



# METHODOLOGY

## ACTION A.2

***Assess collision risk with powerlines and mapping high risk areas at key sites***



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***Conservation of the Dalmatian Pelican along the Black-Sea Mediterranean Flyway/Pelican Way of Life***

*LIFE18 NAT/NL/000716*

***BSPB/BirdLife Bulgaria***

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## 1. Introduction

The main method to provide electrical power to end users in Bulgaria, Romania and Greece is by overhead power distribution lines. These lines located in natural habitats of various types and running along pylons of unsafe structure utilizing isolators of different types, sometimes pose a serious threat to birds and their lives. Contemporary studies from various states show that bird mortality, caused by hazardous overhead power lines is one of the main global problems causing loss of biodiversity (Markus 1972, Haas 1980, Ledger & Annegarn 1981, Ferrer & Hiraldo 1991, Ferrer *et al.* 1991, Bayle 1999, Guyonne *et al.* 1999, 2001, Arhipov 2000, Janss 2000, Kruger & Van Rooyen 2000, Van Rooyen 2000, Adamec, 2004, Karyakin *et al.* 2005, Karyakin & Barabashin 2005, Mastina 2005, Medzhidov *et al.* 2005, Pestov 2005, Rubolini *et al.* 2005, Kariakin & Novikova 2006, Cartron *et al.* 2006, Lehman *et al.* 2007, Harness 1998, 2000), Harness *et al.* 2008).

There are two main aspects of the negative effect to birds of the power distribution lines:

- **Electrocution** – when perching on, or taking off, a pylon, a bird may cause electric shock by bridging with its body the power conductors and the earthed parts of the pylon. The risk of such short circuits increases during wet and rainy weather. In addition, the birds' excrement is semi-liquid and may, during defecation, cause a 'voltaic arc' while the birds are perching on a pylon above the conductors.

- **Collision with power lines** – during flight, birds may collide with the power conductors that are difficult to see, especially in poor weather with low visibility. Another reason why birds collide with overhead power cables is that when flying, birds often aim their attention away from the direction of their flight, seeking food on the ground or looking out for threats.

Various studies have recorded the negative consequences for certain species at the population level, such as the Spanish Imperial Eagle (*Aquila adalberti* Brehm, 1861) (Ferrer *et al.* 1991), the Eagle Owl (*Bubo bubo* Linnaeus, 1771) (Sergio *et al.* 2004) or the gallinaceous birds (Galliformes) (Bevanger 1995). According to the available evidence, the increased mortality and reduced population of the Steppe Eagle (*Aquila nipalensis* Hodgson, 1833) in Kazakhstan is caused exactly by the power transmission grid (Moseikin 2003).

It is clear from the studies carried out so far, that most of the overhead power lines in Bulgaria are not safe for the birds. The 20 kV power transmission lines are most hazardous (Stoychev & Karafeizov 2004, Demerdzhiev *et al.* 2009, Demerdzhiev 2014) and, also, are among the most widespread in Bulgaria (along more than 110,0000 km). The first systematic study of bird mortality caused by interaction with the hazardous 20 kV power distribution network was carried out in 2004 (Demerdzhiev *et al.* 2009). The results from this study show that a large number of birds of various species die every year by interaction with the hazardous power distribution network, with the most affected orders being *Ciconiiformes* (storks), *Accipitriformes*, *Falconiformes* (diurnal birds of prey), *Passeriformes* (sparrows) and the family *Corvidae* (corvids).

## 2. Project sites

This action will take place in Bulgaria, Romania and Greece. Collision with power lines is known as a threat for many bird species including Dalmatian Pelican. Mortality of Dalmatian pelicans caused by collisions has been recorded in some project sites including Mandra- Poda,

Amvrakikos and Messolonghi wetlands, Lake Suhaia along the lower Danube. Along project sites Lake Tasaul-Corbu and in the Danube Delta Biosphere Reserve, there are sections of power lines which are located along the most commonly used flyways by Dalmatian pelicans from their breeding grounds to breeding colonies. In many countries with high concentrations of waterfowl birds, the power lines pose a considerable threat and this threat requires assessment to evaluate its severity. Understanding the nature of bird collisions is essential for minimizing them.

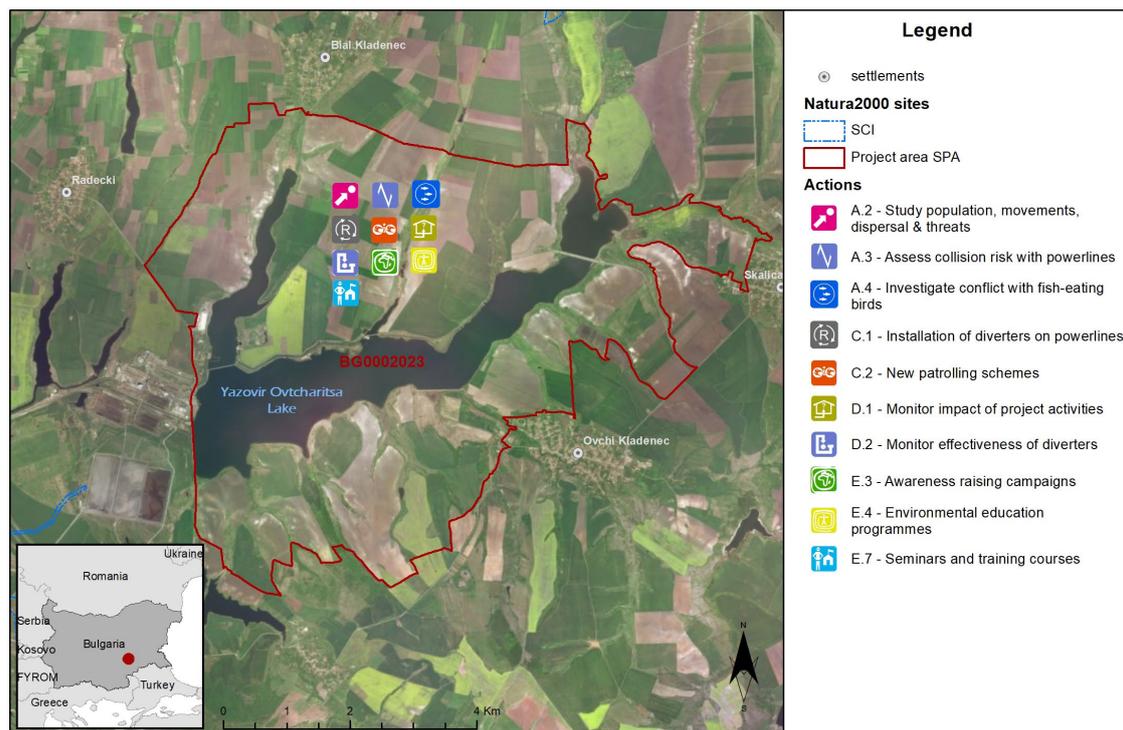
## **Bulgaria:**

- **Yazovir Ovtcharitsa BG0002023**

The site is reservoir of the Ovtcharitsa River, east of the town of Radnevo that does not freeze in winter. It is surrounded by low hills of arable land. Immediately next to the dam wall Heating Plant 2 is located. The area is also includes the nearby small pools with standing water, the sedimentation pools of the heating plant and the valleys of several smaller rivers. Ovtcharitsa Reservoir is one of most important places in the world for the wintering Dalmatian Pelican. The peak of the wintering pelicans count for the site is 406 individuals. A large proportion of the Dalmatian Pelicans are young and immature individuals.

Project site 7: Yazovir Ovtcharitsa

SPA: BG0002023 Yazovir Ovtcharitsa



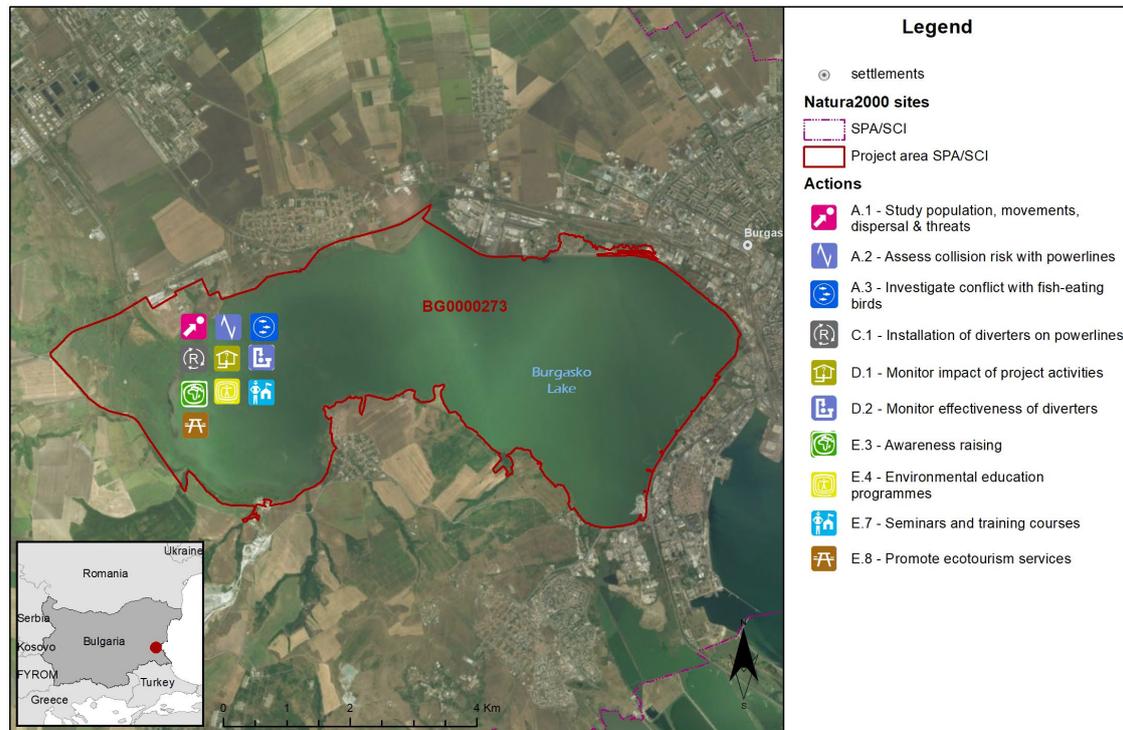
- **Burgasko Lake BG0000273**

Burgasko Lake is a shallow brackish coastal lake – an open firth with a loose connection to the sea, fringed with hygrophytes. It is located to the west of the city of Burgas. Its entire eastern part and parts of its northern and south-western parts are contiguous with the industrial and residential areas of the city. Burgasko Lake is one of the most important staging sites for the Dalmatian Pelican in this part of Europe. All the population from the Danube Delta stages here

during migration. The species occurs at the lake all year round and uses the lake mainly for feeding. In its eastern and western parts, pelicans roost as well, sometimes in flocks up to 130 individuals.

Project site 6: Burgasko Lake

SPA/SCI: BG0000273 Burgasko ezero



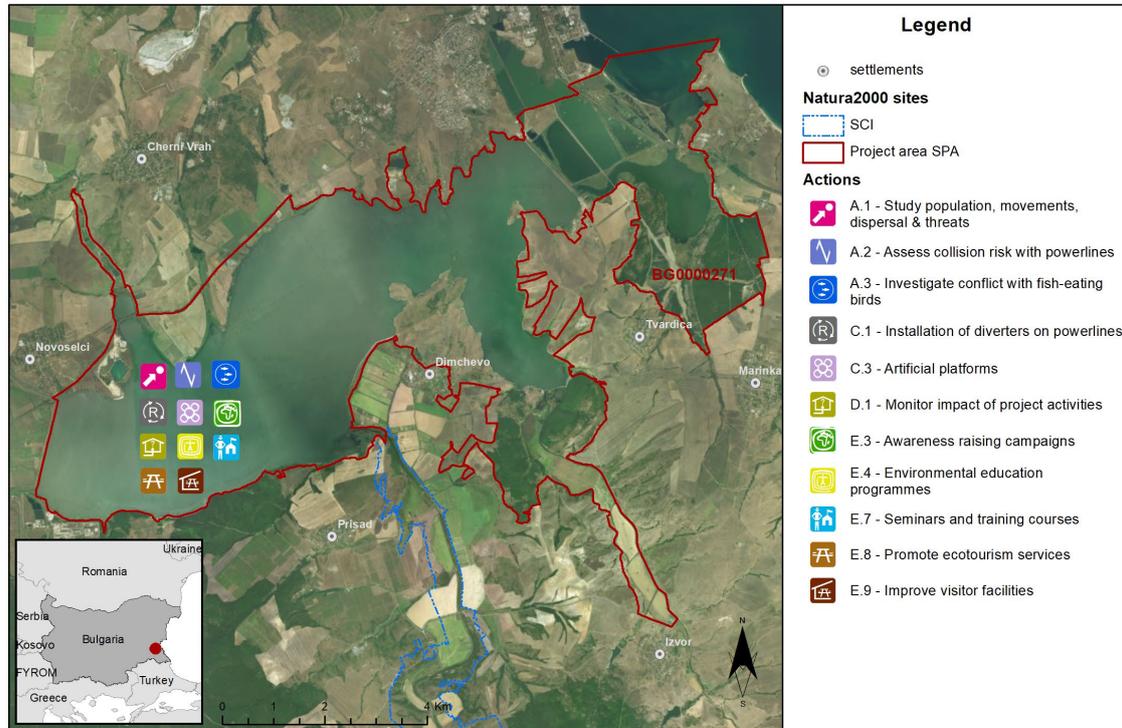
- **Mandra-Poda Complex BG0000271**

The Mandra–Poda Complex includes Mandra Lake with its adjacent wetlands. Mandra Lake is located at the Black Sea coast and is the southernmost of the Burgas lakes. Its north-eastern section is continuous with the city of Burgas. This former brackish lake has been converted into a freshwater reservoir. A lagoon, covering the areas of Poda and Uzungeren, has been preserved between the dam of the reservoir and the Black Sea, connected with the shallow marine area of Foros bay. The former oxidising pools of the petrol refinery between the dam and the E87 road (in the Komlushka Lowland) and the cascade-like located fishponds in the north-western part of the lake, south of the village of Cherni Vruh, are also part of the complex. Until 1940 Mandra Lake hosted the last mixed breeding colony of the Dalmatian Pelican and White Pelican in Bulgaria. Its disappearance is due to the drainage of the marshlands at the western part of the lake, which has destroyed the huge reedbeds there. Since then the lake and adjacent smaller wetlands have been used by pelicans all year round (sometimes demonstrating breeding behaviour), but no nesting was proved. Being situated at just one-day flight for the pelicans from the Danube Delta, the Mandra, Burgasko and Atanasovsko Lakes are the key stopover area on the migration flyway of these two species. Together with Burgasko Lake, the Mandra Lake is their main feeding place during their annual presence here. The easternmost parts of Mandra–Poda complex (Komlushka Lowland and Poda) are also important roosting sites for the Dalmatian Pelican. During severe winters, when the rest of the Burgas Wetlands get frozen, the Poda Protected Site and Foros Bay are

the only area with open water around Burgas, where Dalmatian Pelicans (and all other wintering waterfowl, including White-headed Duck, Common Pochard, and other globally threatened birds) find shelter and food.

Project site 3: Mandra-Poda Complex

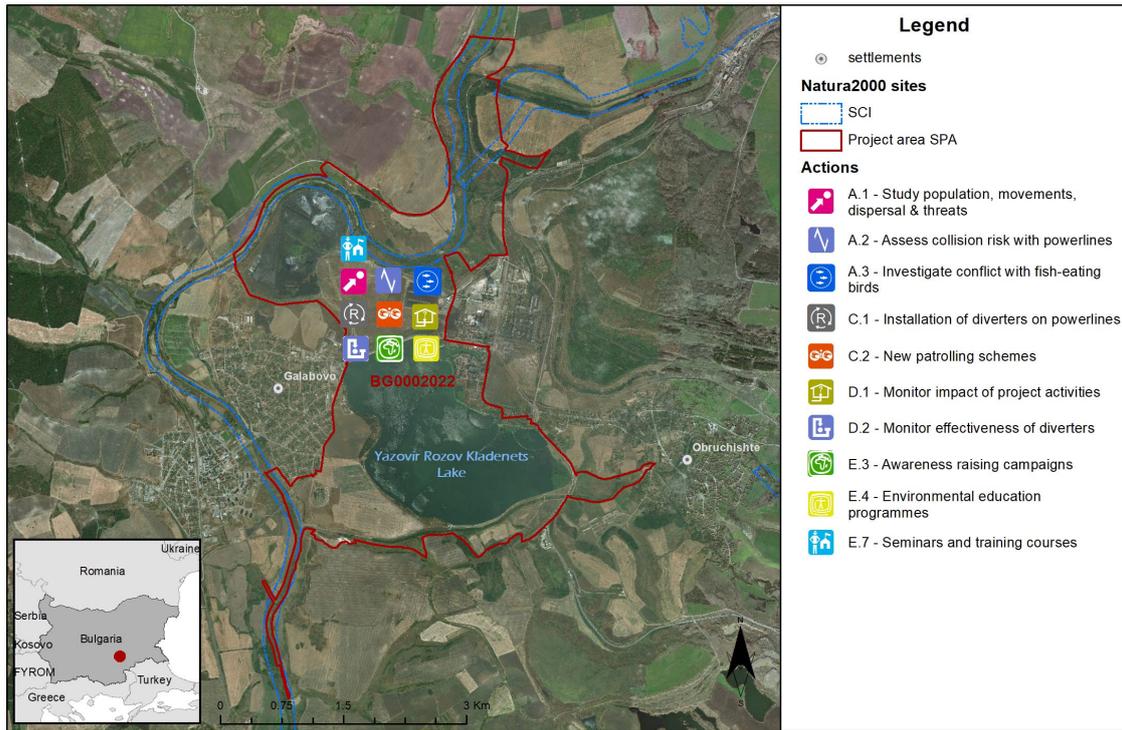
SPA/SCI code: BG0000271 Mandra - Poda



- **Yazovir Rozov Kladenets BG0002022**

A water reservoir, located between the villages of Galabovo and Obruchishte in the Sokolitsa river valley, at the spot where it joins Sazliika River. It is surrounded by low hills (100-130 m high) and by settlements with huge industrial center on the east and west. There is a smaller water reservoir to the north of the reservoir wall, at about 1 km from it. Because of the existing natural connection, the area also includes a part of the shallow valley of the Sazliika River. The reservoir water is used to cool down the nearby heating plant and because of this they keep a comparatively constant temperature in winter, usually higher than the ambient. Rozov Kladenets reservoir is one of most important places in Bulgaria for the wintering Dalmatian Pelican. The peak of the wintering pelicans count for the site is 212 individuals. A large proportion of the Dalmatian Pelicans are young and immature individuals.

Project site 8 : Yazovir Rozov Kladenets  
 SPA: BG0002022 Yazovir Rozov Kladenets



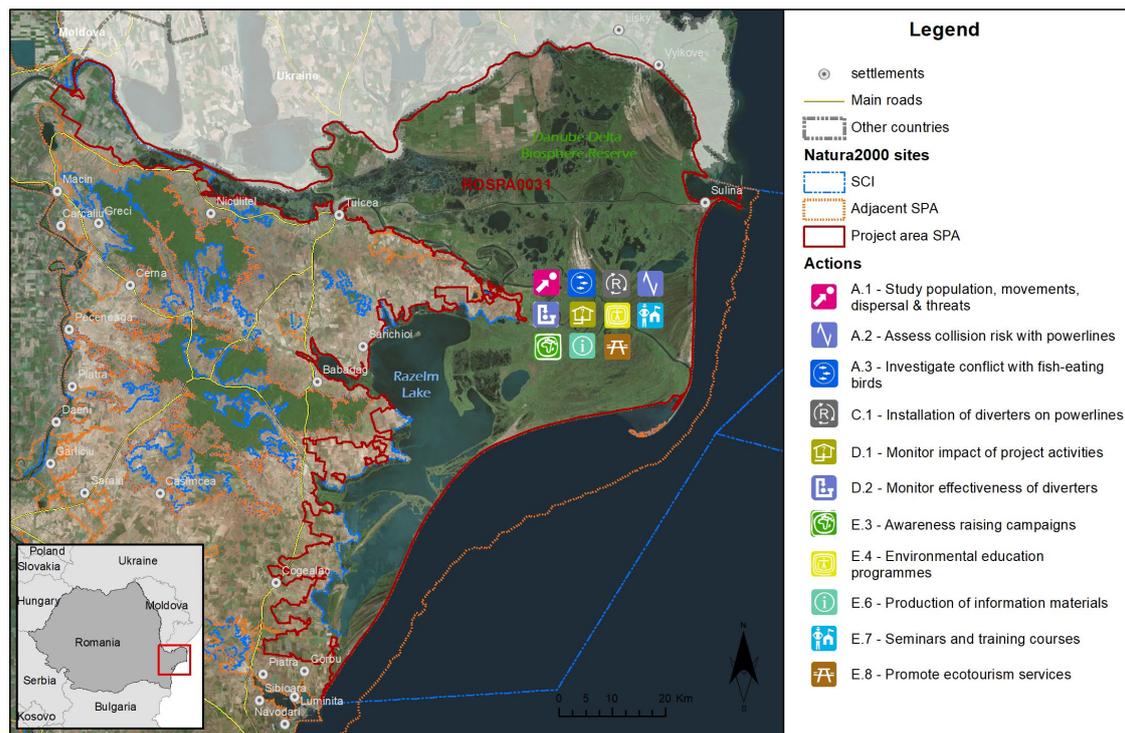
## Romania:

- **ROSPA0031 Danube Delta and Razim-Sinoe Complex**

The site is situated in the Predobrujean Dingle, at the contact between North-Dobrudjean Platform and Scythic Platform and is geostructurally part of the Black Sea Dingle. The Danube Delta represents the territory between the first Danube crotch (Chilia Branch) and the Black Sea coast line, sided to the north by the Chilia branch, and to the south by Razelm-Sinoe lake complex. The biggest part of the Danube Delta (82%) is situated on Romanian territory. The Razelm-Sinoe lagoon complex is spreading in the south region of the actual Delta, all the way to Cape Midia. The complex includes many lakes, from which the biggest are Razim, Sinoe, Golovita and Zmeica. The hydrographic network is formed by the main branches, backwaters and channels. The Danube and its branches represent the major arteries through which the river offers the liquid and solid flow rate for the delta. The Sulina Branch was shortened and deepened for the navigational ways, in comparison with Chilia Branch which grown in its length by the advancement of the secondary delta with the same name. The biggest lakes in the delta are Furtuna, Gorgova, Isac, Matita, Merhei, Rosu, Lumina, Puiu and Dranov. Totally the delta counts 479 lakes with a surface larger than 1 ha, their surface covering almost 8% of the Danube Delta. The site is of international importance for the Dalmatian Pelican, as most of the breeding colonies from Romania (apart from one) are located inside the boundaries of the Biosphere Reserve. During the past 20 years, there are estimates of nesting of up to 450 pairs, which represent 25% of the population of this species at European level. There are 6 colonies where the species has been breeding recently. 2 of the colonies are located in Rosca-Buhaiova core area (one recent and one together with Great white pelicans- up to 118 pairs counted), one on lake Lejai in Sacalin-Zatoane core area (up to 149 pairs counted) and one on

Ceaplace island core area in the Sinoie lagoon (up to 107 pairs counted). These represent the stronghold, as the most important breeding sites. Dalmatian pelicans are sporadically using as breeding locations also Bisericuta island on lake Razelm (28 pairs in 2011) and Prundul cu Pasari islands (26 pairs in 2016) in the Sinoie lagoon. Altogether, more than 95% of the national breeding population is located in the DDBR, making this site of crucial importance both nationally and internationally for the conservation of the species.

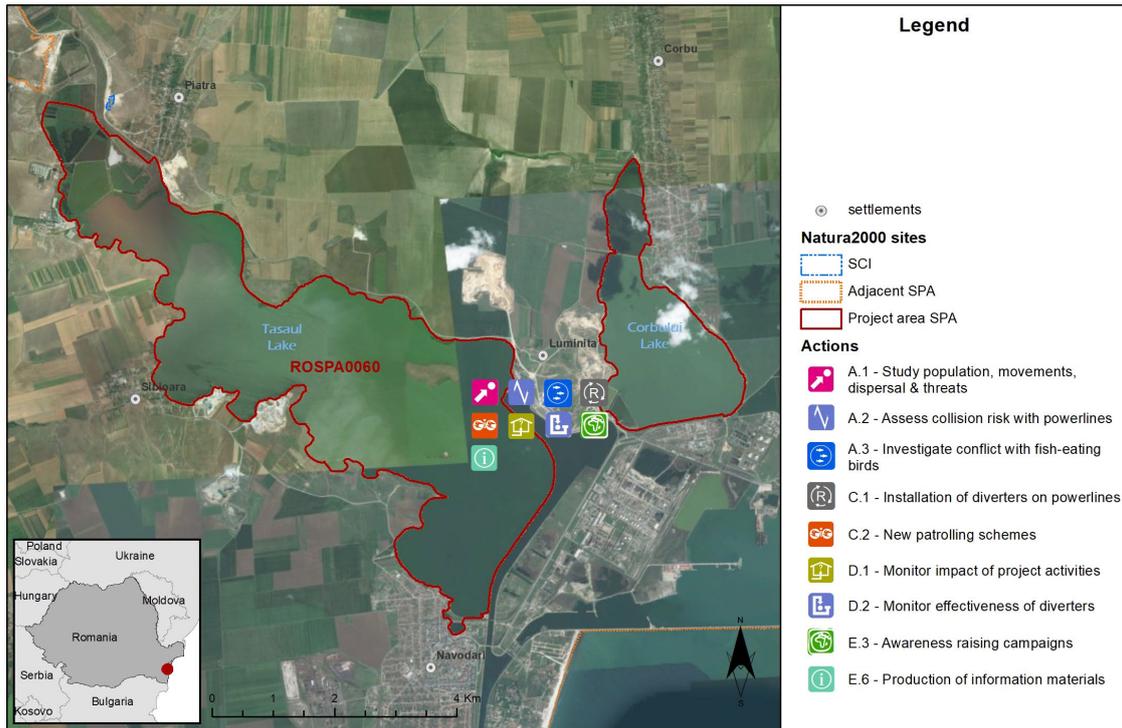
Project site 23 : Danube Delta and Razim-Sinoe Complex  
 SPA: ROSPA0031 Delta Danube Complexul Razim - Sinoe



- **ROSPA0060 Lacurile Tasaul-Corbu**

A coastal lake at the end of the Casimcea valley with a steep limestone shoreline, except on the eastern side where it is separated from the sea by a sandbank. The lake reaches a depth of 5.6 m and has two islands. Sparse reedbeds (*Phragmites*) are found in the north-west of the lake. Lake Tasaul, together with Lake Corbu, forms a lake complex, a typical marine haven unconnected to the sea. The site is of crucial importance for Dalmatian pelicans as it has been used regularly as feeding and staging area for many years by up to several tens of individuals. The most important feature is the presence of a few islands on the lake, of which the southernmost has been continuously used by waterbirds for roosting and breeding (mixed colony consisting of Great Cormorants, Pontic Gulls, Night Herons, Pygmy Cormorants, Little Egrets). Dalmatian pelicans have as recently as 2013 started breeding on the island and currently the colony consists of 10-15 pairs. This is the only breeding colony in Romania known outside of the Danube Delta Biosphere Reserve and of crucial importance for the protection of the species.

Project site 13 : Lacurile Tasaul-Corbu  
 SPA: ROSPA0060 Lacurile Tasaul-Corbu



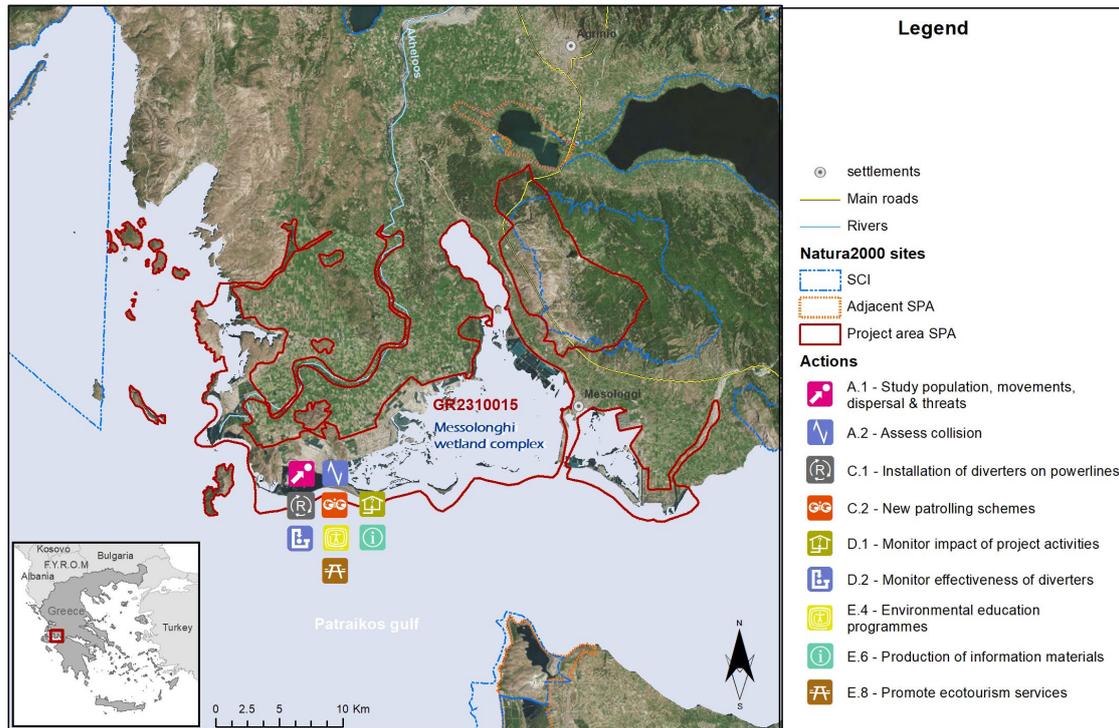
## Greece:

- **Messolonghi wetland GR2310015**

This is one of the most important wetlands in Greece, included in the Ramsar Convention due to its great ornithological significance. It is a complex wetland network formed by rivers Acheloos and Evinos and dominated by the lagoons of Messolonghi (11,200 ha) and Aitoliko (1,400 ha). Most of the wetland is formed from the sediments deposited by these two rivers. Extensive salt meadows, sand bars, mudflats and riparian forest remnants occur along the rivers' main flow. The interspersed rocky hills between the lagoons together with mount Arakynthos constitute important habitats for raptors. The lagoons are used for the development of aquaculture and salinas, while in the surrounding areas agricultural and small-scale industrial activity is common. Messolonghi hosts a small but very important colony of Dalmatian pelican, since together with Amvrakikos breeding populations they form the core of the western sub-population of the species, a distinct meta-population which is small in size and isolated, thus vulnerable and in need of monitoring and special conservation measures. Messolonghi holds a breeding colony of 55 – 70 pairs (2015-2016) on seven small islets, i.e. less than 1% of the national population. Wintering populations range from 95 – 256 individuals (2007-2015). DPs are present in Messolonghi all year round, although part of the population moves to other closeby wetlands (e.g. Amvrakikos, Kotychi) during the summer months.

Project site 1: Messolonghi wetland

SPA code: GR2230001 DELTA ACHELOOU, LIMNOTHALASSA MESOLONGIOU - AITOLIKOU, EKVOLES EVINOU, NISOI ECHINADES, NISOS PETALAS

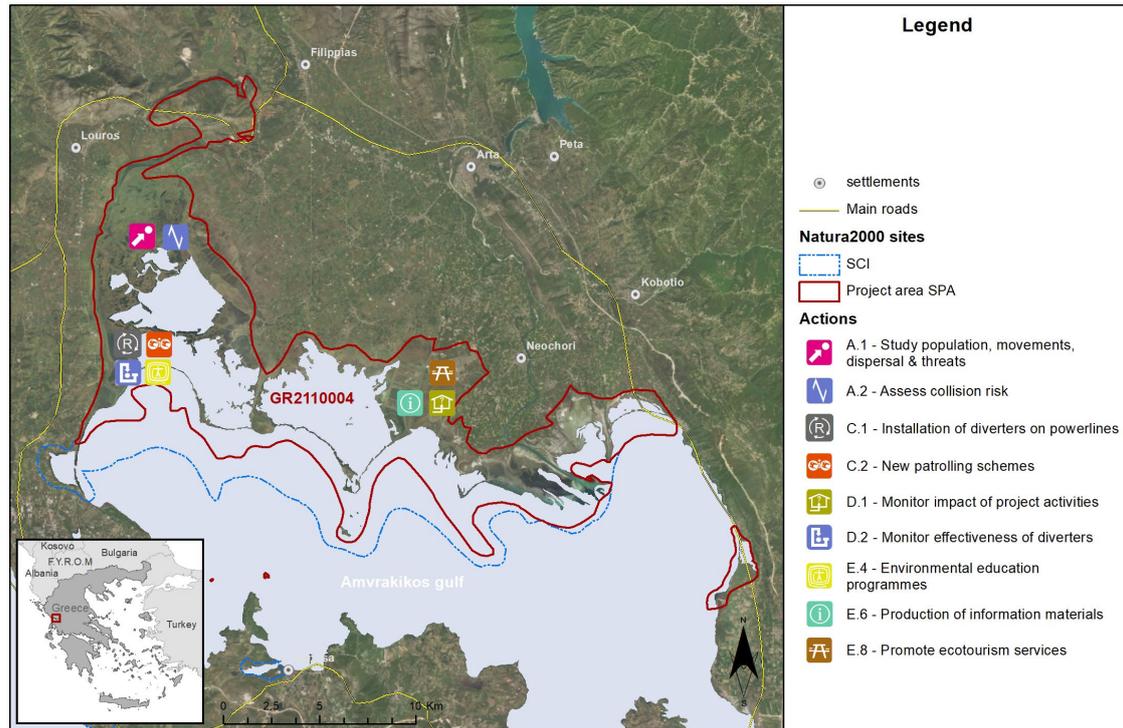


• **Amvrakikos Gulf GR2110004**

The wetland complex of Amvrakikos Gulf is one of the largest and most important wetlands in Greece and southern Europe. Following the drainage of Lake Karla in 1962, Amvrakikos comprises the most important wetland of Greece for wintering waterbird concentrations. The great variety of habitats occurring in Amvrakikos is formed by the deltas of rivers Louros and Arachthos which flow into the north part of the gulf, forming 20 large and small lagoons (7,000 ha), sand bars, salt marshes, reedbeds, wet meadows, mudflats, and riverine zones with remnants of riparian forest and hills between and among the lagoons. Its reedbeds and salt marshes, as well as complex of lagoon systems comprise the most extensive in the country. The lagoons (the largest and most important being Tsoukalio, Logarou and Rodia) are characterized by high biological productivity and function as natural fish farms both for fish and crustaceans, providing food for many bird species and other organisms. Amvrakikos Gulf is the third most important site in Greece for the Dalmatian pelican, holding regularly about 89 - 130 pairs (2015-2016), i.e. about 7% of the national population and about 4% of the SEE breeding population. Wintering populations range from 209- 608 individuals (2007-2015). DPs are present in Amvrakikos all year round, although part of the population moved to other closeby wetlands (e.g. Amvrakia, Lysimachia) during the summer months.

Project site 2: Amvrakikos Gulf

SPA code: GR2110004 AMVRAKIKOS KOLPOS, LIMNOTHALASSA KATAFOURKO KAI KORAKONISIA



### 3. Aim and objective

This study aims to: Study the impact of the 20 kV and 110 kV power lines distribution network as a factor for increased mortality among birds in the areas inhabited by Dalmatian Pelican in Bulgaria, Romania and Greece and to identify the power lines in priority need of isolation in order to prevent deaths among individuals of this particular species.

The data for following tasks will be collected in order to achieve these goals:

- Studying of the species of the victims and identification of taxa, which are most affected by the negative impacts of the 20 kV/110 kV power lines.
- Recording of the type of electricity pylons causing bird mortality by electrocution.
- Recording of deaths caused by collision with power lines.
- Identification of the most bird-unsafe pylons and the most dangerous power distribution lines.
- Recording the effect of the habitats on bird mortality caused by the 20 kV/110 kV power distribution network.
- Recording the effect of the topography on bird mortality caused by the 20 kV/110 kV power distribution network.
- Recording the effect of the annual seasons on bird mortality caused by the 20 kV/110 kV power distribution network.
- Recording the effect of the birds' sizes on bird mortality caused by the 20 kV/110 kV power distribution network.
- Outlining specific measures to prevent bird mortality caused by the 20 kV/110 kV power distribution network.

## 4. Methodology

### 4.1. General information

Several types of 20kV power distribution facilities (referred to below as pylons for short) are present in the studied areas in Bulgaria, identified by various combinations of support structure (the pylon) and the number and positioning of the insulators on the structure. The main pylon types are (Annex 1):

- **Type 1** – tension lattice towers with 3 isolators attached sideways;
- **Type 2** – reinforced concrete pylons with 3 standing isolators;
- **Type 3** – lattice towers with 6 isolators positioned on 2 support beams in a downward direction (dual line with hanging isolators);
- **Type 4** – reinforced concrete pylons with 3 hanging isolators;
- **Type 5** – lattice towers with 3 standing isolators;
- **Type 6** – lattice towers (three-pole disconnectors, outdoor, sectionalizers) with 9 standing isolators (switching electric towers/masts);
- **Type 7** – lattice towers with 6 isolators positioned on 2 support beams in a standing (upward) position;
- **Type 8** – lattice towers with 6 isolators positioned on 2 support beams in a standing position (dual line with standing isolators);
- **Type 9** – dual tensioning lattice towers with 6 isolators positioned on 2 support beams in a sideways position with jumper conductors.

### 4.2. Methodology

The power distribution lines must be inspected once each month between March 2020 and February 2021, with at least 20 and at most 30 days between walk-arounds (Demerdzhiev 2014). For DP's wintering sites and stop-over sites this is September-February while for breeding this is March-August. The walk-arounds are carried out by transect method (Bibby et al. 1999) recording victim remnants within a 20 m. radius around each power-line side. The following parameters were considered for each pylon – GPS coordinates (GPSMAP 60Cx), pylon type, habitat within a 100 m radius around the pylon, topography. The field experts collect data on the following characteristic for each discovered victim: power-line name, type of pylon, GPS coordinates of the victim location, species, age and gender of the bird, if possible, number of victims, condition of victims (fresh carcass, mummified carcass, feathers and bones, only feathers or only bones, with traces of singeing or burns), distance and direction of the location of the victim relative to the pylon and the power conductors, habitat type, and topography. Comparative material (feathers, bones) is used for identification of the victims and of their remnants. Inventoried victims are collected from the respective power line to avoid repeated counting during the next walk-around. All casualties in a radius of 5 m. around the pylon are considered dead from electric shock, and the birds found under the cables, but at a distance of more than 5 m. from the pylon, as dead by collision with the power cables (Demerdzhiev et al. 2009, Demerdzhiev 2014). The data about the casualties will be collected by mobile application like SmartBirds Pro, ObsMapp, E-bird.

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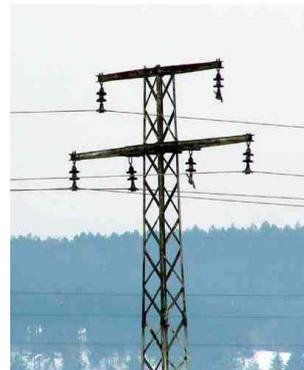
## Appendix 1. Type of the electrical 20kV pylons



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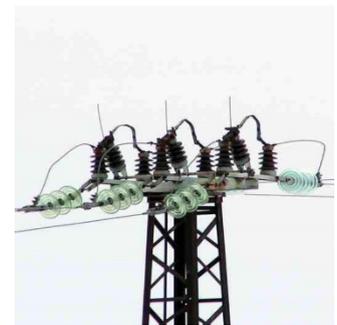
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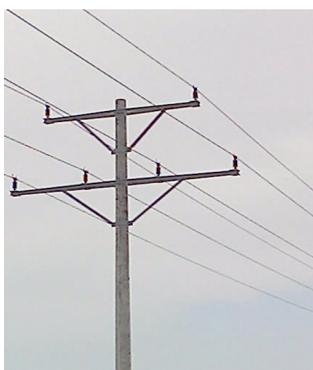
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