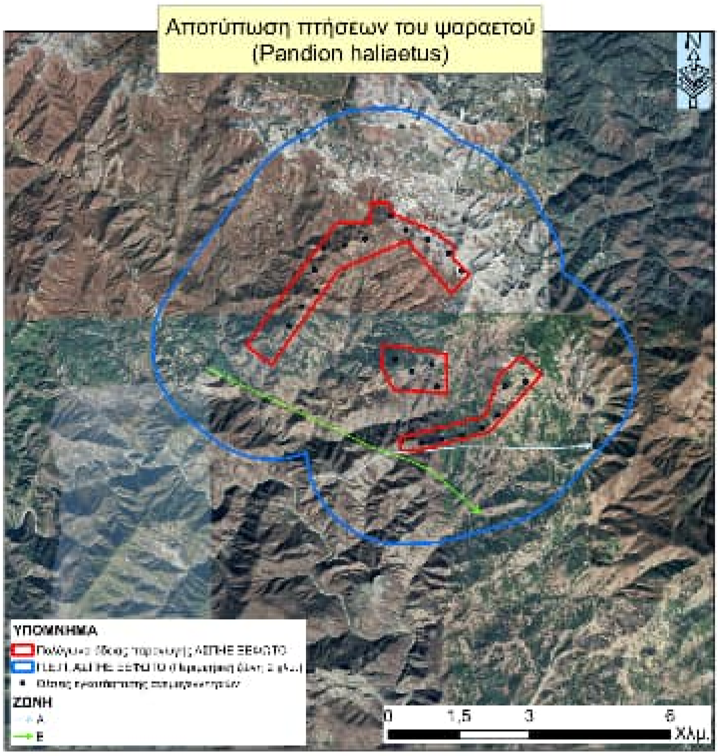


Figure 19: Illustration of the species' activity based on the records made in the field survey area

Cormorant (*Phalacrocorax carbo*)

As mentioned in the previous section, the species was recorded four times (a total of 37 individuals) in the study area during the observations in December 2021, February 2022 and March 2022. One of these flights involved the passage of 21 individuals and occurred within Zone B. The second flight of all observations involved the transit of 13 individuals and took place within Zone A. The third flight of all observations involved the transit of one individual and took place within Zone A. The fourth and final flight of all observations involved the transit of two individuals and took place within the Direct Effect Zone.

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 even with the strictest estimate of that for the hours of predator recording only) in the whole field survey area of the W/F was very low (0.053 crossings per hour).

The impact risk for the cormorant, for flight speeds from 13.0 m/sec to 17.0 m/sec, ranges between 2.4% and 3.1%, while the rotor surface passes per year are 4.29 passes/year. Therefore, the expected impacts (without avoidance) are from 0.103 to 0.133 impacts per year. Correcting the above expected non-avoidance impacts with the **98%** avoidance rate, the final estimate for species-specific impacts per year is **from 0.002 to 0.003 impacts per year,** while correcting the above expected non-avoidance impacts with the much more stringent **95%** avoidance rate, the final estimate for species-specific impacts per year is **from 0.005 to 0.007 impacts per year.**

In the following, we present the visualization of the activity of the species using Kernal density algorithms 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 distance from the wind turbines to be installed.

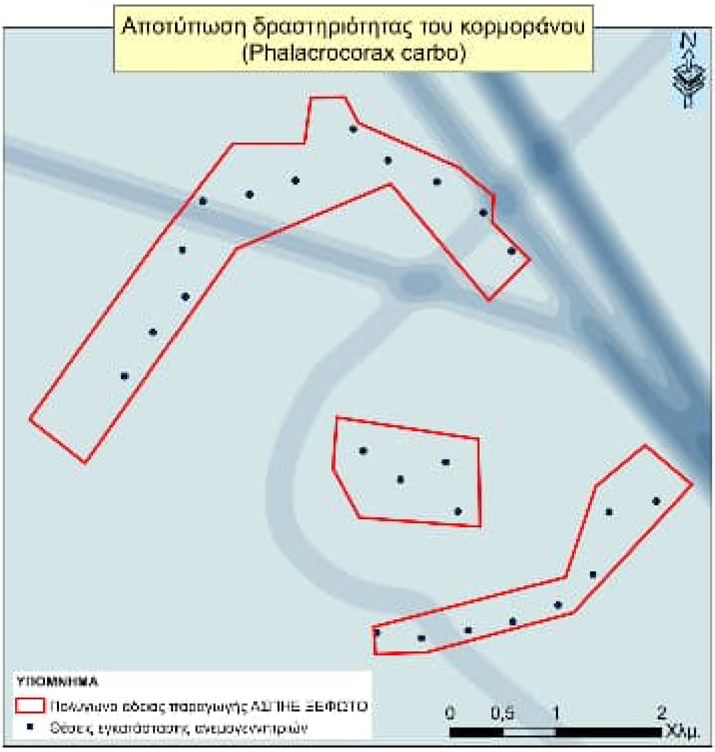


Figure 20: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Eagle-eye (*Lanius collurio*)

As mentioned in the previous section, the species was recorded 15 times (23 individuals in total) in the study area during the observations in May 2022, June 2022, July 2022, August 2022 and September 2022.

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 unusual 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 is not under threat (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 it 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 macchia, 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 occurs as a summer breeding bird, but also as a transient visitor during the two migrations. From Crete it is reported as a summer visitor and from Cyprus as a migratory bird, with the possibility of 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 hedgerows, 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 (Dimalexis 2009), the reported threats to the species are:

- Extension - intensification of annual crops
- Reforestation
- Residential development (urban or extra-urban, legal or arbitrary)
- Commercial - industrial development (ports, airports, industrial zones)
- Tourism-recreation infrastructures (ski resorts, golf courses, golf courses, camps)
- Construction of all categories 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 receiving waters, waterlogging of receiving waters

Threats listed on the IUCN red list are the loss and fragmentation of the species' habitats, resulting from deforestation and intensification of agriculture and increased use of pesticides causing the decline of 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 northern and western regions (Yosef et al. 2012).

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

- Promote low-intensity farming, as the species requires large-scale habitat conservation.
- Management should include the maintenance or creation of open grasslands with alternating tall and low vegetation and thorny thickets, the maintenance of plant barriers between crops and their creation in intensively managed orchards and vineyards, and the maintenance of terrestrial areas.
- Reduction of pesticide use (Tucker and Heath 1994).

Of all the above listed threats, the installation of the proposed ESDP will not cause any serious impact on the species. No increased concentrations of the species were observed. One to two pairs of the species are estimated to be active in the wider project area, making use of the mainly open areas of the field survey area and its adjacent, abundant counterparts. 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 impacts on the species from the installation of the ESDP is considered negligible.

Next, we present the visualization of species activity using Kernal density algorithms based on all records made in the field survey area (darker shading indicates stronger activity).

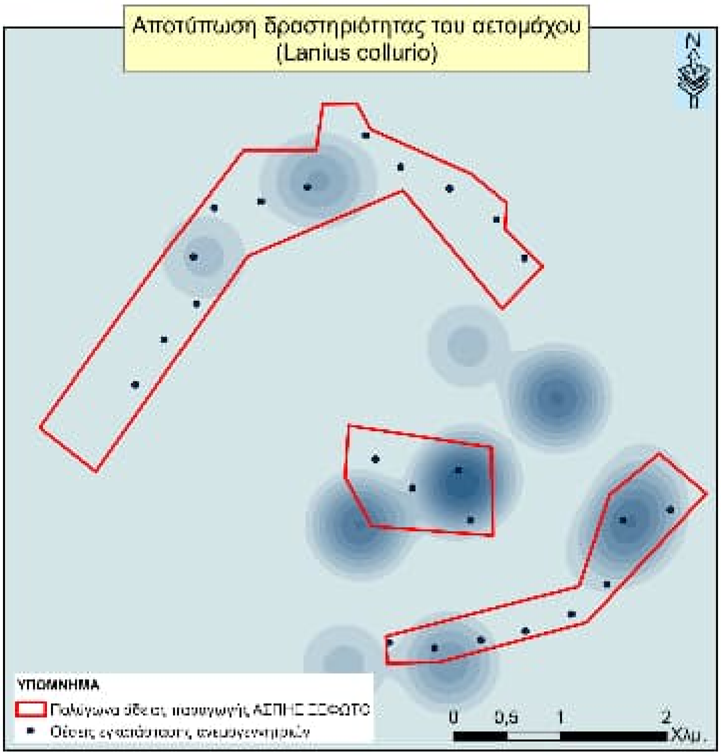


Figure 21: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Tree star (*Lullula arborea*)

As mentioned in the previous section, the species was recorded 29 times (46 individuals in total) in the study area during observations in November 2021, December 2021, February 2022, March 2022, April 2022, May 2022, June 2022, July 2022 and August 2022, and can be described as abundant in the general area, with the species being observed within the open farmland and natural grasslands of the study area.

This species breeds in most European countries, especially in Spain, Romania, Poland, Turkey and Portugal.

The European population of the species is estimated at 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), shrublands, orchard steppes and forest habitat boundaries. It breeds in open rocky areas, open woodland, scrubland with scattered clumps of trees, etc. (in mountainous 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 loss and degradation of the species' habitat due to agricultural intensification or deforestation due to abandonment of extensive livestock production (Tucker and Heath 1994). Also, extreme winter weather conditions can cause significant declines in the species' populations (Donald 2004).

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

- Promotion and continuation of extensive livestock farming and protection of the species' habitats
- New plantation management (Tucker and Heath 1994)

Of all the above listed threats, the installation of the proposed ESDP will not cause any serious impact on the species. Two to three 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, abundantly populated corresponding areas. 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 impacts on the species from the installation of the ESDP is considered negligible.

Next, we present the visualization of species activity using Kernal density algorithms based on all records made in the field survey area (darker shading indicates stronger activity).

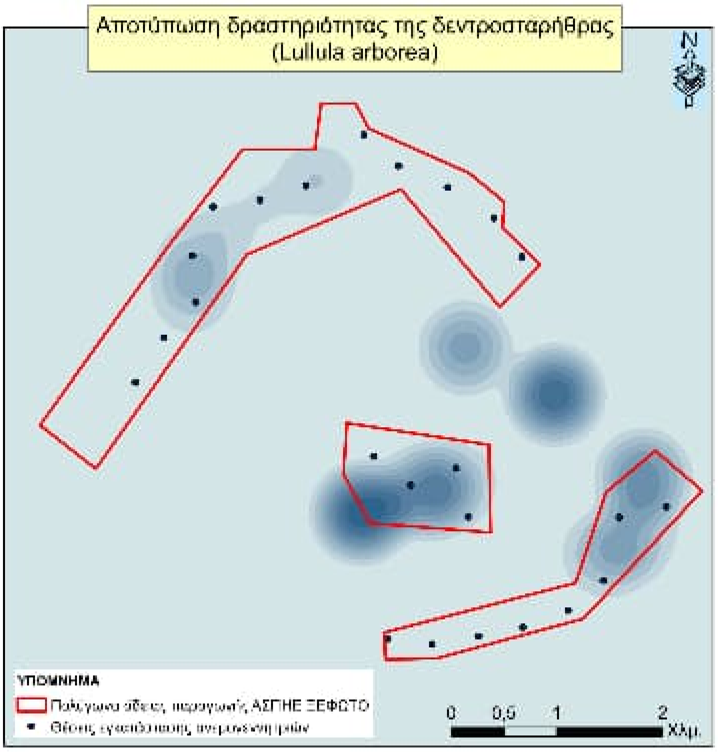


Figure 22: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Black woodpecker (*Dryocopus martius*)

As mentioned in the previous section, the species was recorded five times (five individuals) in the study area during observations in November 2021, February 2022, May 2022 and September 2022.

In Europe, the breeding population is estimated at 622,000 - 1,140,000 pairs (1,240,000 - 2,270,000 mature individuals), while according to the IUCN red list, in the EU28 the population is estimated at 208,000 - 254,000 pairs (416,000 - 707,000 mature individuals). The Greek population of the species is estimated to number 1,000 - 2,000 pairs, which corresponds to less than 1 % of the European population (BirdLife International 2021).

In Europe, the species breeds mainly in Russia (61% of the European population), with smaller populations occurring in most other countries.

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 a threatened species and is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also not listed as a species of European interest for protection by Birdlife International.

The species is observed at higher altitudes in forests of Northern and Central Greece, in low populations. It also breeds in Kefalonia, where it is the only island population of the species in the Mediterranean (Handrinos and Akriotis 1997).

It is found from sea level up to 2000 m and is easily adapted to the dominant forest species of the stands in which it lives, which varies (conifers, beech, willow, poplar etc.) (Gorman 2004). Its adaptability, in terms of species, composition and age of the dominant forest species, is thought to be the main reason for its population stability despite changes in forest ecosystems caused by anthropogenic interventions, unlike other woodpeckers (Rolstad et al. 2002b). At 45-47 cm, it is the largest European woodpecker and therefore needs large trees to nest. It is not exclusively dependent on naturally mature forests, and is fairly tolerant of a small diversity of forest species (Angelstam 1990). This is one of the reasons why it colonises areas where it was not previously present (Spitznagel 1990). It can live in managed pure coniferous forests (Nilsson et al. 1992). Spawning begins from mid-March to mid-May, and usually lays 3 -5 eggs. It is an insectivorous species and feeds mainly on ants, which in some areas make up 97% of its diet during the summer. Plant food forms a very small part of its diet (Rolstad et al. 1998). It is thought that the distribution of wood-eating ants has a commensurate effect on its distribution which is the main reason for its absence from Britain (Kear 2003). Some ant species, following felling, colonise on the stumps of fallen trees, often attracting individuals of the species (Rolstad et al. 1998). It is not particularly affected by adverse winter weather conditions, and only in cases where snow depth exceeds 100 cm does it seek out ants and beetles living on tree trunks for food, or leave its winter range if none are present. It shows the widest distribution of all oakleaf species after the parsnip, but is absent from some southern European countries. It is the only European woodpecker with an expansion of its range in recent years (Gorman 2004).

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

- Improper forest management
- Deforestation logging
- Changes in the extent and distribution of habitats due to climate change.

The threats listed in the IUCN red list are inappropriate forest management and deforestation (Garmendia et al. 2006, Zhelezov 2010).

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

- Establish monitoring to ensure that logging and forest management do not pose a serious threat.

Of all the threats documented, the installation of the proposed ESU 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 impacts on the species from the installation of the ASPE is considered negligible.

Next, we present the visualization of species activity using Kernal density algorithms based on all records made in the field survey area (darker shading indicates stronger activity).

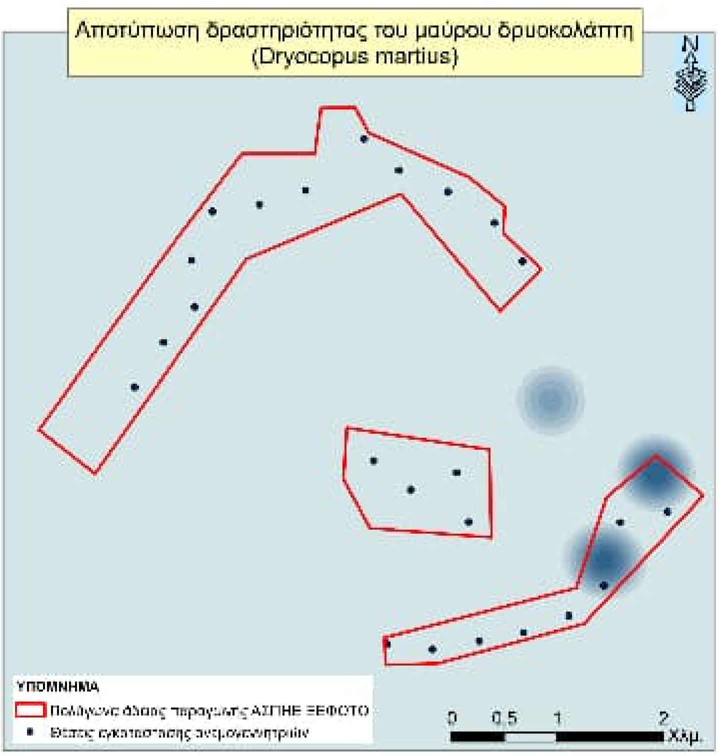


Figure 23: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Medium woodpecker (*Leiopicus medius*)

As mentioned in the previous section, the species was recorded four times (four individuals) in the study area during observations in January 2022, April 2022 and September 2022.

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 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).

For most of its range, it inhabits extensive, mature oak forests, or forests of other deciduous trees with a large proportion of large mature oaks. Clusters of oak stands of *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 (Cramp1985). 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 at 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 threats recorded in the list of threats to the species (Dimalexis 2009), the reported threats to the species are:

- White crops
- Improper forest management
- Deforestation logging
- Changes in the extent and distribution of habitats due to climate change

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

- Adoption of conservation measures for the species
- Maintain suitable trees, within forested areas, for nesting and foraging.
- Maintain appropriate land areas at 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 ASDP 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 impacts on the species from the installation of the ASPE is considered negligible.

Next, we present the visualization of species activity using Kernal density algorithms based on all records made in the field survey area (darker shading indicates stronger activity).

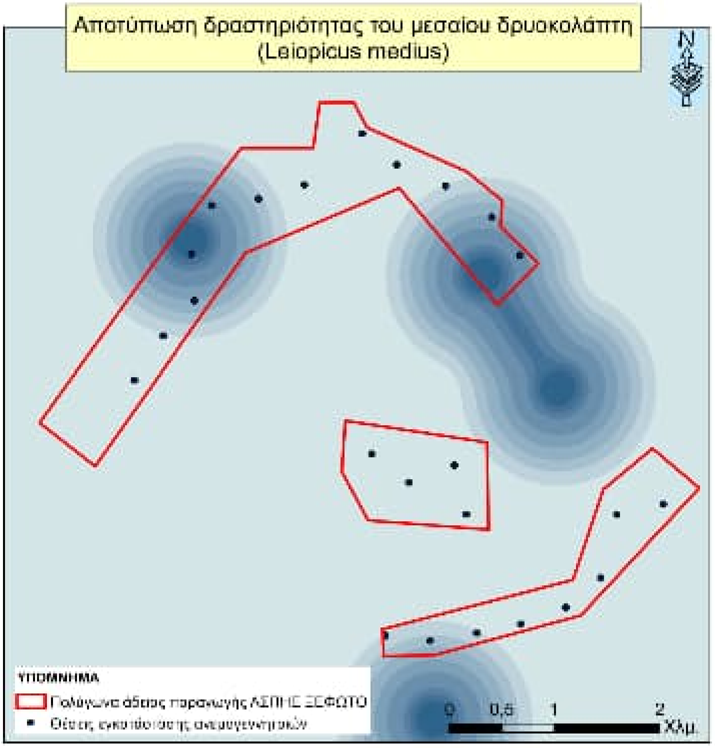


Figure 24: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Yiddish (*Caprimulgus europaeus*)

As mentioned in the previous section, the species was recorded three times (three individuals) in the study area during the observations in April 2022, May 2022 and June 2022.

In Europe the species breeds largely in Russia and Turkey, and also mainly in France and Belarus.

Its population in Europe is estimated at 597,000 - 1,110,000 males exhibiting spatial behaviour (1,190,000 - 2,220,000 mature individuals), while in the EU28 the population is estimated at 180,000 - 336,000 males exhibiting 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 classified as a SPEC 3 species of European conservation concern 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, forests and woodlands (especially clearings), recently forested areas and new forest 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 proposed 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.
- Reduction of 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 ESU 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 impacts on the species from the installation of the ASPE is considered negligible.

Next, we present the visualization of species activity using Kernal density algorithms based on all records made in the field survey area (darker shading indicates stronger activity).

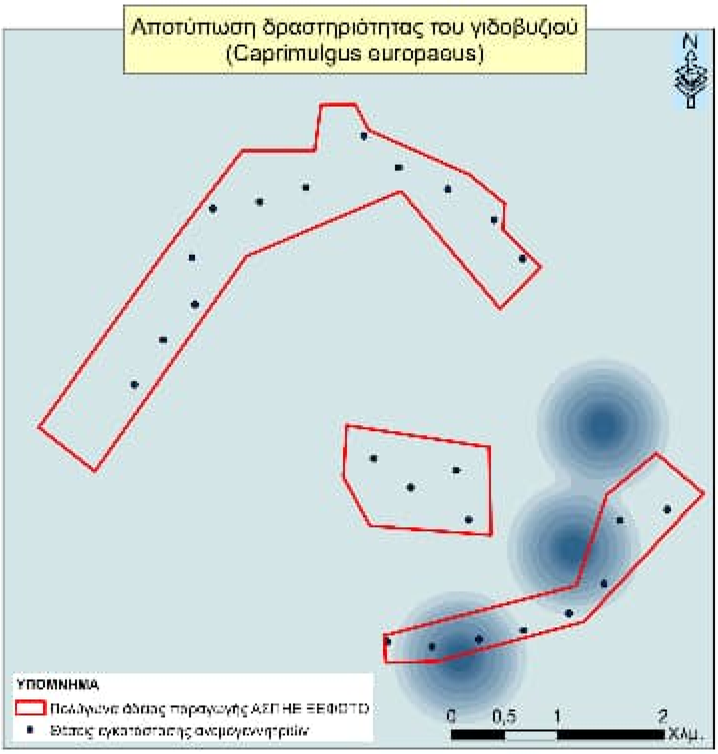


Figure 25: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Balkan woodpecker (*Dendrocopos syriacus*)

As mentioned in the previous section, the species was recorded three times (three individuals) in the study area during the observations in May 2022, June 2022 and July 2022.

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 required.

Of all the threats documented, the installation of the proposed ESU 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 impacts on the species from the installation of the ASPE is considered negligible.

Next, we present the visualization of species activity using Kernal density algorithms based on all records made in the field survey area (darker shading indicates stronger activity).

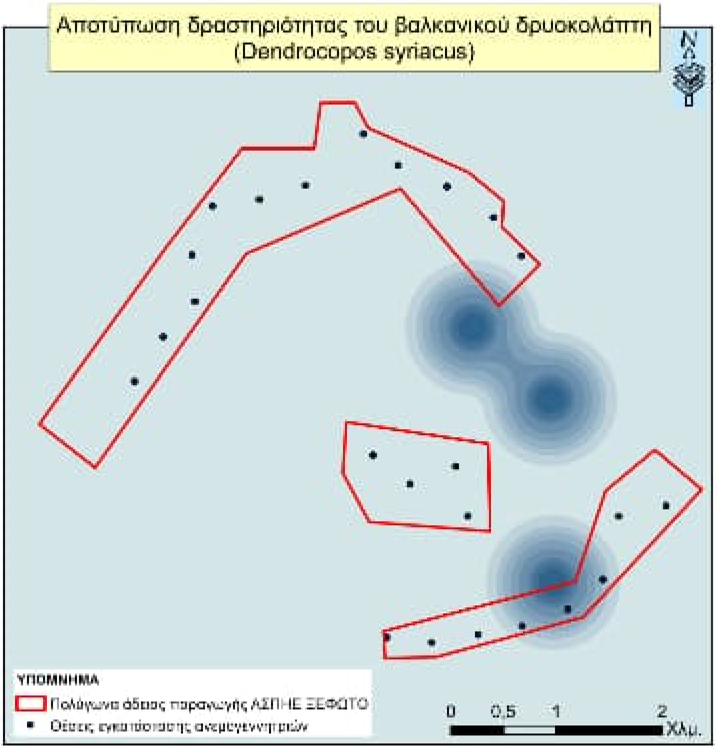


Figure 26: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Corydalis (*Emberiza hortulana*)

As mentioned in the previous section, the species was recorded 11 times (a total of 18 individuals) in the study area during the observations in April 2022, May 2022, June 2022 and July 2022.

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 required.

Of all the threats documented, the installation of the proposed ESU is not expected to cause any serious impact on the species. No increased concentrations of the species were observed. It is likely that a pair is active in the vicinity of the field survey area. 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 ASPHE is considered negligible.

Next, we present the visualization of species activity using Kernal density algorithms based on all records made in the field survey area (darker shading indicates stronger activity).

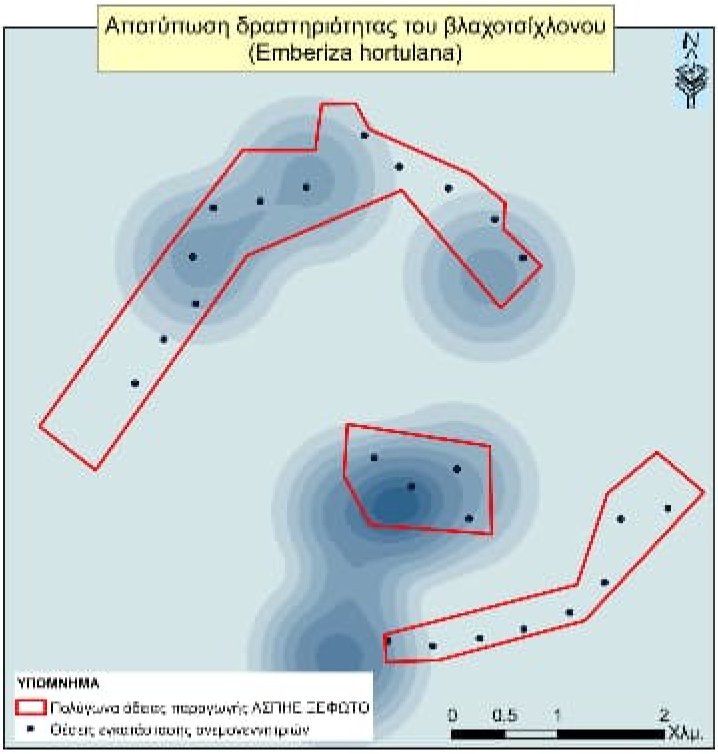


Figure 27: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Oak woodpecker (*Ficedula semitorquata*)

As mentioned in the previous section, the species was recorded once (one individual) in the study area during the observations in May 2022.

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 required.

Of all the threats documented, the installation of the proposed ESU is not expected to cause any serious impact on the species. No increased concentrations of the species were observed (the species as mentioned above was observed only once during the whole observation period). 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 ESU is considered negligible.

It is not possible to present a capture of the species' activity using Kernal density algorithms (due to single recording).

Cinderella (*Lanius minor*)

As mentioned in the previous section, the species was recorded twice (two individuals) in the study area during the observations in May 2022 and June 2022.

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.

Of all the threats documented, the installation of the proposed ASDP is not expected to cause any serious impact on the species. No increased concentrations of the species were observed (the species as mentioned above was observed twice throughout the observations). 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 ESU is considered negligible.

It is not possible to show the activity of the species using Kernal density algorithms (more than two records are required).

Analysis of mammalian records

From the records of other mammals (except the cephalopods) in the survey area, the existence of mostly common species of this fauna class was found. Most of these species are observed in most parts of Greece, are species with satisfactory or particularly large populations, and their conservation status is described in detail in the relevant tables in this report. However, of particular interest is the species *Canis lupus* , which according to the Greek Red Data Book in Greece is classified as a threatened species (VU: Vulnerable), while according to the IUCN at European level it is listed as a species of reduced concern (LC) . A total of nine mammal species were recorded, **of which none belong to Annex II of Directive 92/43/EEC**, while one (*Felis silverstris*) belongs to Annex IV of the above Directive and one (*Canis lupus*) belongs to Annex V of the Directive. The main characteristics of the above mammal species observed during the field survey are listed below, except for *Canis lupus*, which belongs to the species of interest herein, and whose main characteristics, ecological requirements, and pressures and threats to it have been fully analysed in Section 5, in the relevant subsection required. 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.*, M pakaloudis D. 2008. *Wildlife Biology*. Yachoudi

Publications, Thessaloniki, p 413, IUCN Red List of Threatened Species, www.iucnredlist.org available on 15/10/2022.

Fox (*Vulpes vulpes*)

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 an endangered category (NE and LC respectively). It is also protected by the International Convention CITES (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 south, January-February in the central regions and February-April in the northern limits of its range. It usually gives birth to 5-8 young. The young remain with their mother until the following autumn. The size of the endemic area varies depending on habitat quality. 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 density of a population is one family per square kilometre but can range 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, rabbits and hares) and birds. It also feeds on eggs, reptiles and carcasses. Finally, a significant part of the species' diet consists of fruit. Its diet is opportunistic and at certain times of the year, with a lack of prey, worms can come to cover more than 50% of this.

The threats listed in the IUCN red list are the persecution of the species by humans as a predator 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.

Hare (*Lepus europaeus*)

The species has an extremely wide distribution range, which extends from Western Europe to Western Siberia and Southwest Asia. It also 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, as well as on the islands of Crete, Evia, 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 adaptable species and occupies a wide variety of habitats, including 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). It is also found in open forests at the southernmost limits of its range. The breeding season runs from mid-January-February to 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, including certain 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 this food source, cultivated species are selected (Reichlin et al. 2006).

The threats listed in the IUCN red list are the intensification of agriculture, especially the increased use of pesticides, fertilizers and heavy machinery, which is considered 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 join in the near future. In Greece, the introduction of rabbits from other 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 density.

Stone Coon (*Martes foina*)

The species occurs in much of Europe and Central Asia. In Greece, it spreads 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, at forest edges, and on 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 serious threats. It is sometimes persecuted by humans as an undesirable species, and in India and Russia it is hunted for its fur.

Badger (*Meles meles*)

The species is spreading 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 mainland 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 boundaries 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 usually forms groups of 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 that 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.

Wildcat (*Felis silvestris*)

The species has a very wide distribution range that extends throughout 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 bobcat is a forest-dwelling species and prefers mainly broad-leaved forests, but it is also found in wetlands, scrub 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 minor 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.

Wild boar (*Sus scrofa*)

The species is spreading 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 is found in a wide variety of habitats, from temperate to tropical, from high mountains and forests to shrublands. 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).

Roe deer (*Capreolus capreolus*)

The deer has a wide range of distribution in the Palaearctic. 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 range being the mountains Oiti, Vardousia, Giona and Parnassos. 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 in Europe 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 mounds (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 spreads. Poaching is a potential threat to the species. In Greece, hunting of the species is prohibited.

According to the Greek Red Book (Legakis and Marangou 2009), the most important threat remains poaching. The 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, since 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 habitats 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.

Squirrel (*Sciurus vulgaris*)

The species has a wide range of distribution in the Palaearctic, extending from Ireland, Spain and Portugal in the west, through mainland 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 (Annex III). According to the Greek Red Data Book in Greece the species has not been assessed and therefore is not under threat (NE), while according to the IUCN at European level it is listed as a species of reduced concern (LC).

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 foods, 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 shelter (Parker 1990; Nowak 1991). It also uses artificial nesting sites (e.g. artificial boxes). 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.

Analysis of the records of the worst offenders

From the records of **handflies**, the seasonal presence of 21 species (barbastelle, trunked bat, mountain bat, Alcathus myotis, footed myotis, Daubenton's myotis, trunked myotis, great crested newt, etc.) was found in the survey area, micronight bat, nocturnal bat, white bat, Nathusius's bat, nanon bat, micronight bat, brown oton bat, Mediterranean oton bat, Mediterranean oton bat, parade bat, winged bat, mesrinolophus, microrhinolophus, trannorhinolophus). Of the 21 species of arthropods recorded seasonally in the area, seven are Annex II species of Directive 92/43/EEC (but also Annex IV) (barbastelle, footpad, trannomyotis, winged bat, mesrinolophus, microrhinolophus, trannynolophus), while barbastelle is a threatened species according to the IUCN: VU (Vulnerable), footed myotis: VU (Vulnerable) , fluttering bat: VU (Vulnerable), mesrinolophus: VU (Vulnerable), microrhinolophus: NT (Near Threatened), and tranquilophus: NT (Near Threatened), while of all the other chiral species (except Annex II) only the Mediterranean otter bat is classified as NT (Near Threatened). Table 30 below shows the recorded frequencies of transits per hour of record for each species, which are also shown in Figure 28 below, and in Figure 29 as the number of transits per hour of record and per month (hand bat activity per month of presence).

Table 30: Recording rate of cephalopod species observed during field surveys in the field survey area (number of records per hour of recording).

Kind of	Number of recordings per hour of recording
*Barbastella barbastellus**	0,014
Eptesicus serotinus	0,109
hypsugo savii	0,175
Miniopterus schreibersii	0,367
Myotis alcathoe	0,903
Myotis capaccinii	0,029
myotis daubentonii	0,049
Myotis myotis	0,307
Nyctalus lasiopterus	0,080
Nyctalus leisleri	0,737
Nyctalus noctula	0,422
Pipistrellus cowlick	0,622
Pipistrellus nathusii	0,224
Pipistrellus pipistrellus	1,543
Pipistrellus pygmaeus	2,036
Plecotus auritus	0,057
*Plecotus kolombatovici***	0,115
Rhinolophus euryale	0,321
Rhinolophus ferrumequinum	0,009
Rhinolophus hipposideros	0,057
vespertilio murinus	1,021

***** In a shaded cell in bold type, species classified in the VU threat category at European (or in the absence of this category at global level), according to IUCN, ****** in bold type, species classified in the NT threat category at European (or in the absence of this category at global level), according to IUCN.

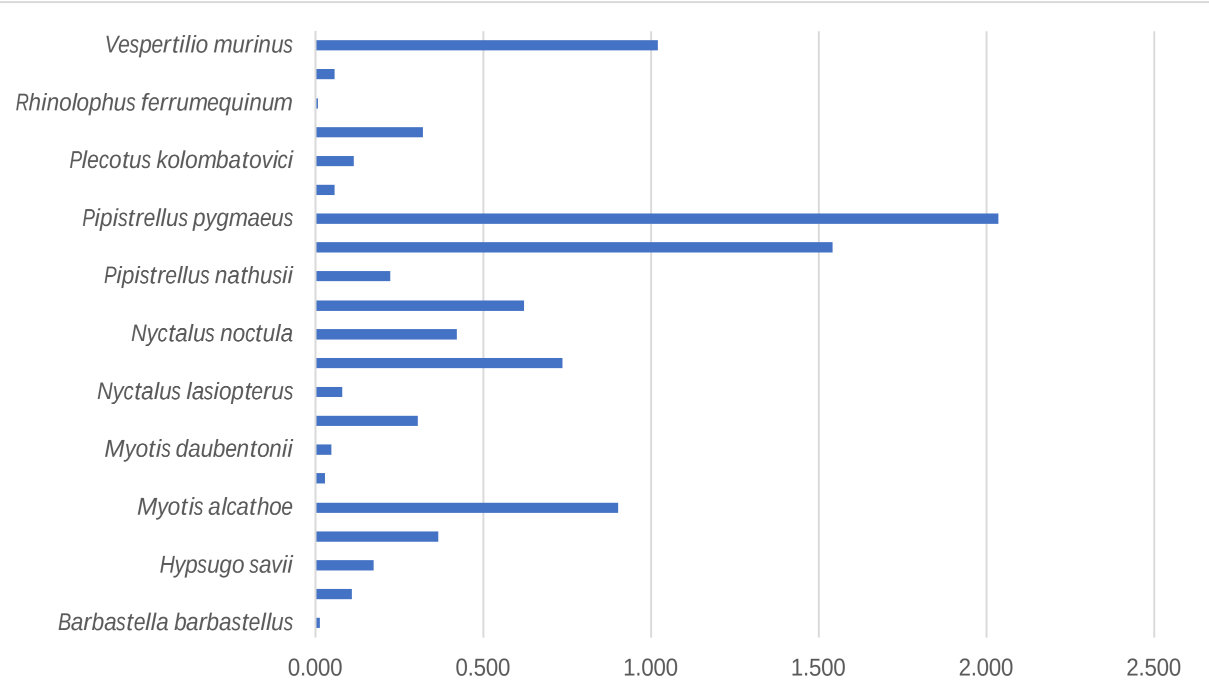


Figure 28: Graphical representation of the number of recordings per hour of recording of the chinstraps observed in the field survey area.

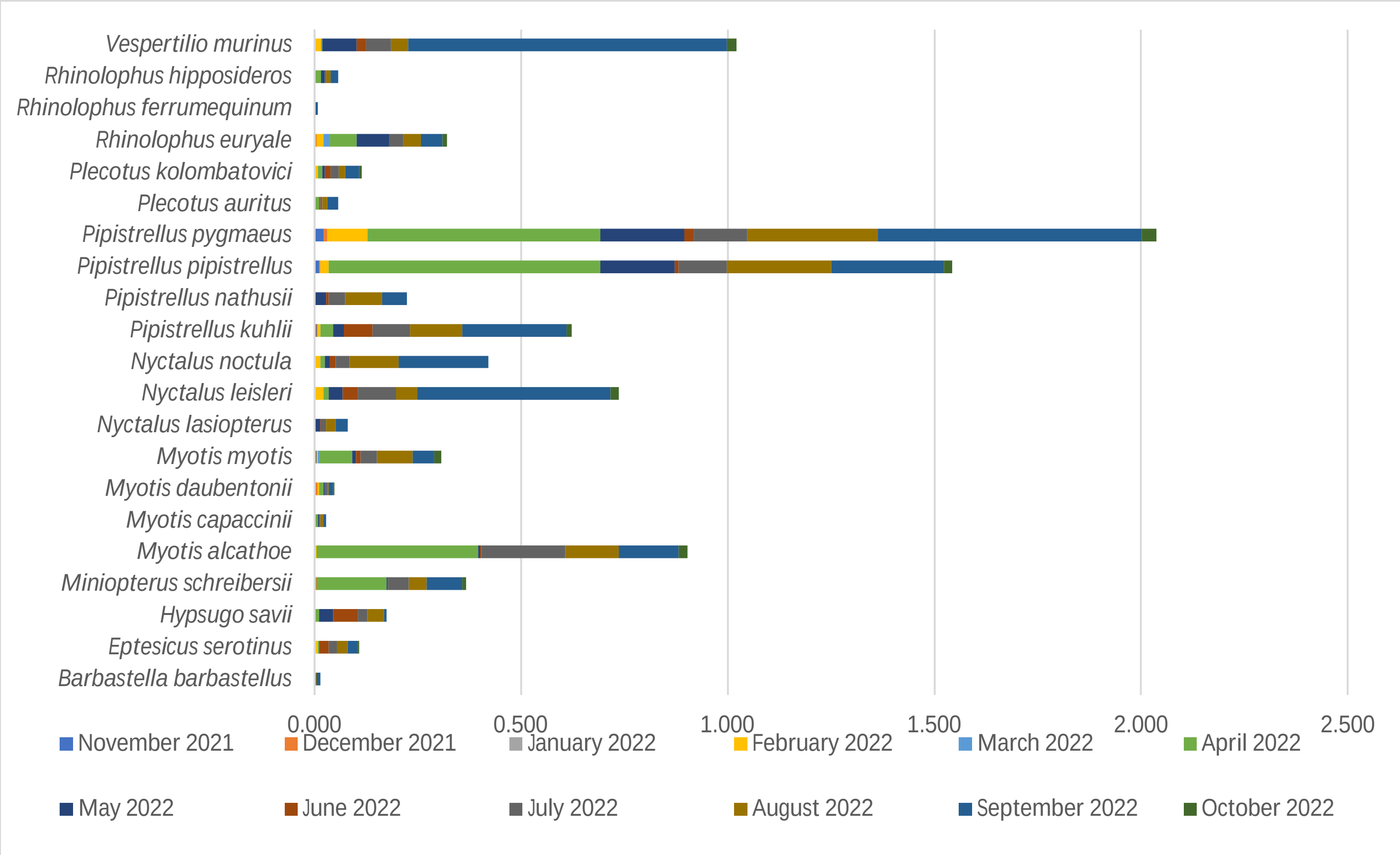


Figure 29: Graphical representation of the distribution of the number of recordings per hour of the number of handicapper observed in the field survey area, by month of recordings.

From the above data it is clear that the area is not used significantly by chironomids, which, although observed in a 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: *Barbastella barbastellus* (0.014) *Miniopterus schreibersii* (0.367), *Myotis capaccinii* (0.029), *Myotis myotis* (0.307), *Rhinolophus euryale* (0.321), *Rhinolophus ferrumequinum* (0.009), *Rhinolophus hipposideros* (0.057), while for the only species classified as threatened and not included in the above mentioned species (a species listed in Annex IV of the Directive), which is *Plecotus kolombatovici*, the number of crossings per hour of record is also extremely low (0.115).

The following are the main characteristics of 14 of the above 21 species of chironomids observed during the field survey, including *Barbastella barbastellus*, *Miniopterus schreibersii*, *Myotis myotis*, *Myotis capaccinii*, *Rhinolophus euryale*, *Rhinolophus ferrumequinum*, *Rhinolophus hipposideros* are species of interest (as selected in a previous section of this Special Ecological Assessment) and their main characteristics, pressures and threats have been fully analysed in Section 5, in the relevant subsection required. 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 15/10/2022.*

Micronystocat (*Nyctalus leisleri*)

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 on trees and buildings, and loss or degradation of foraging habitat. However, they are not currently considered to be significant threats.

Mountain bat (*Hypsugo savii*)

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 m.

It is generally found at low densities and is limited by its habitat requirements, but is abundant in some European Mediterranean regions. Summer colonies of the species usually number 20-70 females.

The species feeds in open woodlands, grasslands and wetlands, and is often found feeding in farmland near urban areas.

According to the IUCN red list, there are few threats to the continental distribution of the species, except in cases where the roosts are located in buildings.

Pileated bat (*Pipistrellus pipistrellus*)

According to the Greek Red Data Book in Greece the species is poorly known (DD), while according to the IUCN red list at 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 east 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, and in some parts of its range it migrates 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.

The threats listed on the IUCN red list are the loss of habitat for the species. Agricultural intensification is leading to the destruction of small-scale structured, insect-rich traditional rural landscapes and a decrease 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).

Otonbat (*Plecotus auritus*)

According to the Greek Red Data Book in Greece the species is classified as VU, while according to the IUCN red list it is listed globally 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.

According to the latest data, the oton bat is endemic to Europe (Spitzenberger et al. 2001, 2006). In the southern parts of the species' range it is found at high altitudes. It is widespread in the British Isles and Sardinia, while its distribution in Iberia, Italy and the Balkan Peninsula is fragmented. The species is not common in Greece. It has been reported from fewer than 15 sites, in mountainous areas of northern and central Greece (from sites with altitudes up to 1,600 m) and one from the northern Peloponnese (Dietz et al 2008). Some of these reports probably refer to individuals of *Plecotus macrobullaris*, whose presence in mainland Greece was recently established (Juste et al. 2004), while others are very doubtful (Hanak et al. 2001). From the data available to date, its distribution range does not exceed 10,000 km2 , its distribution is fragmented, and its heavy dependence on forests and stands of mature trees makes it more vulnerable.

Breeding colonies are mainly found in tree cavities, in artificial bird or bat boxes. It is also often found in buildings, preferably in attics of churches and barns. In attics, breeding colonies are found in the niches of the rafters, between the tiles and behind the wood panelling. Breeding colonies contain up to 100 females (but usually 10-50). They hibernate in underground roosting sites such as cellars, warehouses, mines and caves, as well as in rock crevices, wood piles and cavernous trees (Dietz et al. 2009). Foraging habitats include woodlands, forest edges, shrublands, hedgerows, hedgerows, traditional orchards, parks and gardens. The species hunts near roosting sites. In Switzerland, the average foraging distance from roosting sites was 1.2 ± 0.6 km and the average endemic area was 51.8 ± 33.8 ha (5.2-103.2 ha) (Ashrafi et al. 2013). Usually a resident species. The longest recorded movement was 90 km (Steffens et al. 2007). The oldest recorded individual of the species was 30 years old (Lehmann et al. 1992).

According to the Greek Red Data Book, the greatest threat is the degradation and destruction of mature forests and stands of mature trees.

Threats listed on the IUCN red list are the loss of roosts in buildings during renovation works. Also, the removal of old trees with cavities and dead wood reduces the number of suitable roost sites. Disturbance of winter sites (caves, tunnels, abandoned mines) by visitors, use of pesticides and wood treatment in attics and roofs are also threats to the species. It suffers from declining insect abundance due to intensive agriculture, forestry and horticulture (Simon et al. 2012). Finally, there is a high risk of collision with vehicles (Fensome and Mathews 2016).

Parallax bat (*Vespertilio murinus)*

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 interest (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.

An abundant species in the northern parts of its European 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 various types of habitats, such as forests, urban areas, steppes, 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.

White bat (*Pipistrellus kuhlii)*

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 continued population growth.

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 almost 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.

Nathusius bat (*Pipistrellus nathusii)*

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 interest (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 range, and less common but increasingly recorded in the southern and western parts of their range. Summer breeding colonies of up to 200 individuals have been recorded, but large winter aggregations are not known.

It forages in a range of habitats, including woodlands, wetlands and open parks. Summer roosts are found in tree holes, buildings and artificial bat boxes, mostly in woodlands. 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.

Micro bat (*Pipistrellus pygmaeus*)

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 interest (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. The species has only recently been differentiated from *Pipistrellus pipistrellus*, and some details on its distribution are still lacking. The distribution range of the species extends from the British Isles through much of Europe (including the islands of Corsica and Sardinia) eastwards to the Ukraine and western Russia. Its range may extend much further east, as well as into northern Africa (Wilson and Reeder 2005), although it is also possible that the species does not occur outside Europe. It occurs further north in Scandinavia than *P. pipistrellus*.

It is generally a less abundant species than *Pipistrellus pipistrellus*. Summer colonies can be larger than *Pipistrellus pipistrellus*, numbering up to 250 (or occasionally up to 3,000) individuals. It is not known whether the species concentrates in winter or what the size of its winter colonies is.

It forages around forests and wetlands and is more closely associated with water than *P. pipistrellus*. It feeds mainly on small diptera (especially aquatic insects).

Breeding colonies are generally found in buildings. No specific data are available for *P. pygmaeus* winter colonies, *but they* are probably similar to those used by *P. pipistrellus.*

According to the IUCN red list, breeding colonies tend to be located in buildings, so the species may be vulnerable to anthropogenic factors such as disturbance, timber processing and building renovation. However, this is not considered a significant threat.

Tranny bat (*Eptesicus serotinus*)

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 occurs throughout the Palaearctic, from Portugal to Central Asia (Artyushin et al. 2012, Juste et al. 2013, Artyushin et al. 2018). In summer, the species is found in old buildings, attics, etc. Also, in summer, it prefers perching sites that offer a varied microclimate, so that individuals of the species can choose their location depending on the outdoor temperature. Individual individuals, mostly males, occasionally use roosting sites in tree cavities or artificial nesting boxes (Baagoe 2001; Simon et al. 2004; Dietz et al. 2009). Colonies usually consist of 10 - 60 females, but colonies of up to 300 females have also been reported. Sometimes there are male-only colonies, which number up to 20 individuals. The species hibernates, mainly in deep cavities in buildings within 40 - 50 km of summer roosting sites. It feeds on insects which it catches mainly in the air (Baagøe 2001). The species forages above trees along roads and around street light bulbs. The main prey species of the species are associated with open and semi-open habitats, such as meadows and pastures, with groups of scattered trees and vegetation barriers. The distance from foraging sites can be as much as 5-7 km, but the species usually spends about 90% of its foraging time at distances of less than 2 km from roosting sites. Analyses of faecal samples from different parts of the species' European distribution revealed that the species mainly feeds on coleopterans. The species is mainly epidemic, with longest movements of up to 330 km (Havekost 1960). The species reaches an age of 24 years (Steffens et al. 2007).

According to the IUCN red list, in Europe the species is affected by habitat loss and the disturbance and destruction of colonies in buildings and underground sites where it hibernates (hibernation). Also, building renovations result in loss of roosting sites. In addition, the species is threatened by agricultural intensification due to the loss of natural grasslands and pastures (insect-rich areas), abandonment of extensive livestock production, more frequent mowing, removal of plant barriers, increased pesticide use, and conversion of grasslands and pastures to cropland. Finally, the species is at high risk of collision with vehicles (Fensome and Mathews 2016).

Nightjar (*Nyctalus noctula*)

According to the Greek Red Data Book in Greece the species is poorly known (DD), while according to the IUCN red list at 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 II) and Bonn (Annex II) Conventions.

The species occurs in most of Europe and is relatively common over most of its distribution range. It is considered to be very abundant in the former Russian Federation. The species is common in winter in Austria, with no signs of population decline (Spitzenberger 2002). However, there have been documented local declines in the Netherlands and there are suggestions that there were significant declines in the UK during the 1940s, although the population trend now appears to have stabilised (Bogdanowicz 1999; Battersby 2005).

The species hunts in wetlands, woodlands and pastures. It feeds on insects (beetles, moths and flies). Summer colonies of the species are found in tree holes and sometimes in buildings. Winter roosts are found in cracks in rocks, in caves and occasionally in man-made structures. Breeding colonies number 25-50 females (occasionally up to 100 individuals), but winter colonies can be large (10,000 individuals in one case in Germany) (Harrje 1994; Mayer et al. 2002). Seasonal movements between summer roosting sites and winter hibernation sites located in central and southwestern Europe usually cover distances of less than 1,000 km. The longest recorded movements are 1,546 km (Hutterer et al. 2005).

The threats listed on the IUCN red list are the loss of cormorant tree sites in Northeastern Europe. In Romania and Hungary, colonies are threatened by building renovation. Local declines in the Netherlands are associated with the loss of wetland areas (Bogdanowicz 1999). They are not considered to be serious threats to the species at present.

Daubenton's myotis (*Myotis daubentonii*)

According to the Greek Red Data Book in Greece the species is classified as VU, while according to the IUCN red list it is listed globally 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.

It is listed as a species of reduced concern because it is widespread and abundant, it does not face major threats and there are indications that its population is now on an upward trend.

The species is rare in the Mediterranean, but is found in the Balkan countries, including Montenegro (Karapandža et al. 2014, Presetnik et al. 2014).

Breeding colonies of the species may contain up to 600 females and may be housed in tree cavities, buildings or other artificial structures (e.g. bridges), as well as in artificial bat boxes. The common size of a colony is about 40 females that change roosting sites in trees, while roosting sites in buildings are occupied for longer periods of time. Males can also form summer colonies of up to 200 individuals that roost in various underground and aboveground shelters (Simon et al. 2013). It ranges over a wide range of subterranean habitats, Seasonal movements between winter and summer residences are mostly within 100-150 km (Hutterer et al. 2005). The longest distance travelled is 304 km for males and 261 km for females, with a maximum age of 30 and 22 years respectively (Steffens et al. 2007). *M. daubentonii is* associated with aquatic habitats. Feeding areas are usually located at a maximum distance of 2-5 km from roosting sites, but sometimes they can be up to 10 km away. Females tend to forage closer to roost sites than males.

The range of the species in our country is limited to northern Greece. It has been reported from about ten sites in Epirus, Macedonia and Thrace (Helversen and Veid 1990, Hanak et al. 2001, Dietz et al. 2008). Its populations appear to be isolated.

In Greece the distribution of the species is very limited and its populations are fragmented, probably due to its close dependence on large water bodies.

This species is poorly studied in Greece. Throughout its distribution range, it shows a close dependence on large water bodies, where it feeds on moths, diptera and hemiptera. Occasionally, the species forages in forests. The species' summer refuges are found in tree hollows, buildings and underground habitats (caves, mines). It roams in various underground shelters (Stubbe et al. 2008).

The threats to the species, according to the Greek Red Data Book, have not yet been investigated. It is probably affected by the shrinkage and degradation of the wetlands where it hunts (drainage, pollution, contamination, vegetation removal). Maintenance of buildings and visits and disturbance to underground habitats where it nests are also potential serious threats. More specifically, the impacts of caving activities and visits by nature lovers, especially during the lactation and hibernation periods, are estimated to be negative. Often the tourist development of caves and archaeological research in caves has a devastating effect on their fauna. Equally negative for bats are the effects of blocking the entrances to caves and mines for security reasons.

According to the IUCN red list there do not seem to be any significant threats to the species. Changes in water quality may reduce food supply, and loss, destruction or disturbance of roosting sites in trees, buildings and other man-made structures and underground habitats may cause temporary localized losses. However, these are not believed to pose serious threats to the survival of this abundant and expanding species.

Myotis alcathoe (*Myotis alcathoe)*

According to both the Greek Red List in Greece and the IUCN red list at European level the species is poorly known (DD).The species is protected by Directive 92/43/EEC (Annex IV) and the Bern (Annex II) and Bonn (Annex II) Conventions.

The species was recently described and is poorly known (von Helversen et al. 2001), but current information suggests that it is endemic to Central and Southern Europe. It occurs in Spain, France, Switzerland, Germany, the Czech Republic, Slovakia, Hungary, Montenegro, Serbia, Bulgaria, Switzerland and Greece (Ruedi et al. 2002, Benda et al. 2003, Agirre-Mendi et al. 2004, von Helversen 2004, von Helversen et al. 2006). Recent records revealed the presence of this bat species also in Austria, Poland, Belgium, Belgium, Romania and the UK (Spitzenberger et al. 2008, Jan et al. 2010, Sachanowicz et al. 2012, Uhrin et al. 2014, Nyssen et al. 2015).

The population size and trend of this species is unknown. To date, approximately 15 sites have been recorded in international publications (von Helversen 2001; Benda et al. 2003; von Helversen 2004); however, new sites continue to be discovered (EMA Workshop 2006).

According to the limited knowledge about the species, it inhabits wooded areas and feeds mainly on flies and moths (Lučan et al. 2009, Danko et al. 2010). It seems to prefer mature oak forests, but is also found in gardens and urban habitats. It is likely that cormorant sites during the wintering period are subterranean habitats. Summer colonies may number up to 80 individuals. The only known breeding colony was found in a tree cavity.

Threats listed on the IUCN red list are degradation and destruction of riparian forests, which is considered to be a threat in some areas of the species' range (von Helversen et al. 2001). The wider loss of woodland, and therefore suitable roosting sites for trees, may also be a threat.

Greater Nightshade (*Nyctalus lasiopterus*)

The species has a segmental distribution. The species is distributed in Central and Southern Europe, North Africa and Asia Minor. The species is easy to detect with bat detectors, so its distribution in Europe is known to be highly heterogeneous. By 1999, it had been recorded in 120-130 sites in Europe (Benzal 1999). The species ranges from sea level to 1,900 m altitude (Switzerland).

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 Data Book in Greece the species is classified as Vulnerable (VU), while according to the IUCN red list at European level there is a lack of data for the species (DD) but at the Mediterranean basin level the species is classified as Near Threatened (NT).

The species, as mentioned above, has an inhomogeneous distribution and occurs at very low densities, making it very difficult to survey. It has specific habitat requirements and deforestation, particularly the loss of mature old trees, is a problem in many parts of its distribution range and is likely to cause population declines. Some cases of mortality have been recorded following collisions with wind turbines at wind farms.

Its heterogeneous distribution and low population density at its widest distribution range suggest a relatively small global population. Breeding colonies are usually small (up to 35 females) and few are known. Only two breeding colonies of larger size (50-100 females) are known in the world. There is a large population of the species in northern Hungary. The species is difficult to survey and is difficult to capture with nets as it hunts 10 - 20 m above the ground.

Greece is the southernmost end of the species' distribution in continental Europe, where its distribution is again highly fragmented. It has been reported in a few areas of Pindos, Halkidiki, the Forest of Dadia and the coastal areas of Thrace (Wolf 1964; Helversen and Weid 1990; Hanak et al. 2001). It has not been reported from any island but may be present on some of the more forested ones (Thassos, Crete, Ionian Islands). To our knowledge to date, the total area of its range does not exceed 20,000 km, and its populations appear to be isolated.

The species hunts in mixed and deciduous forests in river valleys. It depends heavily on mature forests (the species needs many mature trees to support a colony, so any removal of trees is a threat to the species). It feeds mainly on insects, but has been reported to feed on small birds during bird migration, which form an important part of its diet during this period (90% of the species' faeces during bird migration has been reported to consist of feathers of small ostriches). It has been reported, after monitoring the species using radar in Spain, to fly for several hundred metres, presumably to catch migratory birds. In summer it roosts in tree hollows and occasionally in buildings. Cracks in rocks can be used during winter hibernation. It often roosts in suitable locations with other species such as *Nyctalus noctula.*

According to the Greek Red Data Book (Legakis and Marangou 2009), the main threat to the species in Greece seems to be the loss of mature trees with cavities where it nests during spring and summer. Other threats are forest fires, especially in mixed forests, and water pollution.

The threats listed in the IUCN red list are the loss of mature forests and disturbance to suitable habitat areas of the species (mature trees and buildings). Dead individuals have been found in wind farms in Spain.

Mediterranean bat (*Plecotus kolombatovici*)

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 the species is classified as threatened (NT). The species is protected by Directive 92/43/EEC (Annex IV) and the Bern (Annex II) and Bonn (Annex II) Conventions.

The population size of the species in Europe is small, estimated to be less than 10,000 individuals, and is mainly found in coastal areas where it is suspected that pressure from tourism is causing a population decline.

The distribution of the species is restricted to three main places: the southern Balkans and Asia Minor, Libya and northwest Africa from Morocco to Tunisia.

Summer colonies usually number 10-30 females, although a breeding colony of 120 females was found in a building in Croatia. Winter colonies are smaller (10 individuals) and the species is usually solitary at this time of year.

It feeds in a variety of open areas, mainly steppes, but also in rural landscapes in both lowland and mountainous areas. Often forages over small bodies of water. It feeds mainly on moths, but also supplements its diet with beetles and flies. Summer roosting sites are mainly rocky hollows, but also dark areas of old monuments, ruins, caves and buildings. Winter roosts are found in buildings, mines, caves, wells and trees.

According to the IUCN red list, pesticides and disturbance to cormorant sites have a negative impact on the species, but are not considered to be causing a significant population decline globally. However, in Europe, where this species is largely restricted to coastal areas, disturbance of cormorant sites by tourists may pose a significant threat.

Analysis of the reptile records

Although Greece is a small country, its geographical location, the wide variety of different habitats and the existence of more than 9,000 islands and 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, seven reptile species (two lizard species, three snake species and two turtle species) were identified and recorded, of which two turtle species, the gray turtle and the Mediterranean tortoise, belong to the species listed in Annex II of Directive 92/43/EEC (they are also listed in Annex IV of the Directive), the green lizard, the wall lizard, the viper and the starry-eyed lizard belong to Annex IV of the Directive, while the water lizard does not belong to any of the above mentioned Annexes. The main characteristics of the above mentioned reptile species observed during the field survey are listed below, except for the two species of turtles *Testudo* hermanni and *Testudo graeca*, which belong to the species of interest herein and whose characteristics, ecological requirements, and the pressures and threats affecting them have been fully analysed in Section 5, in the relevant subsection required. 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 15/10/2022.*

Green lizards (*Lacerta viridis*)

The species is found almost all over 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 in a risk category (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.

Viper (*Vipera ammodytes*)

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 reduced interest (LC).

The species spreads from southern Austria and northeastern Italy to the Balkan region and southern and southwestern Romania, Bulgaria, Slovenia, Croatia, Bosnia, Serbia, Montenegro, Montenegro, Albania, FYROM and Greece (including some islands of the Cyclades). The species spreads from sea level to 2,500 metres. It is a very common species.

The species is found in rocky habitats, including open woodland and scrubland, sand dunes, rocky sparsely vegetated uplands, non-intensively cultivated land, stone walls near agricultural land, gardens and vineyards. The species' diet consists of small mammals, small birds, bird chicks, lizards, frogs and toads. Juveniles prefer invertebrates, lizards and rodent chicks. Mating takes place in spring, after a dance with their bodies raised and wrapped around each other. Fertilization and embryo development takes place internally in the female's body. The female gives birth to 6-12 young in late summer (Capula 1990). The young are 15-23 cm long. She matures sexually at 4-5 years of age. It lives up to 14 years, but in captive conditions can live up to 20 years. The species is active in the early morning and late afternoon, and rests during the warm hours of the day (Taylor 1998). It is a ground dwelling species, but occasionally forages in low shrubs. In summer it hunts during the night. It is a lumbering species and usually hunts its prey by ambush. It has two glands that produce neurotoxic venom and is used to kill its prey. The glands are joined by the two front teeth of the upper jaw, which are hollow and pointed when the mouth is opened. The venom is among the strongest in snakes found in Europe.

Coyote (*Podarcis muralis*)

The species has a wide range of distribution in Europe (largely absent from Northern Europe). The species occurs from sea level to 2,000 m altitude in its southern range, and has been observed up to 2,500 m altitude. It is generally an abundant species in suitable habitats.

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).

The species prefers rocky slopes with herbaceous vegetation and rural areas. It can occur in scrubland, in sparse deciduous and coniferous forests, orchards, vineyards, fields, and on stone walls in old buildings. Its diet consists of insects, small invertebrates and small spiders. The species has two or more spawning runs each year. The female lays 1-4 eggs in the ground, which hatch after an incubation period of 5-6 weeks. In case of danger she cuts off (autonomy) the tail, which grows 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 habitat loss due to intensification of agriculture and excessive use of pesticides. There is also a threat from the harvesting of the species for the pet trade, but the overall impact of this is not considered significant. The introduction of non-native subspecies may pose a threat to some local populations.

Water snake (*Natrix natrix*)

The species is found in NW Africa, in Europe, where it spreads to southern Sweden and southern Finland, and western Asia. In Greece it is found throughout the mainland, while it is absent from Crete and some islands of the Cyclades. At the southern limits of its distribution range, *it is found up to 2,400 m altitude. The subspecies occurring in Greece are Natrix natrix persa, Natrix natrix fusca* and *Natrix natrix schweirzeri.*

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 a risk category but is listed as a species of reduced concern (LC).

The species lives on the banks of rivers, streams, canals, lakes, valleys with abundant water, marshes, wetlands and swamps. It also prefers deciduous forests, agricultural land with hedgerows and meadows (Bakaloudis 2000), often away from water. Its diet consists of frogs, toads, amphibian tadpoles, newts, fish and rarely small mammals and bird chicks. The species usually reaches a length of up to one metre (rarely longer) and in exceptional cases up to two metres. Females are larger than males. It mates in April-May and the female lays 11 to 50 eggs, which she lays in tree hollows, under straw and in depressions in the ground. The eggs hatch after an incubation period of 3-8 weeks. After hatching, the young are 12-21 cm long. Sexual maturity is reached in three years for the male and 4-5 years for the female (Madsen

1983). It is diurnal and less aquatic than other species in the family, although in some areas it hunts in water. It is not aggressive and when it rarely bites it has no venom. It hibernates in burrows on the ground from November to March.

Threats listed on the IUCN red list are water pollution, locally in some parts of its range, affecting amphibian populations. Wetland drainage and general intensification of agriculture are also additional threats. As with many snakes, the species is persecuted by humans. Finally, direct killing on road networks and habitat fragmentation through residential development are additional threats to the species.

Starfish (*Dolichophis caspius*)

The species spreads from southern Hungary, eastwards, to Romania, Moldova, southwestern Russia. It also spreads southwards, through the Balkans, from Croatia (Lastavo Island 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. The species is not poisonous. 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.

The threats listed on the IUCN red list are direct killing on road networks by vehicle traffic.

Analysis of amphibian records

Amphibians are important indicators of ecosystem status and occupy almost all habitat types in Greece (Valakos et al. 2008). Most amphibians exhibit both aquatic and terrestrial phases in their life cycle, so they 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 grounds to breeding ponds or wetlands in spring, post-breeding dispersal and movement back to wintering grounds (juveniles and adults). Under these conditions, breeding adults are extremely 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). In 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 species of amphibian (*Bufo viridis*) was identified, which is not classified as a threatened species but is listed as a species of reduced concern (LC) in the IUCN red list, while it is not a species of Annex II of Directive 92/43/EEC. The main characteristics of the 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 15/10/2022.*

Greenfinch (*Bufotes viridis*)

The species is found in North Africa, Central and Southern Europe and in Western 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 reduced interest (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.

The 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 EU to issue guidelines and reports on this growing activity. The effects of a NPP are highly variable and depend to a large extent on many factors such as the specificity of the site, the habitats found in it and the fauna species and, 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 wider project area includes, among other things, habitats with obvious signs of overgrazing. The installation of an ESDP involves the risk of increasing the human presence at the installation site. However, this impact is mainly limited during the implementation of the works, whereas afterwards, during the operational phase of the NPP, the human presence is considered to be negligible and the area largely returns to its former character. In the case of the wind farm in question, the presence of the existing road network in the wider area is an important positive factor. As a result, the accessibility of the site will not be particularly affected by the installation of the wind farm and will not be much greater than before its construction.

The biggest problems (where they are created) from the installation and operation of ESDS have been identified in the avifauna and especially in sensitive areas such as areas that for some reasons 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 forms of impacts can be identified in four categories:

- Disturbance, which removes bird species from the A/R zone causing **indirect habitat loss** and is due to factors such as noise, visual disturbance, etc.
- Collision, which kills or injures people by direct contact with the wind turbine blades.
- **Creating** a barrier effect on the movement of bird species.
- Direct habitat loss, change in habitat structure due to destruction or occupation of habitat used by the species prior to the construction of the A/P.

Assessment of impacts on the main species

From the analysis of the field records presented above, it is judged that the construction and operation of this particular NPP, in theory, may have some 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 EU guidelines and data (European Commission 2010). 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 records of important species (species listed in Table 29) - Impact risk assessment". The table below lists species that are included in the EU Guide (European Commission 2010) and were observed during the fieldwork, as well as other species of interest in the area that were observed during this work by the study team and not included in the above mentioned guide.

Table 31: Impact assessment on the avifauna recorded in the area, in relation to the EU classifications and data (European Commission 2010) for as many of the above as available .

Kind of	E.U. characterisation.			Estimation in the studied ESDP		
	Loss of habitat	Impact	Creation of a dam	Loss of habitat	Impact	Creation of a dam
Aegypius monachus (Black vulture)	-	-	-	O	XX	O
Aquila chrysaetos (Golden eagle)	X	XXX		O	XX	O
Accipiter brevipes (Saini)	-	-	-	O	X	O
Ciconia nigra (Black Stork)			O	O	X	O
Circaetus gallicus (Snake eagle)	X	XXX	X	O	XX	O
Circus aeruginosus (Cormorant)	X	O	O	O	X	O
Circus cyaneus (Winter squirrel)	XX	X	O	O	O	O
Circus pygargus (Least Cormorant)	X	XX		O	O	O
Clanga pomarina (Crane eagle)		XX		O	O	O
Falco peregrinus (Peregrine Falcon)	X	X	O	O	X	O
Falco eleonorae (Black-backed Gull)	-	-	-		O	
Gyps fulvus (Vulture)	X	XXX	X	O	XX	O
Hieraaetus pennatus (Geraetus *pennatus)*	-	-	-	O	X	O
Milvus migrans (Tsiftis)	X	X	X	O	O	O
Pandion haliaetus (Fish Eagle)	-	-	-	O	O	O
Pelecanus crispus (Silver pelican)	-	-	-		O	
Pelecanus onocrotalus (Pelecanus *onocrotalus*)	-	-	-		O	
Phalacrocorax carbo (Cormorant)	X	O	O		O	
Pernis apivorus (Pernis apivorus)			O	O	XX	O
Caprimulgus europaeus (Yiddish)	X	X			O	
Dendrocopos syriacus (Balkan woodpecker)	-	-	-		O	
Dryocopus martius (Black Woodpecker)	-	-	-		O	
Emberiza hortulana (Stilt)	-	-	-		O	
Ficedula semitorquata (Oak flycatcher)	-	-	-		O	
Lanius minor (Cinderella)	-	-	-		O	

Kind of	E.U. characterisation.			Estimation in the studied ESDP		
	Loss of habitat	Impact	Creation of a dam	Loss of habitat	Impact	Creation of a dam
Lanius collurio (Eagle-eye)	-	-	-		O	
Lullula arborea (Tree star)	-	-	-		O	
Leiopicus medius (Middle woodpecker)	-	-	-		O	
Struciformes (Passeriformes)		X	X	A record was made on a case-by-case basis		

Legend: XXX = evidence of significant risk of impact, XX = evidence of risk of impact, X = possible risk of impact, O = low or no significant risk of impact, Where there is a dash (-) the species is not mentioned in the EU Guide

The following conclusions can be drawn from the above table:

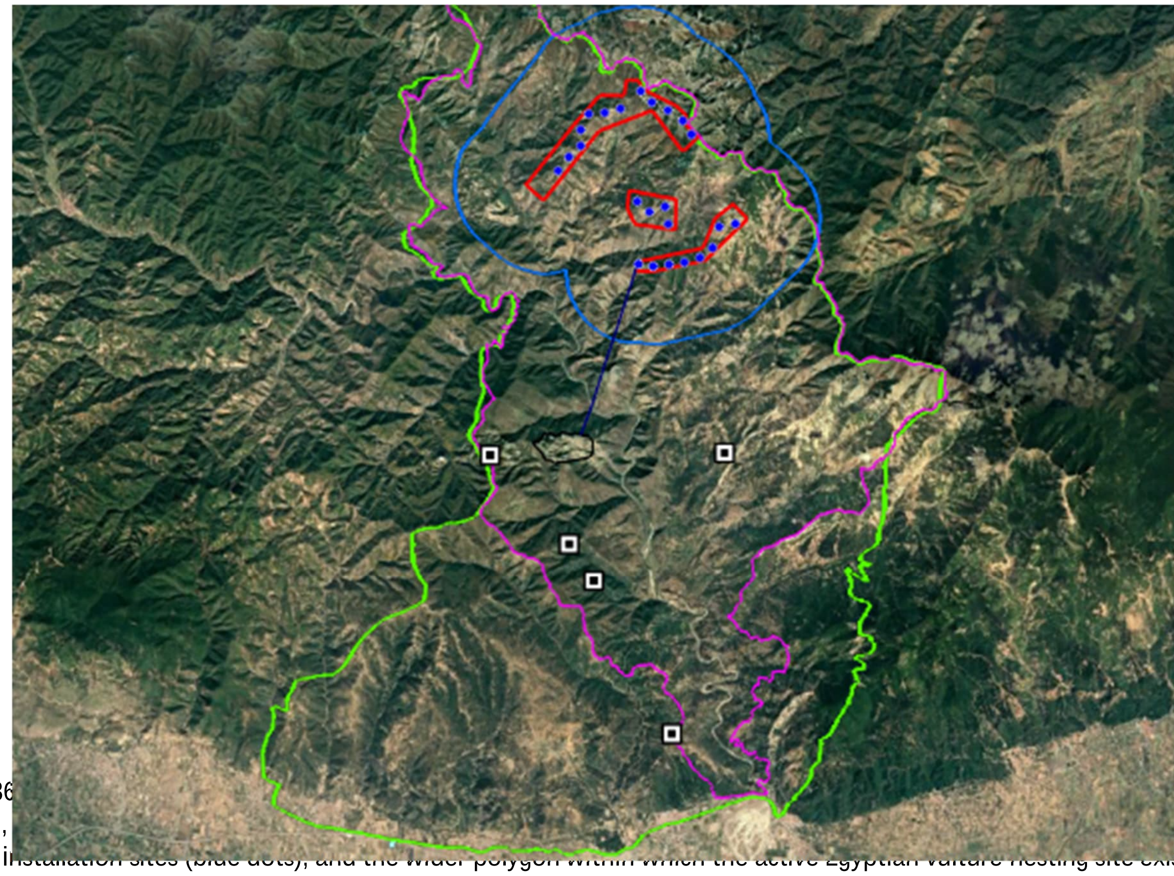
Of the large predator-scavenger species observed in the field survey area, the vulture, hornbill, snake eagle, black vulture, and golden eagle, in descending order of ranking, are considered to face a theoretical potential risk of impact from an impact, as they appear to use the ADF site with lower or higher intensity of frequency. The recorded flights of the species and the frequency of their observations per hour of observation are detailed in the preceding section. Based on the data obtained from the analysis of the field recordings and combining them with the corresponding characterizations of the first three columns of Table 31 derived from the EC Guide, the above species were classified, in terms of impact impact, in the risk category "indicative of impact risk". The above classification was also made given the importance of the wider area for the species, the use of the area (foraging), their size, and the fact that the above species, like most large - scavenging birds, are K-selection species in terms of their evolutionary growth strategies. It would be more appropriate to classify the above species in terms of impact impact in the milder category of 'potential impact risk', as: the estimated impact rates per year were not too high (especially for the size of the project), were calculated using the strictest possible criteria (95% avoidance rate and accepting that all of their recorded flights are flights indicating site use and not accidental passages through the site), and the long term presence of the above listed species in the protected areas of SPA GR009 and Z.EEZ GR1130012, has not been such, at least in the recent past, as to cause even one of the above species to meet the criteria for classification as a designated species in these protected areas within which the project under study is located. Also particularly in the case of the blackbird, the above mentioned project siting area is a suitable area for wind farm siting, as according to the scientific publication by Vasilakis et al. (2017), the authors propose the installation of wind farms in this area as a solution to the potential problem of blackbird population decline if all the wind farms planned to operate in the area are operated simultaneously. The above study predicts that if all the wind farms under licence are installed in this peripheral zone (and even within part of the first zone in the non-core area, see fig. 2 of this publication), even with their simultaneous operation, the population mortality rate will not exceed 1 %, which is the ideal solution compared to the other scenarios. With regard to the snake eagle and the wasp, it is very likely that, despite the fact that the fieldwork did not identify any nests of these two species within the field survey area, nor any behaviour directly suggesting their presence (flights carrying branches or transporting food), most of their crossings were made by the same individuals (a pair for each species) for which the area of the project under study is part of their endemic area.

In the case of the black-throated stork, a more stringent classification of the species in the risk category "potential risk of impact" was also followed, based mainly on the absolute number of observations obtained for the species (37 individual crossings for the black-throated stork) and despite the fact that the expected number of impacts per year was not high (0,019 to 0.032), and even this was calculated using the strictest possible criteria (95% avoidance rate and acceptance that all of their recorded flights are flights indicating use of the site and not accidental passes through the area). The above could also place the species in the milder impact category of "low or no significant impact risk", given the absence of impact effects resulting from the EU Guidance.

For all of the above species, and in order to minimize the possibility of risk from collision impacts, additional measures are proposed in the following section to address the potential impacts, the ***most important of which is the obligation of the project promoter to install an optical system for the automated stopping of wind turbines in case of detection of a species of interest in close proximity, in order to minimize the possibility of collision***.

With regard to the species: kestrel, gull, gull, peregrine falcon, cormorant and common sandpiper, although the probability of impact with the wind turbines of the project is infinitesimal, according to the characteristics of their flights. However, due to their presence in the area, the possibility of impact cannot be excluded by the study team. The above species would most appropriately be classified in the milder category of "low or no significant impact risk", however, due to the importance of the site and the even small probability of impact resulting from its flights, it was preferred to classify them in the "potential impact risk" category. With regard to other species of important raptors, such as the screech-owl, chiffchaff, osprey, prairie falcon, winter warbler and black-headed gull, the probability of impact on the wind turbines of the project under study resulting from the field recordings is zero. Their total individual crossings are minimal (one each for the kite, tufted tit, willow warbler, winter warbler and two each for the osprey and black-throated kingfisher - almost all of the individual crossings of these species took place outside Zone A, except for one of the two individual crossings of the osprey that took place within Zone A). Although the above species do not appear to be directly associated with the study area and in particular the project site, this fact, as mentioned above, cannot exclude the possibility that these species may make incidental transits from the project site, and therefore that there is some possibility of impact for these species, which is however very low, and therefore these species were classified as 'low or no significant risk of impact'. The same category was also applied to the Silver pelican (three records of seven individuals passing through, with one of the three records of two individuals passing through within Zone A) and roseate pelican (one record of four individuals passing through, which took place within Zone C; a distance of more than 1 000 m from the location of the nearest wind turbine of the project). As in the case of the cormorant, no foraging or nesting habitat exists for these two species in both the installation area and the field survey area. For all of the above species, as well as for other raptors and large birds that are likely to be active in the study area but due to their low frequency of passage through the area were not recorded in the fieldwork, despite the great effort made by the study team, the above proposed system of automated wind turbine shutdown in the event of detection of a species of interest in close proximity will ensure that any small chance of collision with the wind turbines is minimised.

Regarding the very important species of interest *Neophron percnopterus* (Egyptian vulture), although it was not observed in the fieldwork of this Special Ecological Assessment, it is considered that it may be occasionally active in the wider area of the project. The species is a breeding visitor to the study area, with an active nesting site in the rocky complex of 'Thracian Meteora'. The active nesting site is depicted on Map 136 below with a record of the wider nesting location (to protect its exact location from potential disturbance or even destruction, following publication of herein).



Map 136 rea (blue outline), the wind turbine installation sites (blue dots), and the wider polygon within which the active Egyptian vulture nesting site exists (black outline). A dark blue line indicates the distance (greater than 5 km) from the boundary of the polygon within which the active nesting site exists to the location of the nearest wind turbine of the wind farm under study. In addition, square dots indicate the feeding stations (feeders) of the wider area, with the nearest of these being more than 5 km from the location of the nearest wind turbine of the wind turbine of the wind farm under study.

In accordance with Commission Decision No. H.P. 8353/276/E103: "Modification 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 Article 5B(3) thereof, it is stated that:

"3. ***For the installation of LULUCF within ZEP areas***, *with one of the following spatial and/or colonial species designation: vulture (Gyps fulvus),* ***Egyptian vulture*** *(**Neophron percnopterus**), black vulture (Aegypius monachus), vulture (Gypaetus barbatus), golden eagle (Aquila chrysaetos), sea eagle (Haliaeetus albicilla), spotted eagle (Hieraaetus fasciatus), black-headed gull (Falco eleonorae), black-headed stork (Ciconia nigra), black-headed gull (Falco naumanni), peregrine falcon (Falco peregrinus), black-headed gull (Circus aeruginosus), Willow warbler (Circus pygargus), kestrel (Hieraaetus pennatus), goshawk (Buteo rufinus), golden eagle (Falco biarmicus), silver pelican (Pelecanus crispus), rose-breasted pelican (Pelekanus onocrotalus), Egyptian gull (Larus audouinii), goldeneye (Calonectris diomedea) and myotis (Puffinus yelkouan), the number of hours of flight time 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."*

All of the above requirements have been fulfilled for the Egyptian vulture in the present ERA, **although the species is not a species of classification of the studied SPA**, as the identification of the species' nest, its location, its classification as active, the importance of the species for the area and for Greece and Europe in general, the identification of the species' feeding areas (listing of suitable habitats), and the other parameters mentioned. In this particular case, the species was not recorded during the fieldwork (although, as mentioned above, a total of 56 field days were carried out by three field observers, covering a total of one calendar year's work cycle).

According to the National Action Plan for the Egyptian Vulture (*Neophron percnopterus*) in Greece (Government Gazette 3760/B/25-10-2017), and specifically according to article 1.2 of Annex I of the same, it is stated that:

"*ANNEX I*

Measures to achieve the objectives

...

1.2 Reducing the risk of collision with wind turbines through the establishment of exclusion zones

Even a small mortality rate of Egyptian vultures, with or without breeding territory, due to collisions with wind turbines, can significantly affect 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 turbines within a radius of at least 5 km around existing Egyptian vulture nests shall be*** *established on specific maps.*"

Therefore, and in accordance with the above defined by the Greek legislation, the exclusion zone for the installation of wind turbines for the present project is defined as the zone of 5.000 meters radius from the Egyptian vulture nest, a distance that does not require the movement of wind turbines of the project under study, as it was taken into account from the beginning during the project's siting, in order to protect the species and harmonize the proposed project with Greek legislation (Government Gazette B' 3760/25-10-2017).

WWF Hellas, in the framework of the implementation of action C1 of the LIFE14 NAT/NL/000901 project, entitled "Conservation of Black and Griffon vultures in the cross-border Rhodopes mountains (LIFE RE - Vultures - Conservation of Black and Griffon vultures in the cross-border Rhodopes mountains) (LIFE14NAT/NL/000901,https://www.rewildingeurope.com/ life -vultures/), implemented with the contribution of the LIFE financial instrument of the European Union by Stichting Rewilding Europe, the Bulgarian Society for the Protection of Birds (BSPB (BirdLife Bulgaria), the Hellenic Ornithological Society, Rewilding Rhodopes in Bulgaria, Stichting The Vulture Conservation Foundation and the World Wide Fund for Nature - WWF Greece, proposed the implementation of an action for the establishment of a network of small-scale feeding stations for vultures in the Komsatou Valley, in public forest areas of P.E. Rodopi. Therefore, the construction of five feeding stations (feeding stations) in the Komsatou Valley (ZEP GR1130012) was approved and implemented. The purpose of the construction of the feeding stations is to provide nutritional support to vultures using the wider study area of 'Thracian Meteora'. The area of the Komsatou Valley, as mentioned above, is included in the Natura 2000 network, and according to the data concerning the avifauna of the wider area (bibliographic data - Hellenic Ornithological Society, ZEP GR1130012), it is very important for three predator-scavenging species, the black vulture (*Aegypius monachus*), the vulture (*Gyps fulvus*) and the Egyptian vulture (*Neophron percnopterus*). As mentioned above, the large livestock population, the population of 'wild' horses, the sparse unlogged oak forest with low grazing intensity and the geographical isolation of the area due to the limited road network provide suitable conditions for feeding vultures. Given that the main human occupation in the area is livestock farming, and although the relevant legislation requires the burial of dead livestock, due to the lack of information on this issue among livestock farmers, the isolation of the area, the existence of rocky terrain which makes it difficult or impossible to bury the animals, and the cost of transport to accessible points in order to load and transport them by the vehicles of the company collecting dead livestock, has resulted in the dead animals being arbitrarily disposed of (e.g.e.g. being dumped in streams and places inaccessible to vultures). The above resulted in the need to construct this network of feeding sites (5 food reinforcement sites), thereby providing vultures with food that would ensure their presence in the area, both for foraging and for stable nesting in the area with breeding pairs, with access to safe food resources, reducing the potential for secondary poisoning from poisoned dead animals to control "noxious mammals". These stations are fed by the farmers themselves in the area and are fenced to avoid attracting competing scavenging mammals (wolves, foxes), as the increase of these mammals in the area can cause damage to the farmers' herds. These stations have been constructed at a relatively close distance from the rock formations of the Thracian Meteora, which are usually used for feeding and roosting by vultures, but at a distance of more than 2 km to avoid disturbance during the breeding season from the possible concentration of crows in the feeding areas. Vulture take-off and landing has been ensured as the sites are located on a hillside and on a sloping hillside. In general, the selection of these vulture feeding sites followed the basic specifications described for the establishment of systematic vulture feeding sites (Tsiakiris et al. 2002, Alivizatos 2004). However, these feeding stations in the Komsatou Valley, as mentioned above, were not designed to function as a systematic feeding site, but as a place for the occasional deposition of dead animals by the farmers themselves, when they themselves would have dead animals. This is why the main criteria for the selection of sites in the area, apart from providing food support for vultures, also serve the easy access of farmers with their vehicles via the existing road network. Within the above map 136, all five feeding sites for predator-scavenging species are shown, with the closest of these being more than 5 km from the location of the nearest wind turbine of the project under study. Therefore, and given the above distance, the project is not expected to adversely affect the role and function of the network of feeding sites.

For the other important species of smaller bird fauna (ostriches, oakleopards, etc.) it is considered that there can be no significant impacts as they are species that move short distances, usually making low flights and in addition, no large concentrations were recorded in the field survey area.

Regarding the impact of habitat loss, as has been analyzed in a previous section, it is not assessed as existing for the area of the wind farm under study, due to the very small area occupied by the project and the large coverage that the respective habitats have both inside and outside the study area. It is also stated that it is not assessed as existing for the area where the wind farm and the field survey area under study are located, due to its mainly forested form, with low-lying woody tree vegetation, mainly of broad-leaved species, which does not therefore make it a typical feeding or nesting area. With regard to smaller birds of prey, some of which use wooded areas within their native range, again the above impact is not considered to be present as the wind farm site is very small compared to the similar type of habitats that abound in the wider study area. The same applies to the black-backed stork, as the installation site is not located very close to water concentrations, nor within streams, nor does it have woodland vegetation of mature coniferous species, which it usually prefers.

Regarding the impact of the creation of barriers, the wind farm under study occupies a small area and therefore cannot cause a similar type of impact on the above species. Also, given the above proposal to install an automated wind turbine stopping system, the wind turbines to be installed will be stopped when birds of interest are passing through the area and the already minimal barrier area will be further reduced.

It should also be pointed out here that this system can be set up to work without deterring birds but only by stopping the turbine, and the problems that may arise due to the topography can be overcome by the correct choice of the angle at which the cameras are positioned, or by an additional number of cameras if necessary, in order to adequately cover the case of a bird coming from a lower altitude than the camera level, due to the topography of the terrain. Correct configuration of the camera parameters according to the area (correct choice of the camera angle to ensure that the case of a bird coming from a lower altitude than the camera level is adequately covered due to the morphology of the terrain, correct configuration according to the biometric characteristics of the species in the area, short response time from the detection of the species to the complete stop of the wind turbine, experimental period of operation of the system with control of its effectiveness by field observers) are necessary parameters to minimize the possibility of risk of collision for these important species .

During the present study, and during the field months it was conducted (November 2021 - October 2022), no concentrations or significant group movements of migratory birds that could be affected by the presence of wind turbines were recorded, despite the fact that the wider study area is an important migratory corridor. Furthermore, despite the fact that methodological efforts were made to identify and record autumn and spring migration and possible movements during winter (night observations when the moon phase allowed, use of a bioacoustic station), it was not possible to record them. At this point it is worth noting that this fact does not, of course, negate the presence of migration in the area. However, the topography of the area where the wind farm is to be installed and the morphology of the wider area does not create narrow passages that could guide the species to cross from the site of the wind farm in question. Therefore, it is estimated that, based on the field data presented here (and for the time period in which they were conducted), no potential impacts on migratory species would occur. However, and despite this fact, the additional mitigation measures for potential impacts proposed in the next section also take into account the location of the study area.

Mammals

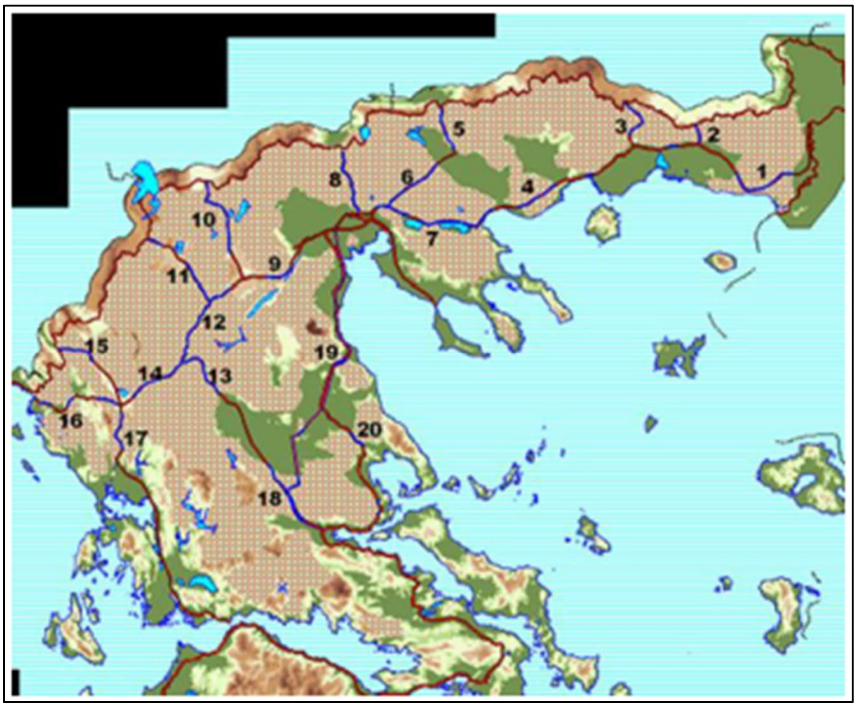
With regard to the mammal species observed and recorded in the survey area, it is considered that the construction and operation of the park cannot cause significant or permanent disturbance or adverse impact. Apart from the construction phase of the project and its accompanying roads (which will be 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 observed in most parts of Greece and are species with satisfactory (e.g. hare) or very large populations (e.g. fox). It is worth noting here that throughout the fieldwork (*as noted above in the fieldwork photo documentation section*), the presence of horses was recorded in the study area, which although referred to as wild horses, are in fact natural populations of individuals of the species that have been established in the area.

However, of particular interest is the species *Canis lupus*. 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 $39^{ου}$ parallel, Annex IV: except Greek populations north of $39^{ου}$ parallel, Annex V: Greek populations north of $39^{ου}$ parallel). 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 species is listed in the TADs of the studied neighbouring Bulgarian Natura 2000 network site EEZ BG0001032, and numbers at least 25 individuals within it. 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 individual observed in the area does not necessarily indicate the species' close association with it. The presence of wolves in areas with livestock activity often increases conflicts between the species and livestock keepers, as they often attack livestock.

According to Iliopoulos (2018), the pressures and threats to the species in Greece based on the six-year national report of 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 refers to the killing of wolf individuals with 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 gun or ice cube.
- 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 availability of game - including carcasses). It 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 wild ungulate hunting management (F03.01: Hunting). Reported as a pressure in the past and as a threat in the future at the local level. It is related to the absence of hunt management of the 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 a large area 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 on the reproductive success of wolf packs has been documented, expressed by displacement of breeding areas up to 4 km away from wind turbines (Alvares et al. 2011).



Map 137. The completion of the 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 a large part of the roads that will be required for access to the polygons of the project under study, already exist, due to the existing road network of the study area and the only requirement is to improve them, while the opening of new roads will be carried out only in those sections that connect the wind turbines. Also, although reference is made to the effects of wind farms on the breeding areas of the species, this is not mentioned as a main threat (C03.03: wind farms), while 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 species' distribution area. 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.

Finally, with regard to the neighbouring Bulgarian Natura 2000 network site EEZ BG0001032, and as indicated in its TADs, wolf populations continue to exist in the area, despite their disappearance from most areas of Bulgaria due to poisoning in the 1970s throughout the country.

In the study area, despite the use of light traps throughout the year, no wolf pack was ever recorded in the study area, only lone individuals of the species and therefore the risk of displacement of the breeding area by the installation of the studied ESU is not evident from the field measurements. Moreover, as already mentioned in previous sections, there is an existing network already installed in the study area, which is also frequently used by hunters for hunting in the area. Despite the above assessment, and despite the fact that it is not possible to directly link the presence of wolves to the field survey area, **in the section on additional mitigation measures, measures are proposed to further reduce any small possibility of a negative impact**.

Among mammals, cephalopod species are treated with particular care in the case of construction and installation of RES. The reason is that losses of individuals have been observed due to impacts on wind turbine blades or support columns. There is very little research on the effects of wind turbines on handrails and no conclusions can be drawn with certainty, but their negative effects seem to be real, at least under certain conditions. 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 not used 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 chironomids 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 chironomids, 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 location of important caves were designed and proposed by the above project. Of the above designated important caves and protection areas around them, it was found that none were located within the field survey area, nor in close proximity to it. In fact, the nearest site is located at a distance of more than 17 km, as mentioned above. More specifically, the nearest corresponding site is located at an average distance (in a straight line) of 17.45 km south-southwest of the project under study and is the site of 'Amaxades'.

Furthermore, from the examination of the data for the neighbouring Bulgarian Natura 2000 network site EEZ BG0001032, and with regard to the 12 species of primary concern of this site, listed in the site's TADs and listed as Annex II species of Directive 92/43/EEC, there is no recorded site for all of these species within 10 km, according to Benda et al. 2003, with a shorter distance recorded for *Rhinolophus hipposideros* (13 km).), and although according to the IUCN red list the species is classified as threatened (NT: Endangered), according to the Bulgarian Red Book it is not classified as threatened, since as mentioned above, this species, together with *Rhinolophus ferrumequinum*, is the most abundant in the country - *for more information see the preliminary check section*).

From the records of the **chimpanzees** in the survey area it is clear that they do not use the area to any significant extent. Although they were observed in a significant number of species, they do not appear to be heavily active in the area (low recording rate 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: *Barbastella barbastellus* (0.014) *Miniopterus schreibersii* (0.367), *Myotis capaccinii* (0.029), *Myotis myotis* (0.307), *Rhinolophus euryale* (0.321), *Rhinolophus ferrumequinum* (0.009), *Rhinolophus hipposideros* (0.057), while for the only species classified as threatened and not included in the above mentioned species (a species listed in Annex IV of the Directive), which is *Plecotus kolombatovici*, the number of crossings per hour of record is also extremely low (0.115).

However, in the section on additional measures to deal with potential impacts, measures are also proposed for the worst-case scenarios, with the aim of further reducing any small chance of a negative impact.

Amphibians

In the survey area, due to the absence of water bodies and the mountainous terrain, there does not seem to be the presence of amphibians and especially species that need attention or protection. One species of frog was recorded in the area, which is particularly common and abundant in Greece. According to the database of the study area, there are no species listed in Annex II of Directive 92/43/EEC in the wider area.

Reptiles

Seven species of reptiles (one species of lizard, three species of snake and two species of turtle) were identified and recorded in the study area, of which two species of turtles, the gray turtle and the Mediterranean turtle, belong to the species listed in Annex II of Directive 92/43/EEC. The Mediterranean turtle (*Testudo hermanni*) is protected by Directive 92/43/EEC (Annex I and IV) and the Bern Convention (Annex II). It is also protected by the International CITES Convention (Annex II). According to the Greek Red Data Book in Greece, *Testudo hermanni is* classified as Vulnerable (VU), while according to the IUCN at European level the species is classified as Near Threatened (NT). The gray turtle (*Testudo graeca*) is protected by Directive 92/43/EEC (Annex I I and IV) and the Bern Convention (Annex II). It is also protected by the International Convention CITES (Annex II). According to the Greek Red Data Book in Greece, the species is not classified as threatened (LC: of reduced concern), while according to IUCN at European level the species is classified as Vulnerable (VU).

Even the unlikely, accidental loss of individuals of the above species, which may occur during the installation and construction process of the ASPIE, 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. Moreover, the populations of these species are not likely to suffer any kind of disturbance as a result of such accidental loss. Furthermore, due primarily to the fact that the area of the project site is not expected to host significant populations of these species, and that the construction of the project site will primarily use 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 species of turtles and reptiles in general to the extent that it may cause problems. However, **in the additional mitigation measures section, measures are proposed to reduce any minor potential for adverse impacts 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 AISIEC cannot cause any impact on their populations or conservation status.

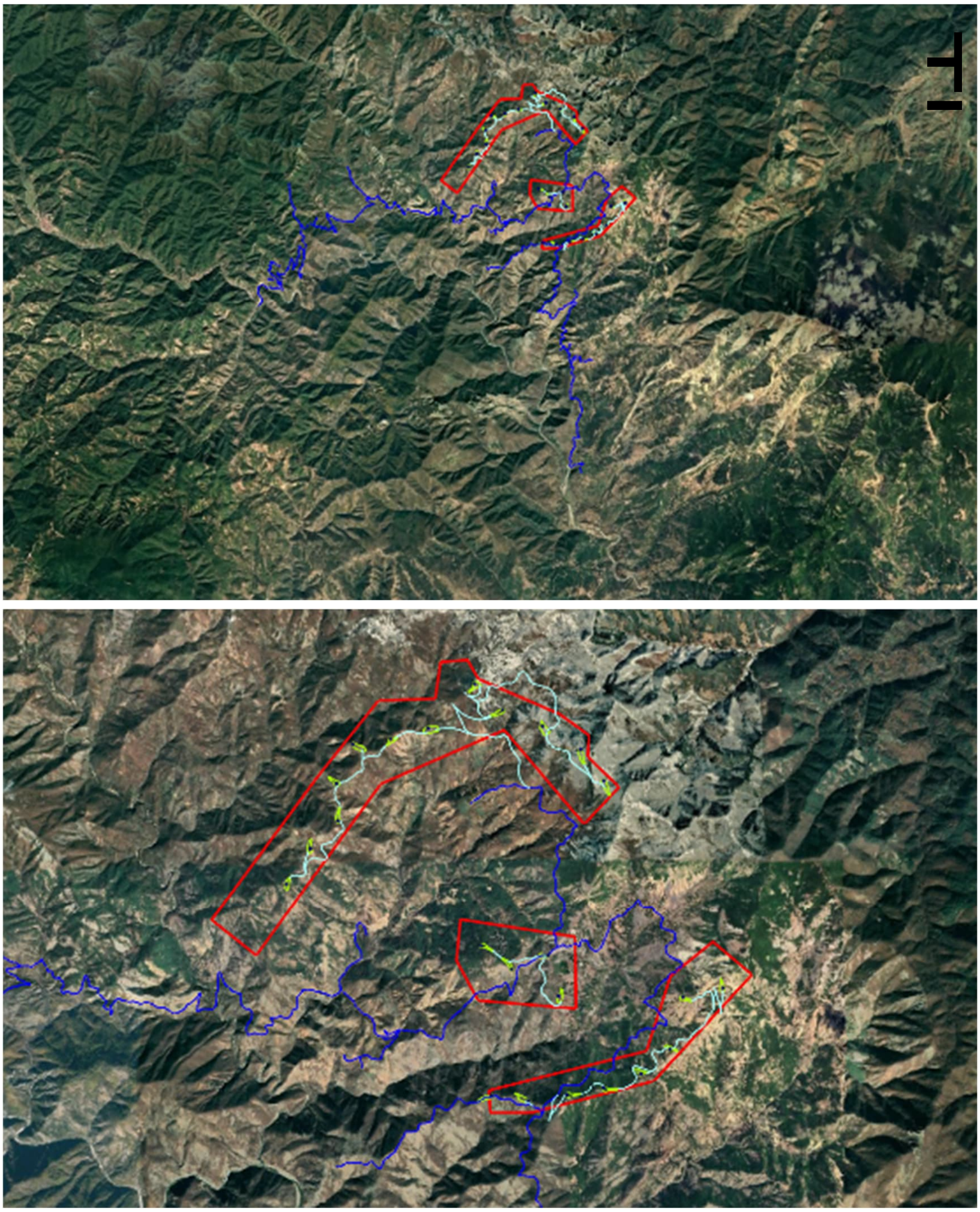
Impact assessment of accompanying projects

Regarding the accompanying works, for the works that are placed within the construction polygons of the project, such as the control centre, it is considered that no special mention is required since the important structure on the site is the wind turbines themselves and any impacts mentioned in the literature relate to them.

For the most part, among the wind farms' associated 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 bird species and 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 poles 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 any impact 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 area and its constituent species and will not harm the conservation objectives of the area and its integrity. The undergrounding of the cables is proposed to follow part of the new road opening and then the existing road network in the area, in order to avoid any additional impact (beyond the part of the new opening) on the environment in general.

In the case of this particular project, an important positive fact is that a large part of the roads that will be required for access to the production license blocks of the project under study already exist and no extensive new openings will be required within the study area, but only new openings of small size, which will connect the existing network with the installation squares, where the wind turbines of the project under study will be placed (Map 138). In parts of the existing network, new roads are assembled and started, which will be used to access the installation sites of the wind turbines of the project under study. The total length of the roadwork is 14,884 metres with a deck width of five metres, and includes the opening of a new road and the improvement of existing roads to provide access for vehicles transporting the wind turbine tower sections and blades, as well as the machinery necessary for their installation. As a result, site accessibility will not be significantly impacted by the installation of the project and will not be greater than before construction. **However, measures will subsequently be proposed for the new sections of the** borehole to **ensure that, although their length is relatively short, any additional burden from the movement of the general public including any non-significant reason for working on the site will be prevented.**

For all the new access road openings, the locations were selected which, apart from their suitability in terms of the geometrical characteristics of the road to achieve safe access, will cause the least possible burden on the flora of the area, as mentioned in detail in a previous section.



Maps 138. Production permit polygons for the project under study (outlined in red), and associated accessibility easements. The new openings are depicted in light blue and the wind turbine plaza occupation decks are depicted in green (black dots), while the existing agroforestry network is depicted in blue.

The siting of a wind farm is mainly determined by the locations where the wind potential occurs, i.e. by factors outside the possibility of human intervention. For this reason, the alternative siting of a specific project, i.e. the siting of the machines in other locations, can be done 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 wind farm took into account elements such as the suitability of the area, the morphology of the site, the local slopes and foundation possibilities, as well as the safety of residential areas to minimise acoustic and visual disturbance. The distance of the wind turbine from the nearest settlement is greater than 500 m, as stipulated by the Decree 25-4-89 (Government Gazette 293 d.d./16-5-89). Regarding the selection of the wind turbine locations, it was based on criteria such as:

- The optimal wind potential of the region.
- The energy efficiency of wind turbines.
- Low atmospheric turbulence.
- The local ground slope and the suitability of the foundation within the ground.
- The prevailing wind directions based on the statistical analysis of the wind data.

The above criteria led to the selection of the optimal location of the wind turbines, which contributes to the maximum utilization of the wind potential of the area and the maximum possible energy production. This particular location was chosen as the 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, which varies spatially, while 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 were 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 sites selected:

- It is in a position that can easily and with the least possible environmental burden be accessed for the needs of the project, from the existing road network of the area, without the requirement of opening a long length of new forest roads in the wider study area.

- It is in an area where the above activity is permitted.
- The habitat types that are located within the area of the study ESPO site are also abundant in the wider study area.
- The design of the project installation was made taking into account the safety distance from the active nest of the Egyptian vulture, as defined by the Greek legislation.

The analysis of all available data does not indicate any significant impact on the important avifauna species that use the site of the ESDP site, given the implementation of the measures proposed later in this report.

- **Alternative solution**

Other polygons were initially selected 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 installation of the wind farm. However, as a whole, the above mentioned sites were rejected during the initial planning process, as they are also located within Natura 2000 sites, but in locations where they occupied critical nesting or feeding areas for important species (e.g. active nesting site of Egyptian vulture, supplementary feeding areas for predator-prey species), and in areas with limited accessibility and therefore requiring long new boreholes. In particular, for Egyptian vulture, the proposed siting is optimal, as in the case of the enclave siting scenarios, there was perhaps the potential for impacts on the species that nests and uses the area. Thus, the proposed siting of the wind turbines was carried out with a view to the greatest protection of the species (the proposed siting of the wind turbines is located at a distance of more than 5 km from the nesting site of the Egyptian vulture) and the harmonization of the project with the Greek legislation (Government Gazette B' 3760/25-10-2017).

All other alternatives were therefore rejected at the preliminary screening stage because of the potential environmental impacts they would likely cause.

- **Zero solution**

Apart from the above, and given that the project promoter of the project under study has proceeded with an investment plan in electricity generation, the zero option, i.e. not creating the investment, was excluded. The benefits of the LDCs 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. MEASURES TO DEAL WITH THE POSSIBLE EFFECTS

Given that any anthropogenic impact on the environment causes impacts on a smaller or larger scale, it is appropriate to take measures to address them. 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 above section, 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 it is assessed during the preparation of the EIA/EIA that negative impacts from the wind farm on the environment may occur and cannot be avoided, measures are required, 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 EIS, and despite the fact that from all of the above it is considered that the project under study will not cause significant adverse impacts in the study area, a number of measures are proposed that can act positively in minimising 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 potential future cumulative impacts.

List of measures, conditions or restrictions proposed

(a) Measures proposed for implementation

During the installation and operation of the wind farm it is proposed to take and implement various measures that will minimise or eliminate any potential impacts on the protected objects of the area. These measures are listed below:

- **<u>Installation of an optical system for automated wind turbine shutdown</u>**: 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 installed on the wind turbine tower without any interference with the tower and with high-resolution cameras to cover a 360^{o} surveillance area around the wind turbine. These systems have a range of a few dozen to a few hundred meters, 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 the use of an optical system is related to the repelling of birds and/or the immobilisation of one or more wind turbines in cases where birds have an impact path to them. This requires real-time recording of the movement of flying birds and immediate decision-making. This is done 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 variable 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 turbine is stopped, and the problems that may arise due to the morphology 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, due to the morphology of the terrain, is also adequately covered.

In the present project it is proposed that the installation of the above system is mandatory from the start of operation of the project, mainly due to the importance of the 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. Also, given the morphology of the terrain and the possibility of the passage of species of interest perpendicular to the axis of the study project installation from a low height, which is likely to be a "blind spot" for the detection system of the above-mentioned stopping system, it is proposed that it is mandatory for the project promoter to carry out a preliminary study on the correct positioning of the camera angles to cover the above-mentioned possibility, while for those wind turbines where this cannot be covered by the installation of four cameras mounted on each wind turbine, it is proposed that the installation of a second set of cameras (eight tracking cameras on each wind turbine instead of four) is mandatory in order to fully cover the tracking of the species of interest from all directions of the horizon and from all possible heights. Other vital parameters that should be rigorously adjusted to achieve the goal of minimizing the probability of collision are proper parameterization according to the biometric characteristics of the species in the area and short response time from species detection to complete wind turbine stop, data that are subject to modification in most of the commercial models of automated wind turbine stopping system. It **is also considered important that after the installation of the project under study, the above automated wind turbine shutdown system be operated with the simultaneous, daily and uninterrupted presence of at least three ground observers** (*foresters or biologists ornithologists, or other related disciplines), with proven knowledge of bird identification*)**, who will also have the possibility of stopping the operation of the wind turbines of the project under study in the event of a dangerous flight of species of interest, until the above automated stopping system is correctly configured. The** above is considered necessary given possible technical difficulties that may arise, but also given the adjustment requirements of these systems, based on the characteristics of the area where they are installed and the species of birdlife in each area.

- **Resting or roosting sites**: no paddling structures that allow birds to perch or congregate should be used in any installation.
- **Shutdown of the wind farm in conditions of limited visibility due to cloud cover and extremely adverse weather conditions**: Incidents of impacts have been observed in conditions where highly foggy conditions or extreme weather events such as thunderstorms prevailed, when visibility in the area is significantly reduced. By shutting down the wind turbine of the W/F wind turbine during extreme weather conditions, any risk of collision with the wind turbine is significantly reduced.
- **Lighting in 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 of the wind farm under construction.
- **Undergrounding of cables**: structures such as power transmission cables should be placed 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, may be above ground, but it should be ensured that they are properly insulated and marked to minimise the risk of electrocution and birds striking them. The wind farm in question is proposed to be connected underground to the grid
- **Removal of dead animals**: one of the most important measures that should be foreseen is the obligation to immediately remove dead animals (dogs, sheep, goats, horses, cows, etc.) found within a radius of at least 500 m from the base of the wind turbines. **These dead animals should be transported to safe places away from the** wind **farm, while remaining available for scavenging birds and carnivorous omnivorous mammals. In the wider study area, given that there are five feeding stations, it is proposed that the dead animals be transported to these stations, rotating the stations at a time.** This will reduce the risk of scavengers colliding with the wind turbines when they locate each dead animal and will not affect 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 of removing such potential food source that could attract predators, especially scavenging species, causing a higher concentration than recorded in the area. In the event that the proposal of this EIS for placement of dead animals at the above-mentioned five reinforcing feeding sites is not accepted, then suitable disposal sites should be demonstrated by the relevant agencies after a scientific study and permitting, and the cost of design, establishment and proper operation of such sites should be borne by the relevant regional agencies.

- At the same time, special care must be taken during the construction and installation period of the park so that **the works do 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 (period of reproduction of fauna species or nesting and rearing of chicks of avifauna).
- **Restoration of the surrounding area**: Following the completion of construction activities, it is proposed that all unnecessary roads and encroachments be restored in order to limit access to the site 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 sections of the new road openings that will result, despite their relatively short length, **should not be in common use for all.** In particular, it is proposed that a barrier be placed at the beginning of the sections of the new openings, 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 have access to 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 wolves and "wild" horses in the vicinity of the study area of the AISP, it is proposed that the project proponent be required to install warning signs warning of their presence on the access roads, in order to reduce the speed of passing vehicles and avoid accidents that could result in both deaths of these species and loss of life.

- **Provision to limit mortality of herpetofauna during the construction phase:** Given 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 a limited ability to avoid anthropogenic hazards due to their low speed of movement, were observed in the wider 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.The movement of individuals of the above-mentioned species that are likely to be found outside the occupation zone of the above-mentioned works should be carried out by a specialist specialist in the areas where the works are to be carried out (e.g. new sections of the excavations) and the movement of individuals of the above-mentioned species that 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 potential impacts on avifauna - fauna:** There should be an explicit obligation to monitor the effects of the park, especially on avifauna species and other terrestrial fauna, after construction and during the pre-construction and construction period, for a **minimum period of four years** (in total). The method of monitoring should meet specific requirements to be defined by the competent Ministry of the Environment, Nature Conservation and Nuclear Safety or by the consultative bodies or suggested by the international literature. Monitoring is proposed to be carried out by a team of experts, 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.

Apart from the above measures and monitoring, which is discussed further below, no other type of monitoring is proposed, with technical or other equipment, which cannot substitute the experience and judgment of qualified 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 (installation and operation of the NPPF) a change in the frequency of passage of important species of avifauna is observed and it is considered that based on the new data, the risk of collision - accident is increased, then it is proposed to consider the following proposed measures and, after documenting them, to propose those that will be evaluated as the most efficient (without rejecting the documented proposal of other measures not mentioned herein).

Therefore, after the construction of the wind farm, it may be necessary to actively manage the habitats in and around the wind farm, 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 wind farm operator.

- **Active management of habitats under the wind turbines**: In those cases where post-construction monitoring identifies some impacts (increased concentration or mobility of species on the site, incidents of collision 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 must also take into account the other flora and fauna species in the area.
- **Active habitat management around the periphery of the wind farm**: It is possible that in cases where a wind farm is located in an area where bird

protection measures are needed, 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 wind farm, as well as the other flora and fauna species in the area.

- **Increasing the starting speed of wind turbines:** If there is an impact of the installation and operation of the wind turbine under study on the handrails, and as soon as it is detected (e.g. finding a significant number of handrails killed by the operation of the wind turbine), it is proposed to implement the measure of increasing the starting speed of the wind turbines. When implementing this measure, it is suggested, to avoid wind conditions with the highest bat activity, to increase the wind turbine starting speed and blade rotation speed so that at low wind speeds, on the order of 3.5 m/sec, the rotation of the wind turbine rotor is avoided (Fric et al. 2018). Wind turbines "spin freely" at wind speeds less than the activation wind speed (i.e. the minimum speed at which the turbines produce energy). The unnecessary wind turbine activity described above can be reduced in three ways: a) by sweeping the blades (so that they are parallel to the direction of the prevailing wind, in effect reducing their surface area), b) by increasing the activation wind speed, and c) by implementing methods that prevent the blades from rotating at lower wind speeds (Rodrigues et al. 2015, Arnett 2017). Evidence from Europe and North America suggests that trimming and increasing wind activation speeds are the only proven ways to reduce bat mortality due to impact (Rodrigues et al. 2015, Behr et al. 2017).
- **Monitoring possible effects on the handrails:** If an impact from the installation and operation of the studied ERM on handrails occurs, and as soon as it is detected (finding of a significant number of killed handrail users from the operation of the ERM), it is proposed that, in parallel with the monitoring of the potential impacts on avifauna and other terrestrial fauna, a corresponding monitoring of the potential impacts on chironomids is proposed, despite the fact

that the site of the proposed ESRP is not located within a significant area of presence or feeding of chironomids. The monitoring in this case should also be carried out by expert scientists in order to ensure the correct selection of monitoring methods based on the standards of relevant international-national research programmes, the correct assessment of the impacts and, consequently, the correct selection of additional mitigation measures (if any), e.g.e.g. even avoiding activities during periods when bats are most sensitive to disturbance (e.g. breeding, hibernation), as well as during transits and foraging based on local knowledge, etc. (Fric et al. 2018).

- **Wind turbine blade painting with black paint:** As mentioned again in this EIS, a recent study has shown that painting one wind turbine blade black can help reduce the annual mortality rate, compared to turbines where this treatment is not performed, with the greatest effectiveness of the proposed measure being observed in raptors, which are the species of interest in this Special Ecological Assessment, as they have higher visual acuity and sharp vision at long distances.
- **Full shutdown of the** wind turbine generator 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 proposed monitoring programmes, after the installation of the project under study, indicates (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, and cannot be assessed during the proposed monitoring programmes, the wind turbine generator will be shut down.

(c) Interventions to mitigate potential future cumulative impacts

In this section, a proposal is presented concerning interventions to mitigate the potential cumulative impacts of energy production and transmission projects in the wider region of Thrace, which concern actions that can be adopted in case of installation of all the planned RES projects within the protected areas under study (Z.E.P. GR1130012 and S.E.P.E. GR009).

In the context of this SEA, potential significant impacts were assessed in the event that all of the SSEs under licensing are constructed within the protected areas under study, however the contribution of the SSE under study is assessed as minor. However, in order for both this and the other projects under licensing to mitigate any negative impact on the ecologically sensitive area under consideration, 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 SDSs for vulture species are the European (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 to 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. Improve 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 dangers of poisons, reducing vulture mortality by 50% compared to previous decades e.g. 2000-2015).

3. Reduce mortality due to the consumption of veterinary medicines (NSAIDs) (understanding and assessing the problem, banning dangerous medicines).

4. Reduce lead mortality (assess the problem, ban the use of lead in hunting ammunition and implement alternatives).

5. Improving food sources for vultures in 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 (assessment of mortality due to impact with power lines and wind turbines or electrocution and implementation of mitigation techniques).

7. Improve the breeding success and viability of vultures (protection of nesting habitat, reduction of poaching and disturbance, control of human activities in breeding areas)

8. Reduction of direct human mortality (institutional and legislative measures to control poaching, taxidermy and vulture trade).

9. Promote metapopulation communication (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 review 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 protection measures and actions of the above deliverable) for the implementation of which each of the ESPOs that will be implemented within the above protected areas, for actions that will be implemented within them, or all of the ESPOs located within protected areas of Greece for actions that will be implemented in the whole Greek territory, following the recommendation of a special voluntary

9. MONITORING PROGRAMME (MONITORING)

It is proposed that during the operation of the ESDP, the monitoring and recording of its operational impacts be entrusted to qualified personnel who will be regularly on site and can act as a source of baseline information and continuous baseline observation. This staff should consist of qualified relevant scientists who will monitor the accuracy of the predictions of this study, possible variations in the use of the field survey 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 of the area by the different bird species, the effectiveness During the monitoring programme for avifauna, it is proposed to apply in parallel (if required, based on the above) 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 during the year).

It is recommended that the monitoring and recording of impacts that will be carried out should be at least 4 years and should be carried out during both the preconstruction and construction phases, as well as during the first two years of operation of the project and should include the following:

- Regular surveys (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 the risk of collision and the detection of nests in the area.
- Inventory of project area use data and record the flights of important species in the project area and their interaction with the turbines.
- Display of the above on a map to assess the situation.
- Checking and recording of possible mortality in a special protocol that will be maintained by the company and will be available to the competent services - agencies for the control of incidents of impacts in the area.
- Training of the employees of the W/Fs to deal with incidents of injured birds and the immediate notification of the competent services - agencies.
- Training of the employees of the W/Fs to scan the area of the wind turbines for dead individuals of avifauna and checking the correct application of the procedure with inspections.
- Assessment of the situation based on the information gathered

On the basis of the above programme, it will be possible to assess the progress of the project's operation and determine whether or not additional measures or modifications to the proposed measures are necessary in order to minimise any potential impacts,

10. SUMMARY OF CONCLUSIONS

The project under study is located within the protected area of the Natura 2000 network Z.E.P. GR1130012, as well as within the SPA GR009. It is also adjacent to the Bulgarian Natura 2000 network protected area BG0001032, and is located more than 18 km from the nearest SPA GR1130010, whose protected area is the bird fauna. (as regards the SPA and SPA) and the habitat types listed in Annex I to Directive 92/43/EEC, as well as the fauna and flora species listed in Annex II to the above Directive (as regards the SPA).

Throughout this study, following a literature review and field observations for the period November 2021 - October 2022, all necessary records and assessments were made in order to specifically assess the ecological evaluation of the project in relation to the neighbouring protected areas. Based on these, and **subject to the condition of implementing all of the mitigation measures for potential impacts listed in this EIS (with the grouped priority listed)**, it is assessed that the proposed project:

- It is not likely to delay or interrupt progress towards achieving the conservation objectives of the Natura 2000 sites concerned .
- It is not likely to reduce the extent or fragment the habitat types of Natura 2000 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 the degree of isolation of species.
- It is not likely to cause changes to vital parameters (e.g. nutrient balance, soil degradation from potential erosion, dynamics of the relationships between biotic and abiotic parameters) that determine how Natura 2000 residential sites function.
- It is unlikely to interact with predicted or expected natural changes to the Natura 2000 sites concerned.

The accompanying works of this particular ESDP project **are not considered to have an adverse impact on** the site and its integrity, nor on the species living in it due to the proposed undergrounding of the cabling for the transmission of the electricity generated. The new borehole for the installation of the wind turbines is relatively short and will not cause any adverse effects on the Natura 2000 site and its protected objects, due to the correct siting (and the relevant proposals herein).

The effects of the project synergistically with other related (under permitting) projects in the area are **considered to be less than significant <u>given that all of the mitigation measures for potential impacts identified in this EIR will be implemented</u>.**

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12. STUDY TEAM

PROJECT STUDY GROUP

Name	Specialty	Object
Psarikidis Athanasios	Forester - Environmental Scientist, M.Sc., Sustainable Management of the Environment and Natural Resources	Development of the survey methodology, coordination of fieldwork, field surveys, evaluation and synthesis of results and drafting of the final study
Fotopoulos Georgios	Forester - Environmental Scientist, M.Sc. Applied Geoinformatics in Environmental and Risk Management	Development of the survey methodology, coordination of fieldwork, field surveys, evaluation and synthesis of results and drafting of the final study
Apostolos Tsiobanoudis	Forester	Conducting field recordings and photography
Emrah Haji	Forester	Conducting field recordings
Valsamidis Evangelos	Forester, M.Sc. Urban Green Planning and Management	Conducting field recordings

Environmental Designer of the project

Psarikidis Athanasios	Forester - Environmental Scientist, M.Sc., Sustainable Management of the Environment and Natural Resources