



Report Action D2

Monitor the effectiveness of bird diverters installed on power lines



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LIFE 18 NAT/NL/000716

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Cover photo credits: Sebastian Bugariu, SOR

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1. Summary

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. According to the International Single Species Action Plan for the Dalmatian Pelican (*Pelecanus crispus*), death by collision on overhead electrical wires is an important threat for the species and immediate mitigation measures are required to be implemented. A number of diverter models are commercially available and have been effectively used for a few decades by the power supply companies in order to mitigate bird collision casualties.

2. Introduction

Within the framework of the “Conservation of the Dalmatian pelican along the Black-Sea Mediterranean Flyway project LIFE18 NAT/NL/000716” project the project team assessed the effect of collisions on the Dalmatian Pelican in selected parts of the overhead power lines located in key project areas in Bulgaria, Romania and Greece under Action A2.

Bulgaria

39 power lines with a total length of 62.9 km were surveyed over in the study regions. A total of 38 dead pelicans (23 Great White pelicans *Pelecanus onocrotalus* and 15 Dalmatian pelicans *Pelecanus crispus*) because of collision with power lines were found during the field survey under Action A2. An adult injured Dalmatian Pelican was found at Rozov kladenets dam and was rescued by a BSPB team.

Romania

In Romania, 57 sections of different power lines (both medium and high voltage) that are intersecting project sites or the vicinity have been examined throughout different years, also during implementation of other monitoring activities, in most project sites (14). Besides direct survey, additional information has been collected from other volunteers and also information on collision locations in the past has been centralized in the report developed under Action A2.

A total of 22 dead pelicans (14 Great White pelicans *Pelecanus onocrotalus* and 8 Dalmatian pelicans *Pelecanus crispus*) as a result of collision with power lines were found during the field survey and information collection under Action A2. All the casualties have been recorded at 2 of the project sites (ROSPA0051 Iezerul Calarasi and the majority at ROSPA0031 Delta Dunarii si complexul Razelm-Sinoie).

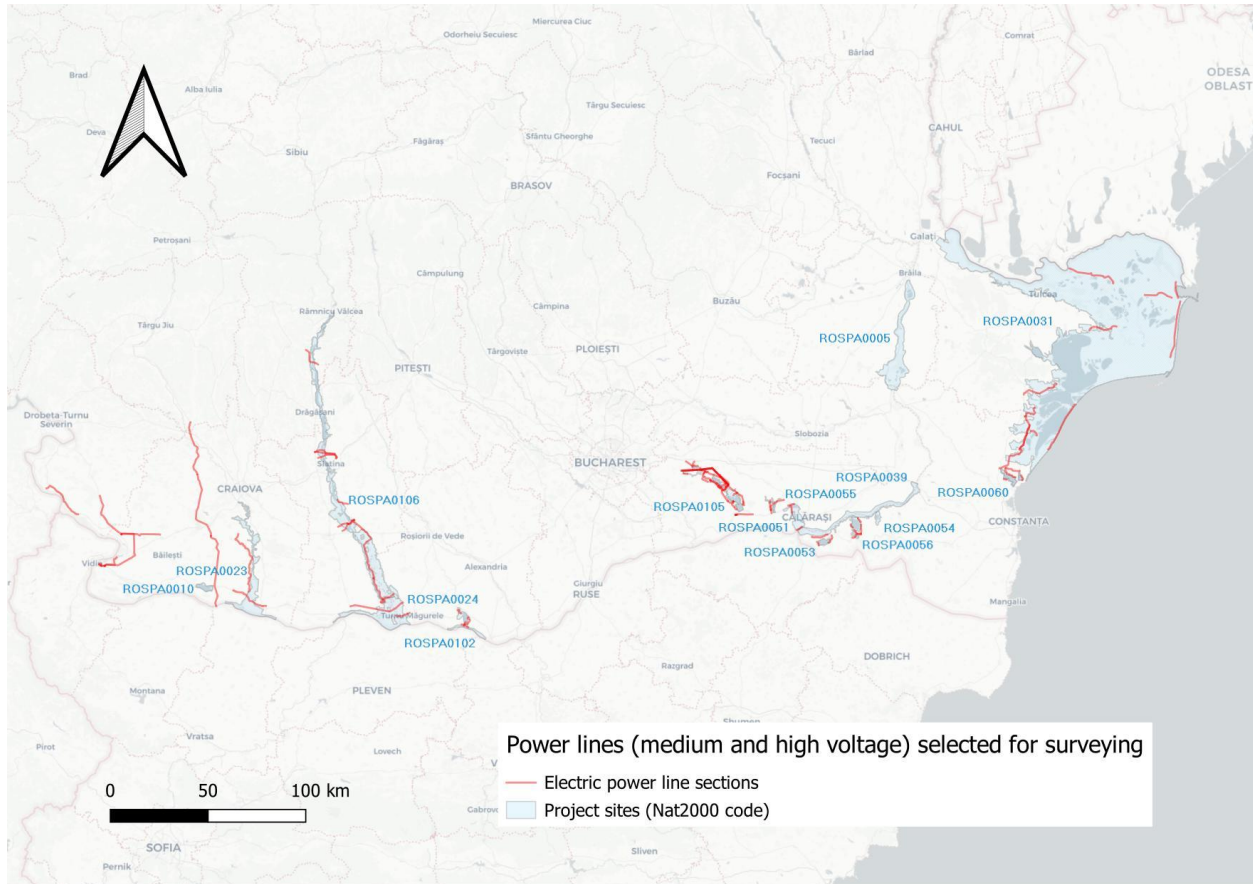
Greece

Within the framework of the LIFE18 NAT/NL/000716 project for the conservation of the Dalmatian pelican (Action A2), field experts from the HOS assessed the effect of collisions on the Dalmatian Pelican in selected parts of the network within the National Parks and Special Protected Areas (SPA) of Amvrakikos wetlands and Messolonghi lagoon, where collision casualties have been found in the past. The particular areas were chosen as they host important Dalmatian Pelican colonies that belong to the western sup-population, which due to its small size is considered to be

more vulnerable. The HOS monitored 14.7 km of medium voltage network from which 7.4 km were assessed to be dangerous and recommended for installation of bird diverters. Yearly estimate of Dalmatian Pelican casualties is at least 4% of the local population in the areas that were monitored.

Surveyed project sites in Bulgaria, Romania and Greece:

Country	Project area	Natura 2000 code	Surface (ha)
Bulgaria	Ovcharitsa Reservoir	BG0002023	4,304.500
Bulgaria	Burgasko Lake	BG0000273	3,088.000
Bulgaria	Mandra-Poda Complex	BG0000271	4,495.000
Bulgaria	Rozov Kladenets	BG0002022	1,281.100
Greece	Messolonghi wetland	GR2310015	44.185
Greece	Amvrakikos Gulf	GR2110004	23.011
Romania	Danube Delta and Razim-Sinoe Complex	ROSPA0031	512,820.110
Romania	Iezerul Calarasi	ROSPA0051	5001.1
Romania	Lacurile Tasaul-Corbu	ROSPA0060	2,701.000
Romania	Confluenta Jiu-Dunare	ROSPA0023	22000
Romania	Lacul Oltina	ROSPA0096	3309
Romania	Valea Mostistei	ROSPA0105	6614
Romania	Bistret	ROSPA0010	1916
Romania	Lacul Dunareni	ROSPA0054	1269
Romania	Valea Oltului inferior	ROSPA0106	54074.8
Romania	Lacul Bugeac	ROSPA0053	1392
Romania	Confluenta Olt-Dunare	ROSPA0024	21285
Romania	Lacul Galatui	ROSPA0055	814
Romania	Dunare-Ostroave	ROSPA0039	16243.8
Romania	Lacul Suhaia	ROSPA0102	1250



Map of examined power line sections in Romanian sites

3. Mitigation measures

In Bulgaria, a total of 760 bird diverters (Fire Fly SF 4-16N and Fire Fly SF 10-70N) were installed on 4.6 km dangerous sections of power lines located in the southwestern part of SPA Mandra-Poda Complex.

In Romania, a total of 400 bird diverters (FireFly SF 10-70N) have been installed. Installation has been performed by the electricity distribution company in ROSPA0051 Iezerul Calarasi (100 pieces) and by the project personnel (SOR) in collaboration with the Danube Delta Biosphere Reserve Administration and the National Waters Administration (management of the powerline in question) – 300 pieces in ROSPA0031 Delta Dunarii si complexul Razelm-Sinoie. In total, 6.5km of powerline were covered (1.6km at ROSPA0051 Iezerul Calarasi and 4.9km at ROSPA0031 Danube Delta). By spacing out the diverters to approximately 15m instead of 10 we managed to increase the covered length of the power line sections without affecting the efficiency of the bird diverters. In addition, during 2024 discussions have been carried out regarding the retrofitting of existing power lines in the Danube Delta by the electricity distribution company (PPC). There are currently plans in place to replace all existing medium voltage power line sections across the Danube Delta Biosphere Reserve with a new system (twisted cabling), which renders the cabling much more visible to birds in flight and also eliminates electrocution risk on the pylons.

In Greece, despite numerous meetings, the company in charge of the maintenance of the national medium voltage power grid (HEDNO) refused to install bird diverters, as they were concerned of potential damages to the power lines and maintenance needs. However, they agreed to substitute a section of the power lines in the southeastern part of Messolonghi lagoons with completely insulated wires (for which they already had previous experience and trusted), that make the whole section of the line electrocution safe. In addition, as an extra action with no added cost for the LIFE project, HEDNO buried another section of dangerous lines again in Messolonghi lagoons (nearly 4 km), making this section of the network 100% safe against collisions and electrocution.

Country	SPA	Natura 2000 code	Nº of diverters installed (pcs)	Length of insulated power lines (km)
Bulgaria	Mandra-Poda Complex	BG0000271	760	4.6
Greece	Messolonghi wetland	GR2310015	-	4.0
Romania	Danube Delta and Razim-Sinoe Complex	ROSPA0031	300	4.9
Romania	Iezerul Calarasi	ROSPA0051	100	1.6
	TOTAL		1160	15.1

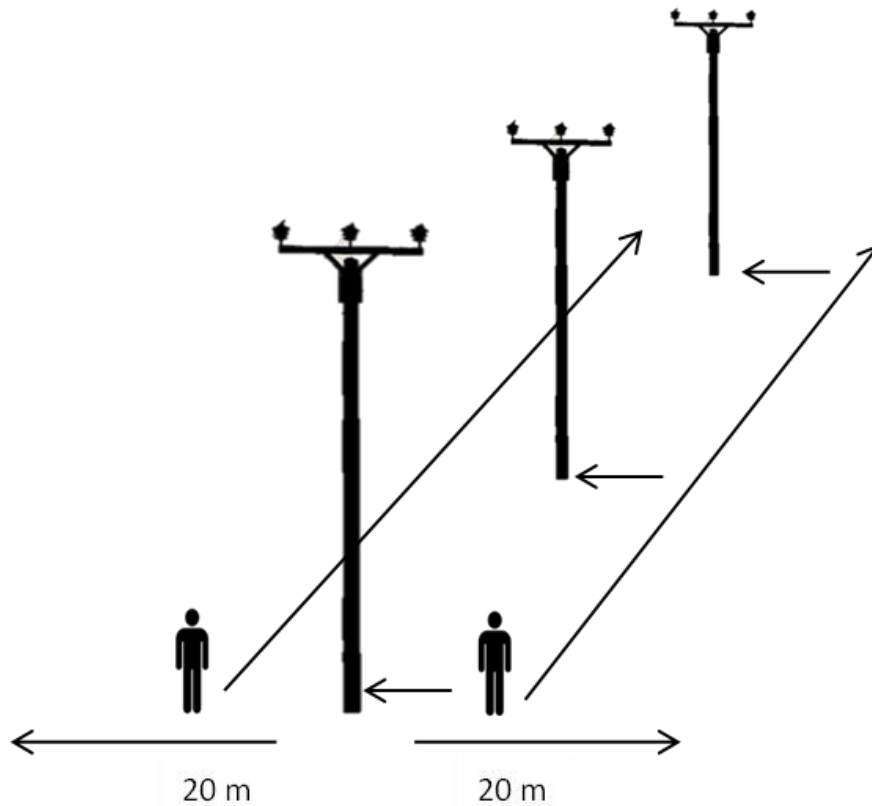
4. Aim

The main aim is to study the effectiveness of the selected bird diverters and other mitigation measures by comparing the bird mortality before/after installation and by monitoring of bird reactions, reaction distances and other important parameters on the same section of non-marked and marked power lines with the same site-specific conditions.

5. Methodology

The methodology of the study under Action D2 is similar to that of the study under Action A2. The power lines marked with bird diverters must be inspected once each month with a recommended period of minimum 10 months, with at least 20 and at most 30 days between walk-arounds. 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 recording bird carcasses within a 20 m radius around each power-line side. The following parameters were considered for each pylon – GPS coordinates, 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 singing 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 electrocution, and the birds found under the wires, but at a distance of more than 5 m from the pylon, as dead by collision with the power

line wires. For the Dalmatian Pelican, only a collision can be determined as the cause of death. The data about the casualties will be collected by mobile application like SmartBirds Pro, ObsMapp, E-bird.

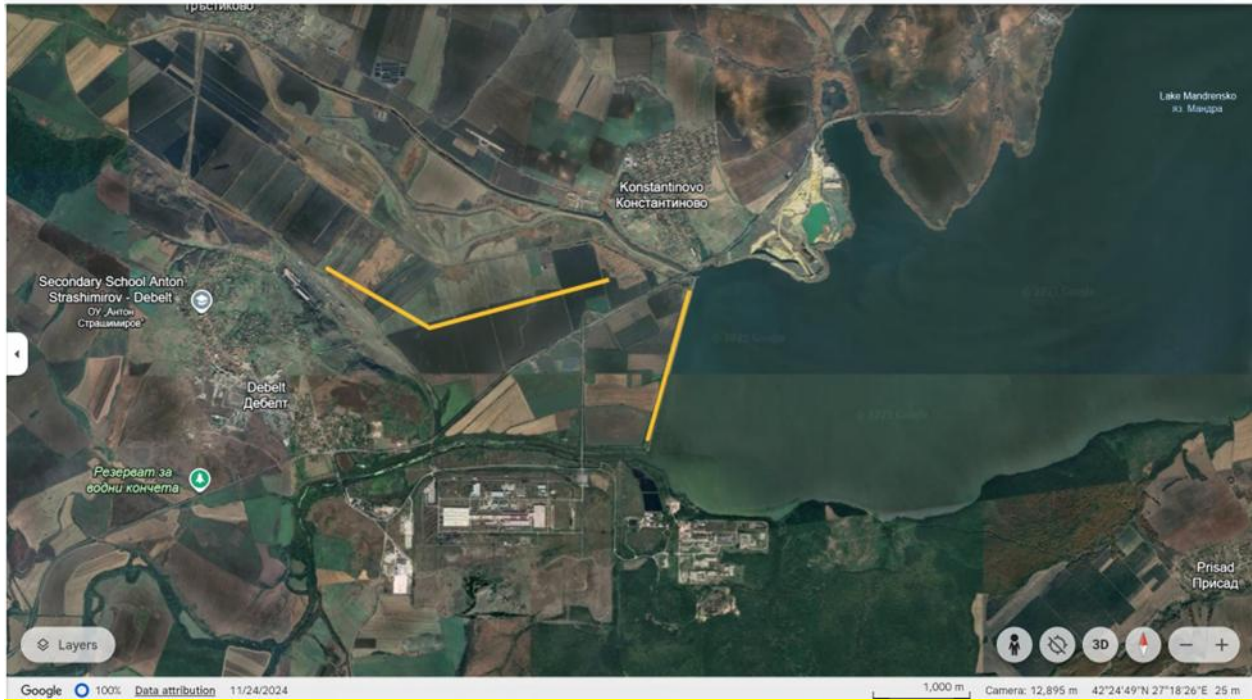


Buffer zone for medium voltage line and recommended movement of field assistants

6. Results

Bulgaria

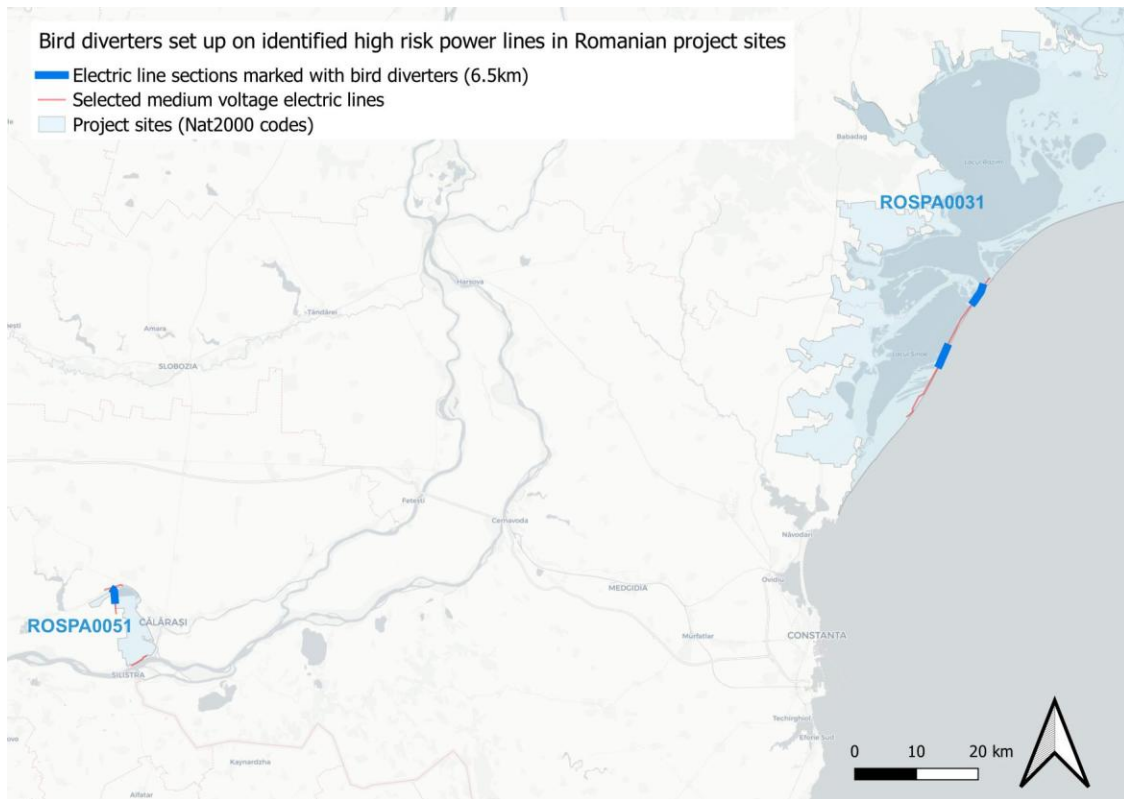
Regular monthly field visits of power lines with installed bird diverters in the region of SPA Mandra-Poda Complex were conducted by BSPB experts in the period from February 2024 to February 2025. During these field visits, no injured or dead pelicans were found around the power lines with bird diverters.



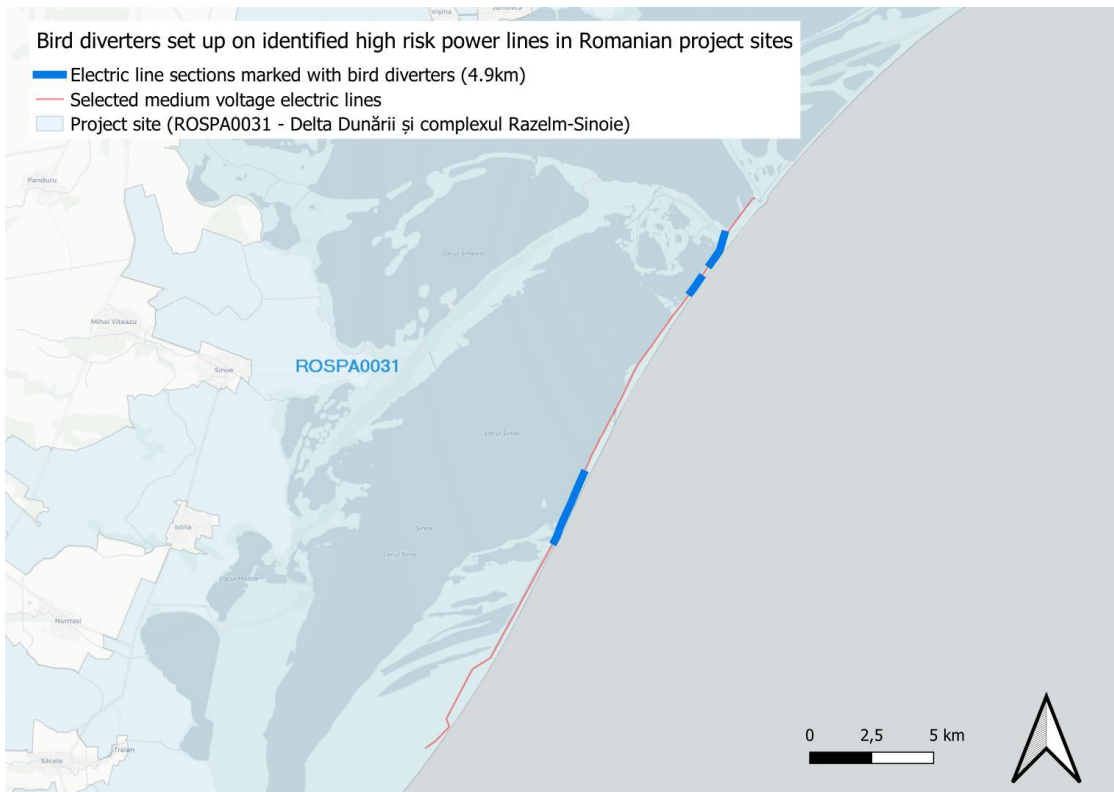
Map with insulated power lines in Bulgaria

Romania

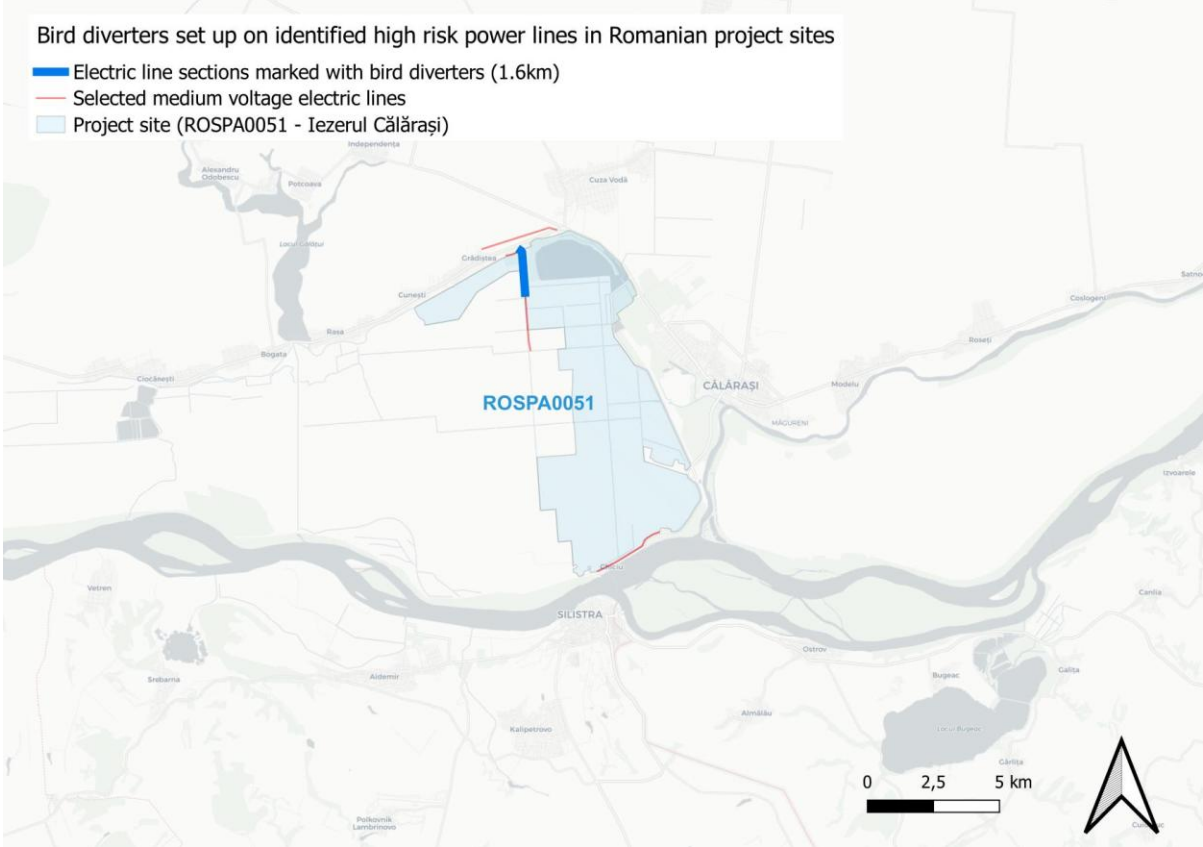
Following the installation of the bird diverters in the 2 project areas (ROSPA0051 and ROSPA0031), regular visits have been performed to these sites during the second half of 2024 to February 2025. During these surveys, no additional casualties (injured or dead pelicans) have been detected around the power lines equipped with diverters.



Map of electric line sections with installed bird diverters in Romania



Map of electric line sections with installed bird diverters in ROSPA0031 project site



Map of electric line sections with installed bird diverters in ROSPA0051 project site

Greece

The buried section of the power line needed no subsequent monitoring to prove their effectiveness for obvious reasons. The insulated section unfortunately was delayed due to shortage of materials and long delivery dates, and thus insulation works were finalized in March 2025. HOS will carry out the monitoring efforts of the insulated line from April to June 2025 with its own funds and update the current report with the results of said monitoring with the Final report. Insulation of the line will have an added value to other bird species in the area suffering from electrocution when perching on the pylons as these lines reduce the risk of electrocution to zero.



Map depicting the location of the insulated line in Messolonghi lagoon (in red) and the buried section (in purple).
Note that half of Messolonghi's pelican colonies is located in the Klisova lagoon.

7. Conclusion

Bird diverters are used throughout the world to reduce collisions by birds at overhead power lines and the additional mortality associated with this. Their effectiveness is determined by factors such as type of marker, target species and environmental variables. Death by collision on overhead power lines is a one of most important threat for the Dalmatian Pelican (*Pelecanus crispus*) in Bulgaria, Romania and Greece and immediate mitigation measures are required to be implemented. Pelicans are amongst those bird groups at high risk from collisions along with other species such as herons, storks, swans, cranes, some species of vultures and eagles. Flight behaviour and other biological attributes contribute to species risk. Individual losses from collision mortality are unlikely to affect large and robust populations. However, for species that are rare or endangered, the loss of a few or even one individual may impact a local population or the overall population's viability.

While power lines are only one of numerous causes of bird injury and mortality, collisions with power lines can be reduced. A number of diverter models are commercially available and have been effectively used for a few decades by the power supply companies in order to mitigate bird collision casualties. Immediate safety is needed by mounting diverters on the riskiest sections of the surveyed power lines in the project areas. These protection measures will not only benefit the protection of birds, but will also be of exceptional importance for the power distribution companies, because by reducing the cases of colliding or electrocuted birds, they will reduce the power cuts, the technical problems, and the need for their elimination. As a consequence, the power distribution companies will reduce their power-line repairing and maintenance costs.

Within the scope of the study under PWOL Action D2 on the impact of diverters and other mitigating measures installed on power lines in Bulgaria, Romania and Greece, their high efficiency and importance as a solution to one of the most influential threatening factors for the Dalmatian pelican was proven.

8. Photographic annex

Installation of bird diverters in Romania (ROSPA0051 project site):







Installation of bird diverters in Romania (ROSPA0031 project site):





Installation of bird diverters in Bulgaria:





