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Monitoring of the project activities' impact on Dalmatian pelicans
Report under Action D1

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LIFE18 NAT/NL/000716

Authors: Victoria Saravia-Mullin[1], Sebastian Bugariu[2], Svilen Cheshmedzhiev[3], Jelle Harms[4], Veselin Koev[5], Annete Mertens[4], Daniela Mihova[5], Mykhailo Nesterenko[6] & Manolia Vougioukalou[1].

[1] *Hellenic Ornithological Society/ BirdLife Greece*
[2] *Romanian Ornithological Society/ BirdLife Romania*
[3] *Bulgarian Society for the Protection of Birds/ BirdLife Bulgaria*
[4] *Rewilding Europe*
[5] *Persina Nature Park Directorate*
[6] *Rewilding Ukraine*

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1. Summary

The present report assesses the impact of conservation actions implemented in the framework of the LIFE project "Conservation of the Dalmatian Pelican along the Black Sea-Mediterranean Flyway" - Pelican Way of LIFE (LIFE18 NAT/NL/716), on the project's target species, the Dalmatian pelican (*Pelecanus crispus*).

The project was implemented across 27 Natura 2000 Special Protection Areas (SPAs) in Bulgaria, Greece and Romania, and two protected areas in Ukraine. Project actions included a range of actions such as monitoring of the species populations, by means of monitoring breeding numbers and breeding success rates, carrying out spring and winter censuses, and following bird movements GPS tracking and colour ringing. Other important actions were the monitoring of threats such as disturbance, persecution and illegal fishing, patrolling of breeding areas to hinder the previous threats, and the creation of nesting platforms.

By means of a series of indicators, the effectiveness of the conservation actions abovementioned and implemented throughout the during of the project is evaluated. A total of 783 patrols were conducted in the project sites, recording 20 disturbance and persecution incidents, mostly in Greece, with effective patrolling schemes reducing incidents over time. Illegal fishing was recorded in Bulgaria, albeit in low numbers. Half of them were recorded at the Mandra-Poda SPA, in Burgas, and protocols were developed for increased control visits. 12 nesting platforms were built and repaired in Bulgaria and Ukraine, proving highly successful in Bulgaria, with breeding pairs and roosting birds increasing every year reaching 132 pairs. GPS tracking and ringing confirmed movement patterns and revealed threats like entanglement in fishing nets and collisions with power lines. Breeding success was stable or increasing in most colonies, despite challenges like the Avian Influenza outbreak in 2022.

In conclusion, the conservation actions implemented in the project were effective and seem to have positively impacted Dalmatian pelican populations. Disturbance remains a localized threat, while illegal fishing and persecution and new threats such as net entanglement need further study. Nesting platforms are effective, and continued monitoring and coordination among countries are crucial for ongoing conservation efforts.

2. Introduction

In the framework of the LIFE Project "Conservation of the Dalmatian Pelican along the Black Sea-Mediterranean Flyway" - Pelican Way of LIFE (LIFE18 NAT/NL/716), the project team implemented a range of conservation actions aiming to reduce the threats on the project's target species, the Dalmatian pelican (*Pelecanus crispus*). These varied from population monitoring actions, the implementation of patrolling schemes, to the construction of nesting platforms. The assessment of the effectiveness of the implemented actions on the pelicans' populations was also one of the actions planned in the project, in order to determine which actions should be continued and promoted to increase Dalmatian pelican conservation.

Project areas:

The project was implemented in a total of 27 Natura 2000 SPAs located in Bulgaria (10), Greece (2) and Romania (15), plus two protected areas in the Danube Delta in Ukraine. Specific monitoring actions (such as the Coordinated Spring counts and Wintering population assessment) were implemented also in other SPAs or wetlands in order to obtain a clearer overview of the total numbers of individuals and of potential threats. This also applies to action A2 where information was deemed relevant to be collected. Some actions were carried out in the Ukrainian project sites, however, due to the current war conflict and military access restrictions, monitoring actions in this project country were severely limited or impossible to complete.

Table 1: Project areas, presence of pelicans and project conservation actions implemented there.

Country	Project area	Natura 2000 / Emerald code	Surface (ha)	Presence of pelicans	Project actions implemented
Bulgaria	Shabla Lake Complex	BG0000156	3,195.4	Migrating, wintering	A1, A3, D1, E3
Bulgaria	Atanasovsko Lake	BG0000270	4,692	Migrating, wintering	A1, A3, D1, D2, E3, E4, E7, E8
Bulgaria	Belene Islands Complex	BG0002017	7,009.77	Breeding, migrating, wintering	A1, A3, C2, C3, D1, E3, E4, E7, E8, E9
Bulgaria	Ovcharitsa Reservoir	BG0002023	4,304.5	Migrating, wintering	A2, A3, A4, C1, C2, D1, D2, E3, E4, E7
Bulgaria	Burgasko Lake	BG0000273	3,088	Migrating, wintering	A1, A2, A3, C1, D1, D2, E3, E4, E7, E8
Bulgaria	Mandra-Poda Complex	BG0000271	4,495	Migrating, wintering	A1, A2, A3, C1, C3, D1, E3, E4, E7, E8, E9
Bulgaria	Srebarna Lake	BG0000241	1,448.2	Breeding, migrating, wintering	A1, A3, D1, E3, E7, E8
Bulgaria	Studen Kladenets	BG0002013	15,995.6	Migrating, wintering	A1, A3, C2, D1, E3, E4, E7
Bulgaria	Rozov Kladenets	BG0002022	1,281.1	Migrating, wintering	A1, A2, A3, C1, C2, D1, D2, E3, E4, E7
Bulgaria	Straldzha Complex	BG0002028	2,871.8	Migrating, wintering	A1, A3, D1, E3, E7
Greece	Messolonghi wetland	GR2310015	44,185	Breeding – Present all year	A1, A2, C1, C2, D1, D2, E4, E8
Greece	Amvrakikos Gulf	GR2110004	23,011	Breeding – Present all year	A1, A2, C2, D1, E4, E8
Romania	Danube Delta and Razim-Sinoe Complex	ROSPA0031	512,820.110	Breeding, migrating, wintering	A1, A2, A3, C1, D1, D2, E3, E4, E6, E7, E8
Romania	Iezerul Calarasi	ROSPA0051	5,001.1	Migrating, wintering	A1, A2, A3, C1, D1, D2
Romania	Lacurile Tasaul-Corbu	ROSPA0060	2,701	Breeding, migrating, wintering	A1, A2, A3, C1, C2, D1, E3, E6
Romania	Confluenta Jiu-Dunare	ROSPA0023	22,000	Migrating, wintering	A1, A2, D1
Romania	Lacul Oltina	ROSPA0096	3,309	Migrating, wintering	A1, A2, A3, D1
Romania	Valea Mostistei	ROSPA0105	6,614	Migrating, wintering	A1, A2, A3, D1
Romania	Bistret	ROSPA0010	1,916	Migrating, wintering	A1, A2, A3, D1
Romania	Lacul Dunareni	ROSPA0054	1,269	Migrating, wintering	A1, A2, A3, D1
Romania	Valea Oltului	ROSPA0106	54,074.8	Migrating, wintering	A1, A2, A3, D1

Country	Project area	Natura 2000 / Emerald code	Surface (ha)	Presence of pelicans	Project actions implemented
	inferior				
Romania	Lacul Bugeac	ROSPA0053	1,392	Migrating, wintering	A1, A2, A3, D1
Romania	Confluenta Olt-Dunare	ROSPA0024	21,285	Migrating, wintering	A1, A2, D1
Romania	Lacul Galatui	ROSPA0055	814	Migrating, wintering	A1, A2, A3, D1
Romania	Dunare-Ostroave	ROSPA0039	16,243.8	Migrating, wintering	A1, D1
Romania	Lacul Suhaia	ROSPA0102	1,250	Migrating, wintering	A1, A2, A3, D1
Romania	Balta Mica a Brailei	ROSPA0005	25,855.580	Migrating, wintering	A1, D1
Ukraine	Kiliya delta	UA0000018	50,213	All year round	A1, A3, A4, C3, D1, D3, E4, E8
Ukraine	Danube Lakes	UA0000142	52,807	All year round	A1, A3, A4, C3, D1, D3, E4

3. Methods

3.1. Indicators for Disturbance, Persecution, Illegal fishing and Effectiveness of patrolling schemes

Patrolling schemes were designed and implemented at selected project sites to help detect certain human activities that could have a negative effect on pelicans, especially during the breeding season, namely disturbance, persecution and illegal fishing. Several indicators were devised to monitor and assess these activities but also to evaluate the effectiveness of the patrolling schemes themselves.

The indicators used were as follows:

- Disturbance and persecution: total number of incidents recorded, number of disturbance incidents and number of persecution incidents recorded. Also, how many of these incidents were reported to the local relevant authorities and how many did the authorities and/ or the project staff address.
- Illegal fishing: this action was carried out only in Bulgaria, where the number of illegal fishing incidents was recorded.
- Effectiveness of patrolling schemes: how many patrols were implemented in each project area, for how many hours and how many seasons. Total number of incidents recorded and trend throughout the implementation of the action.

3.2. Indicators for the effectiveness of interventions for roosting and/or nesting

Action C3 "*Improve breeding and roosting through artificial platforms at key sites along the flyway*" aimed to improve breeding and roosting opportunities for pelicans at key sites in Bulgaria and Ukraine. One of the main problems in sites in Bulgaria is the lack of suitable nesting surface or reduced availability of space. In order to address this important problem, BSPB and PNPD constructed seven nesting platforms in three project sites – Belene Islands Complex, Srebarna Lake and Mandra-Poda Complex. To evaluate the success of these platforms, the number of

breeding pairs using the platforms for nesting each year was used as so was the number of birds using them as a roosting site outside the breeding season.

Rewilding Ukraine constructed three nesting platforms in the two project sites (Kartal Lake, Ermakov island and Kiliya Outer Delta) where the Dalmatian pelicans are present all year round and where the suitable nesting surfaces were missing. Unfortunately, monitoring of the platforms' success was only possible in two project sites (Kartal lake and Ermakov island), due to limited access caused by military restrictions.

3.3. Indicators for the monitoring of breeding numbers and breeding success, overall numbers of birds in spring and monitoring of tagged birds

Action A1 "*Study the current population status, movements, dispersal, threats and key sites along the flyway route*" constituted a core preparatory action of the project, involving a comprehensive assessment of the Dalmatian pelican population. This action was critical to address existing knowledge gaps that may influence the effectiveness of conservation strategies targeting this vulnerable species. The use of ecological indicators—such as population size, number of breeding pairs, and breeding success—provides a clear and systematic overview of the species' status. A decline in these parameters may indicate the presence of significant pressures (sometimes naturally occurring such as the Highly Pathogenic Avian influenza (HPAI) epidemic) or potentially, any insufficiently implemented conservation measures.

A key component of this action was the deployment of GPS telemetry and colour ringing on individual birds, as they provide critical data on spatial ecology, including movement patterns, habitat utilization, and seasonal dispersal. These data not only supply substantial information on the species' life history traits but also facilitate the identification of specific threats causing increased mortality. In some cases, tracking results may reveal previously undocumented threats, thereby improving the responsiveness and targeting of future conservation actions.

These are the indicators used:

- Number of breeding pairs per colony per year and their respective breeding success: colonies were closely monitored throughout the project implementation period, and using different methods such as direct observation, drones and even targeted small aircraft flights, these two parameters were recorded (whenever possible) each year.
- Number of birds in spring: not all adult individuals breed each year for different reasons, while sub-adult and immature individuals may have different staging areas in the species distribution range. As a consequence, comprehensive demographic parameters can help better understand the population turnover, and in addition, provide key information if and how fast the species could recover from a major event such as the Avian Influenza outbreak in 2022. For this reason, coordinated international censuses were organized not only in the project countries but also in other countries within the species distribution range across the Black Sea Mediterranean flyway.
- Monitoring of GPS-tracked individuals: parameters collected here comprise the number of individuals tagged, age class distribution at the time of tagging, recorded mortalities, and associated causes of death where identifiable. Additionally, spatial movement data are analysed to determine maximum travelled distances and inter-colony movements. Such

movements are of interest as they may indicate potential gene flow between colonies, as well as a potential for the transmission of pathogens.

4. Results

4.1. Disturbance, Persecution, Illegal fishing and Effectiveness of patrolling schemes

Patrolling was carried out at four sites in Bulgaria, two in Greece and one in Romania. In total, 20 incidents were recorded, 14 of them in Greece (mainly in Amvrakikos wetland); Bulgaria and Romania recorded three incidents each. Out of the 20 incidents, 17 involved disturbance while three involved persecution of birds, (not directly of Dalmatian pelicans, but cormorants, which could indeed lead to disturbance of pelicans as they fish and roost together on many occasions). Only seven led to the disturbance of the pelican breeding colony, thankfully with no major consequences and none lead to mortality or injury of birds. Eleven incidents were reported to the relevant local authorities who responded and resolved eight, while the project staff responded directly and resolved other eight incidents (Fig. 1).

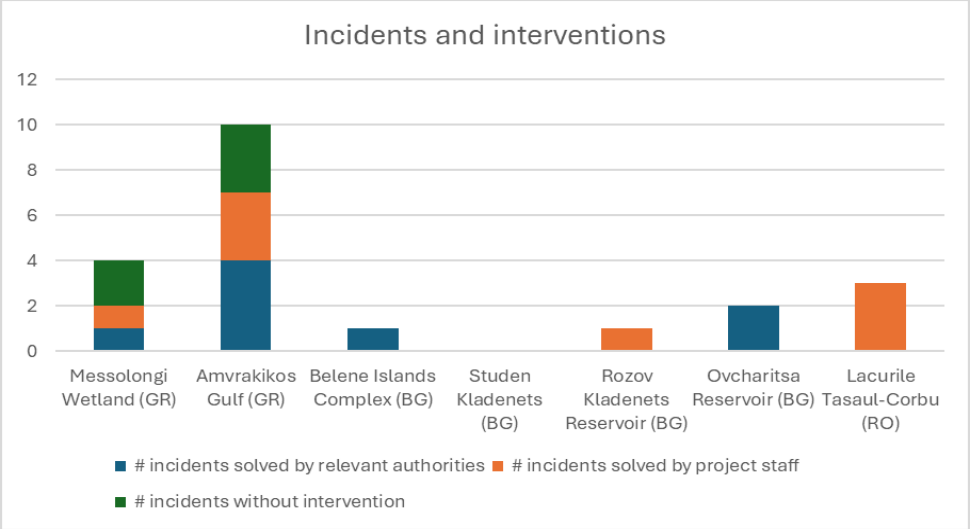

Figure 1: Incidents recorded and who were they addressed by.

Regarding the monitoring of illegal fishing incidents in Bulgaria, this action was carried out in nine project sites, recording a total of 12 incidents, half of them in the Mandra-Poda SPA, at Burgas. All of them were reported to the local relevant authorities (Regional Inspectorates of Environmental and Water) who undertook field inspections in some of the cases. Poachers were not detected, but protocols were developed for increased control visits at problem sites.

A total of 783 patrols were implemented throughout the duration of the project, amounting to 4,866 hours. Approximately 69% of the patrols were carried out in Greece, probably explaining the higher number of incidents recorded there compared to the other two countries. An average of 8-9 patrols per month were carried out in Greece, 1-2 in Bulgaria and 3 in Romania. Although the number of incidents may seem low, it is important to highlight that in extreme cases, one single disturbance incident during the critical breeding period may lead to the abandonment of the colony. All 20 recorded incidents were detected by the project staff implementing the patrols and would have

most likely gone undetected and unaddressed if it were not for their presence. In addition, although local authorities were informed of more than half of the incidents, they did not manage to respond to all of them. This shows the relevance of the patrolling system set by the project as it supported and complemented the work carried out by the local authorities. What's more, looking into the trend in the number of incidents per year, if we exclude those areas where number of incidents recorded can be considered insignificant, incidents seem to decrease in time, corroborating the deterrent effect the patrols had on stakeholders in the area.

Table 2: Implemented patrols and recorded incidents.

Country	Project area	# patrols	Total patrolling hours	# months patrolling was implemented	Average patrols/ month	# incidents recorded	Incident trend
Greece	Messolonghi wetland	241	1,500	30	8	4	Stable
Greece	Amvrakikos Gulf	294	1,486	33	9	10	Decreasing
Bulgaria	Belene Islands Complex	136	1,088	68	2	1	Insignificant
Bulgaria	Studen Kladenets	12	96	12	1	0	Insignificant
Bulgaria	Rozov Kladenets Reservoir	12	96	12	1	0	Insignificant
Bulgaria	Ovcharitsa Reservoir	12	96	12	1	2	Insignificant
Romania	Lacurile Tasaul-Corbu	76	504	26	4	3	Decreasing

4.2. Effectiveness of interventions for roosting and/or nesting

Wooden platforms already existed in the project sites in Bulgaria (Belene Islands Complex, Kalimok Complex and Mandra-Poda), however, with the substantial contribution of the project, these platforms were repaired, made larger in surface or increased in number (six repaired, seven new ones built). Birds in Kalimok Complex immediately started breeding on the platforms and have increasingly done so since 2022, and the colony size has grown from the initial 30 pairs to 92 in 2024. Birds were also attracted to platforms at Belene Islands Complex, using them for breeding in 2023 and 2024 and remaining stable in numbers (39 and 40 pairs respectively). However, for some unknown reasons, pelicans have avoided using the platforms constructed in Mandra-Poda, and have not nest on them since they were built. On the other hand, pelicans in the three areas frequently use and rely on the platforms for roosting sites, increasing their use every year. It is expected that the birds will nest in the coming years.

Table 3: Use of nesting platforms in Bulgaria and Ukraine.

Country	Project area	Nº of breeding pairs				Nº of roosting ind. (max)			
		2022	2023	2024	Trend	2022	2023	2024	Trend
Bulgaria	Belene Islands Complex	0	39	40	Increasing	160	150	220	Increasing
Bulgaria	Kalimok Complex	30	79	92	Increasing	27	39	61	Increasing
Bulgaria	Mandra-Poda	0	0	0	-	44	72	93	Increasing
Ukraine	Kartal lake	-	0	0	-	-	5	-	-
Ukraine	Ermakov island	-	-	0	-	-	-	8	-

Artificial breeding substrates such as the platforms used in the project, are a relatively simple but highly effective method to provide suitable nesting surface for pelicans, particularly in areas where options for nesting are not readily available. This could be because no actual substrate is available or because the areas available are accessible to predators such as jackals or foxes, and thus pelicans won't use them to breed. As it can be observed from the increasing numbers of Dalmatian pelicans in two of the three areas where platforms were built, if given the chance and with the correct conservation measures, pelicans can easily thrive in suitable habitats, crucially contributing to an increase in the breeding population

4.3. Monitoring of breeding numbers and breeding success, overall numbers of birds in spring and monitoring of tagged birds

Breeding numbers and breeding success

From 2021 to 2024 the project team monitored the breeding numbers and breeding success of the Dalmatian Pelican colonies in the project areas. For Bulgaria and Romania, the survey encompassed all breeding colonies in each of these countries, equating to the entire breeding population of each of the respective countries, whereas for Greece, the project areas involved only two of the six existing breeding colonies of the species in the country. In addition, evaluation of the breeding population in Romania and Bulgaria was carried out also in 2020. The monitoring of these parameters presents several difficulties such as the remoteness of some of the colonies (inaccessibility by either land or water in the case of some Danube Delta colonies) or the need to reduce disturbance to the minimum. Therefore, different methods were used in different colonies, and even a combination of methods were needed sometimes. As a result, the team was able to establish a general population trend for the colonies monitored, although it must be taken into account that this a just an approximation as the period of time is limited (only four years). In addition, the impact of the HPAI outbreak in 2022 must also be considered in the general population trend; this outbreak affected the Dalmatian pelicans and was unprecedented both in impact and duration, surpassing previous influenza outbreaks. At a first estimate, almost 10% of the global Dalmatian pelican population died during 2022. Even though most of the colonies monitored by the project weren't severely affected, the population in Romania was significantly impacted by the considerable reduction in the number of nesting pairs and reproductive success during the 2020 season, when the nesting population of the Dalmatian pelican in Romania decreased by approximately 20%. Overall, the population is recovering and in general terms, most colonies have either remained stable with slight fluctuations along the years or have increased in numbers. Some colonies may seem to show decline. For instance, in Greece, the colonies in Messolonghi may seem to present a decline from 2022 to 2023 (Fig. 2 & 6), but this can be partly accounted for by logistical difficulties encountered during the count of some remote islands that hindered an accurate count that year. The number of breeding pairs in the breeding colonies in Bulgaria is closely correlated with the state of the wetlands during the pelican breeding season. Of greatest importance is the presence of water in the wetlands, which in turn is closely related to the water level of the Danube River. For example, in 2023 the wetlands remained dry due to the extremely low water level of the Danube River, which also contributed to the absence of nesting pelicans in the Persina Nature Park (Fig. 2 & 5). In Romania, apart from the impact of the HPAI which significantly reduced the number of breeding pairs across two of the major colonies, the

population has been recovering since then, as the trend has been increasing during the past three years (Fig. 2 & 4). While there have been some fluctuations in a few colonies, others in the vicinity have concomitantly increased in the number of breeding pairs during that respective year, indicating a population exchange between these spatially divided locations (for example between Lake Argintiu and Rosca-Buhaiova, or Vatafu-Rosu and Vatafu-Lumina – the latter a newly detected colony in 2023). Additionally, some of the colonies have shown a steady increase of the number of breeding pairs (Lake Lejai and Lake Tasaul), of which Lake Tasaul has been targeted by active conservation measures and has recently substantially increased in size.

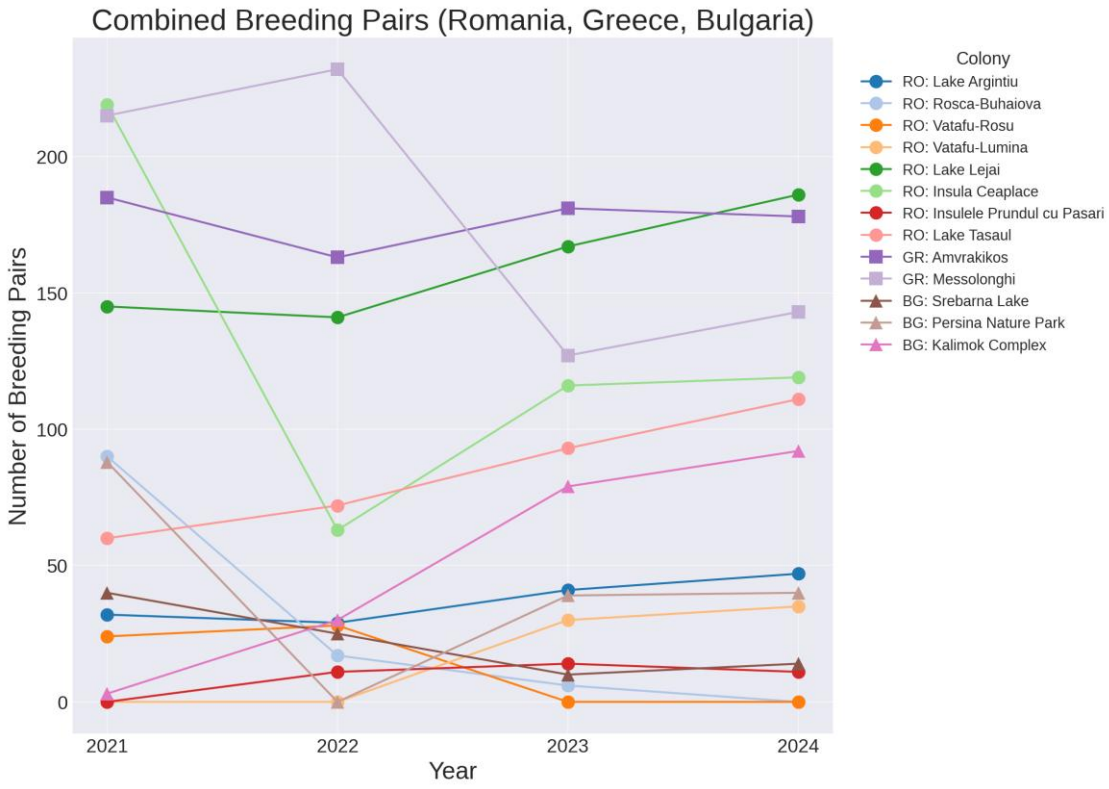

Figure 2: Breeding pairs for the period 2021-2024 in all the different colonies monitored by the project. It must be noted that, while usually two groups of nests that lie more than 3kms apart are considered as two discrete colonies (cf. Coulson 2002), for practical reasons in the present report, the data shown for Messolonghi and Amvrakikos are the pooled data of all the discrete colonies present in each wetland.

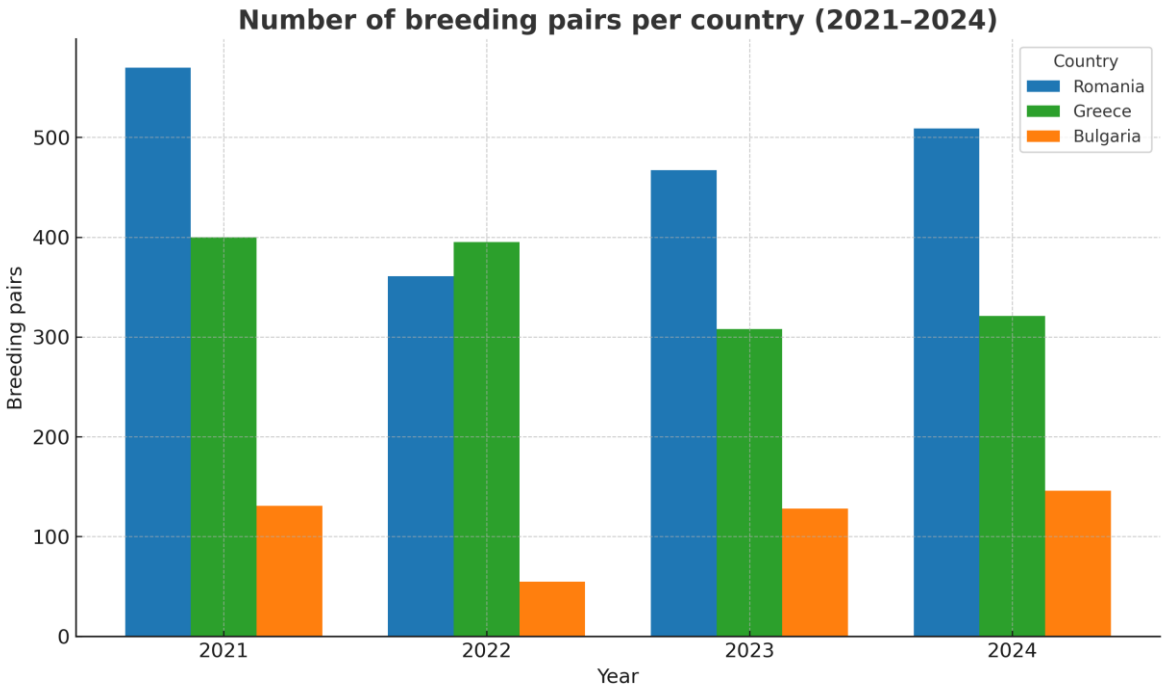

Figure 3: Total number of breeding pairs in each country in monitored colonies

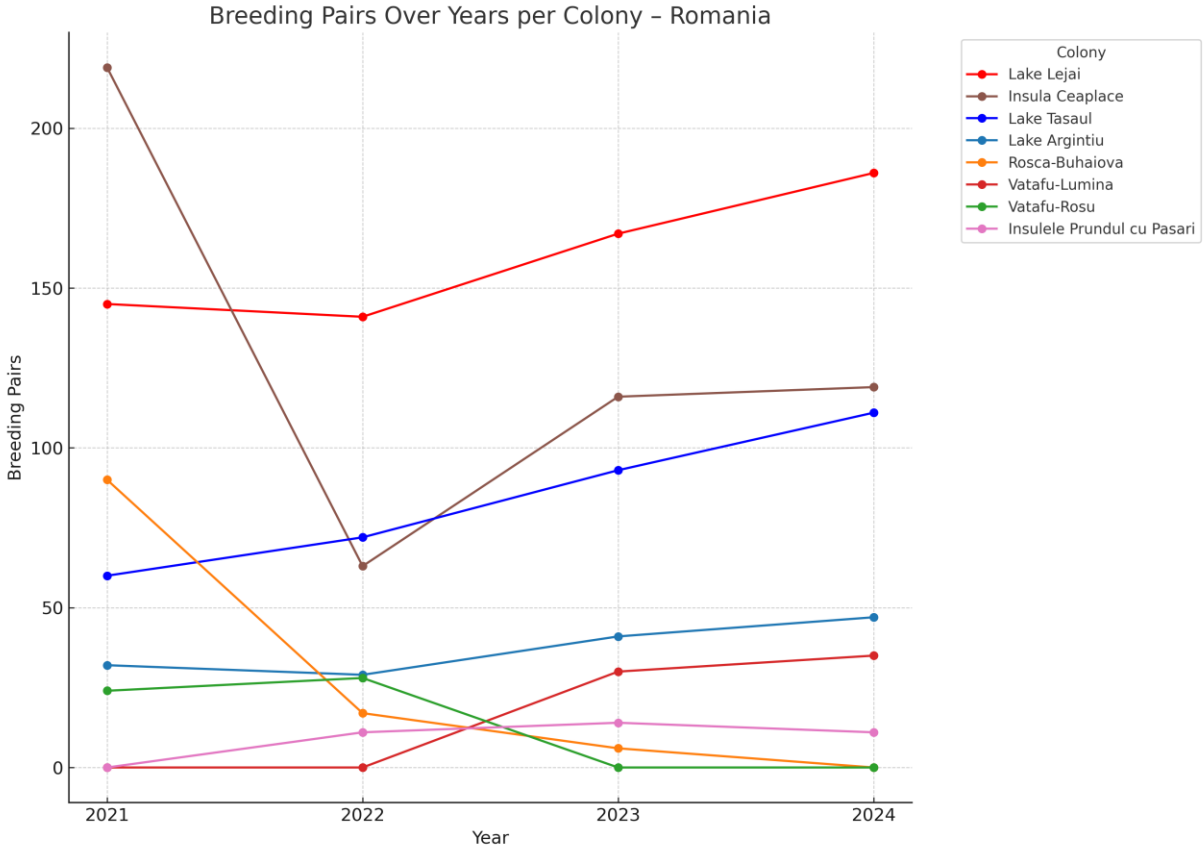

Figure 4: Number of breeding pairs in monitored Romanian breeding colonies

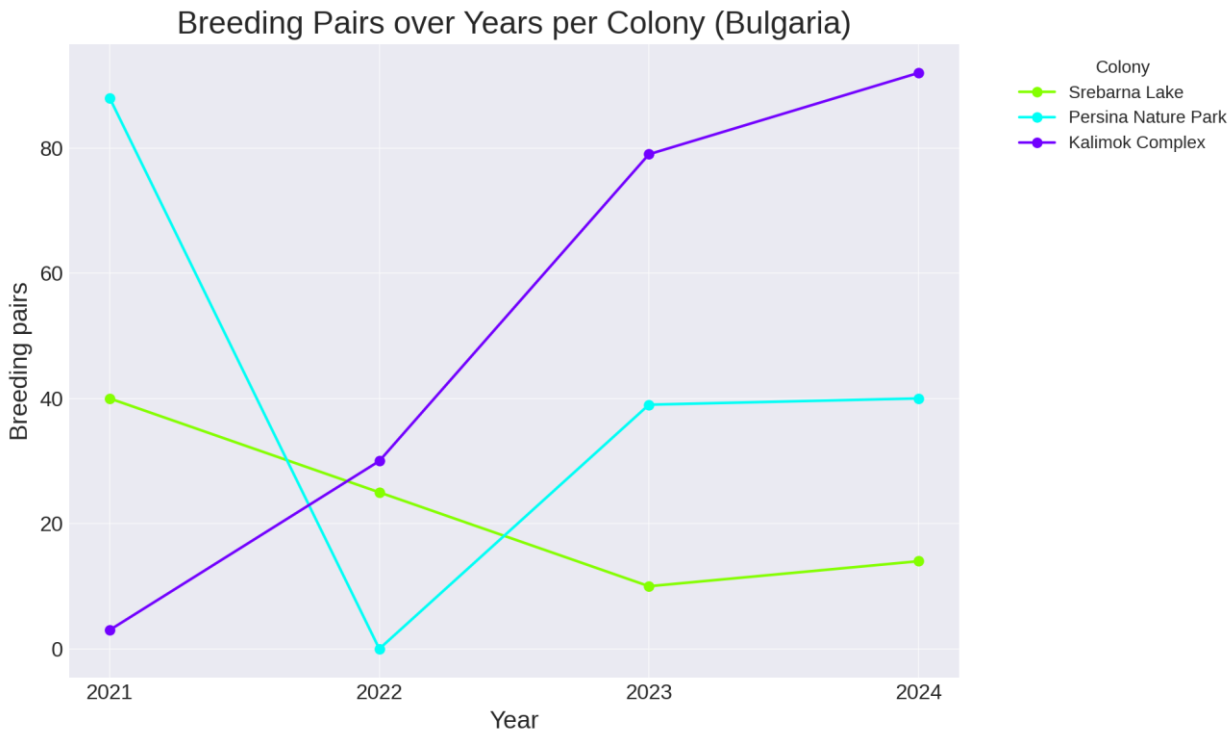

Figure 5: Number of breeding pairs in monitored Bulgarian breeding colonies

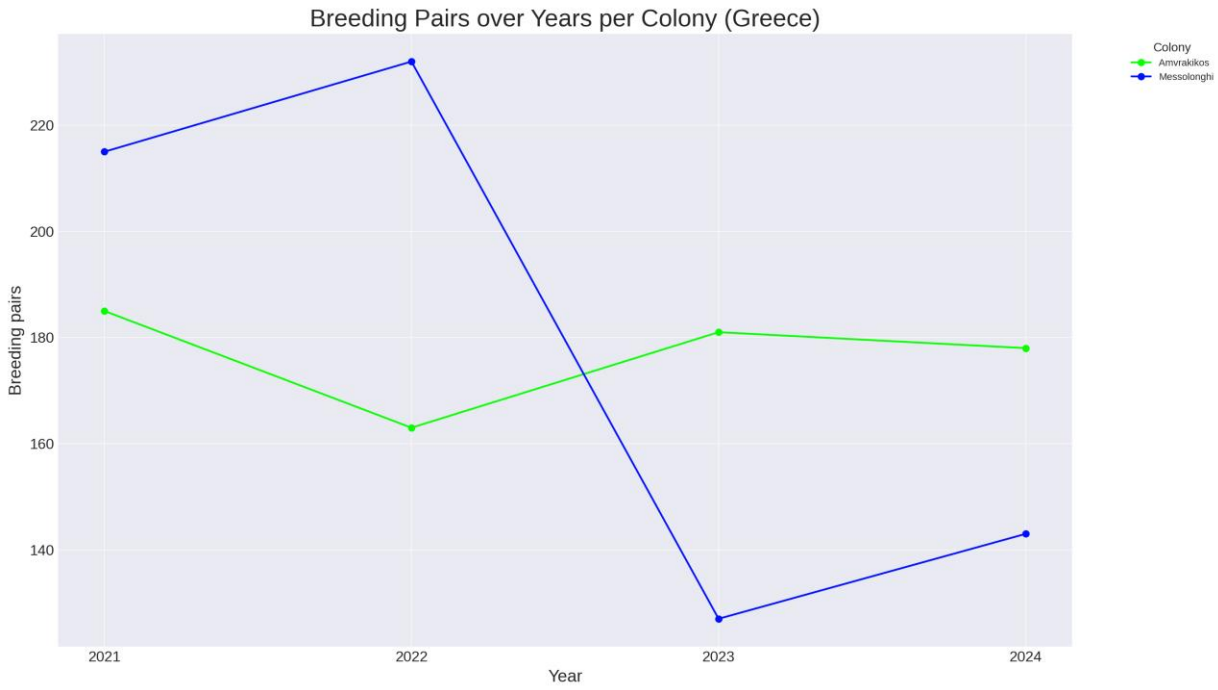

Figure 6: no. of breeding pairs in monitored Greek breeding colonies

Breeding success is a parameter relatively difficult to measure with accuracy due to different factors, but it can still be used as an indicator of the colony's general situation and potential for incurring a population growth. For the purpose of calculating the breeding success, the total number of fledged or nearly fledged young in one breeding colony is measured against the total numbers of nests, and their quotient represents the index for breeding success (no. of fledged or nearly fledged young /nest(pair)). An index of over 1 is generally considered to ensure a population growth in time. For instance, the breeding success across the colonies of Bulgaria seems quite stable and similar (Fig. 7 & 9). Breeding success in Messolonghi also seems stable while Amvrakikos seems to present a slight increase, after a couple of years decreasing, a fact that could be related to the levels of water in the lagoon where they nest (Fig. 7 & 10). Finally, in Romania the breeding success is generally stable in larger colonies, although a decrease was noticed as expected during the 2022 HPAI outbreak as a consequence of adult mortality ((Fig. 7 & 8). Low breeding success has been observed in one smaller colony (Prundul cu Pasari) where generally birds either attempt nesting later in the season in small numbers, or in colonies from where there has been a recent shift of individuals to other locations (Rosca-Buhaiova and Vatafu-Rosu). In all other colonies, the breeding success has been stable or increasing during the past two years.

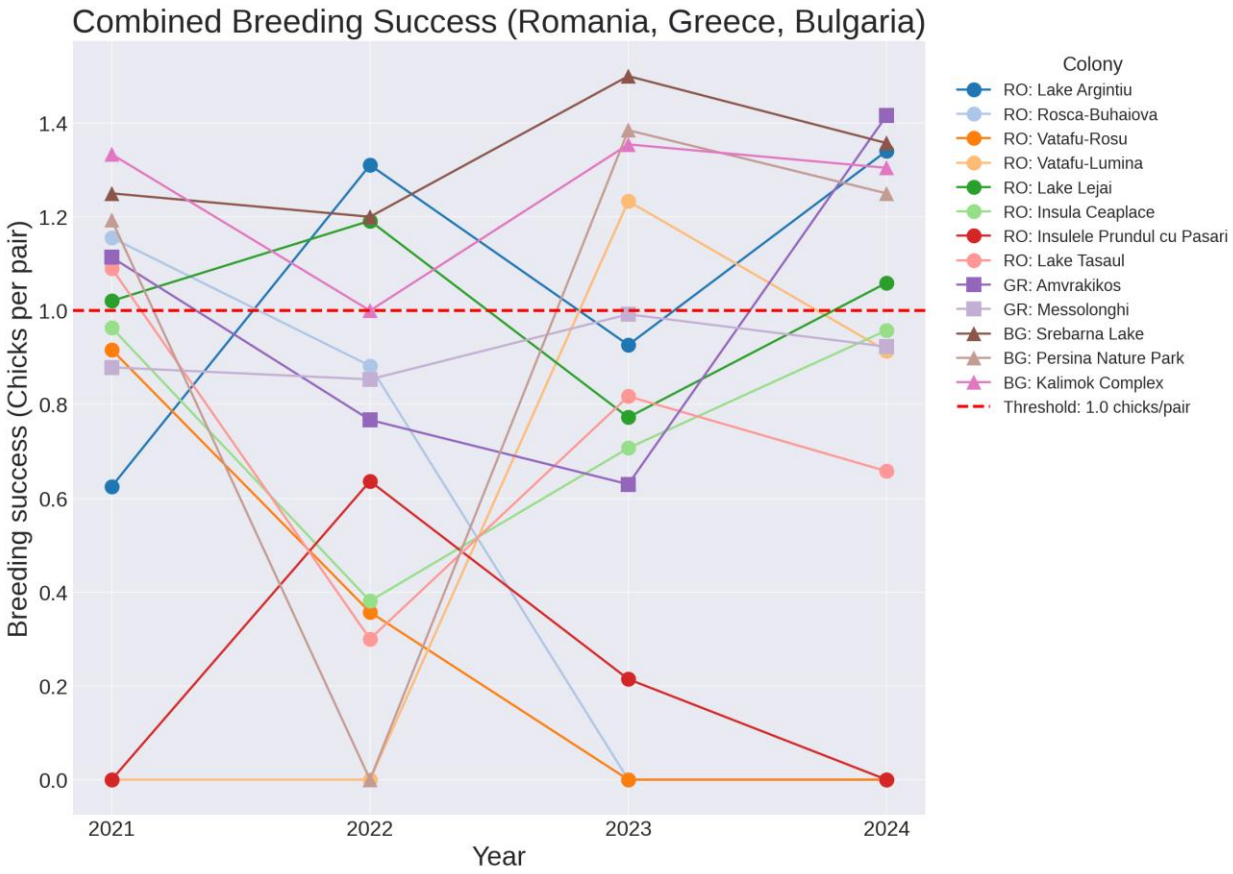

Figure 7: breeding success in all monitored breeding colonies

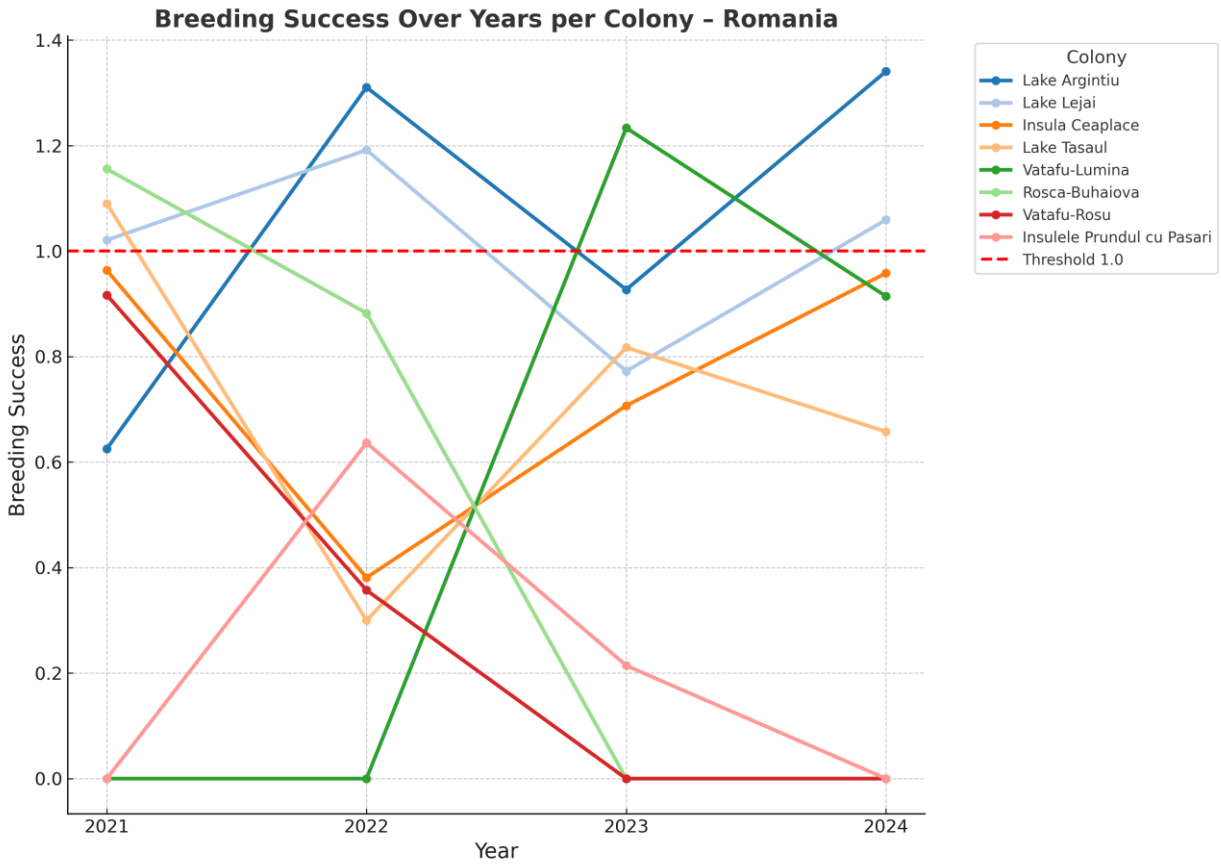

Figure 8: breeding success in Romanian monitored breeding colonies

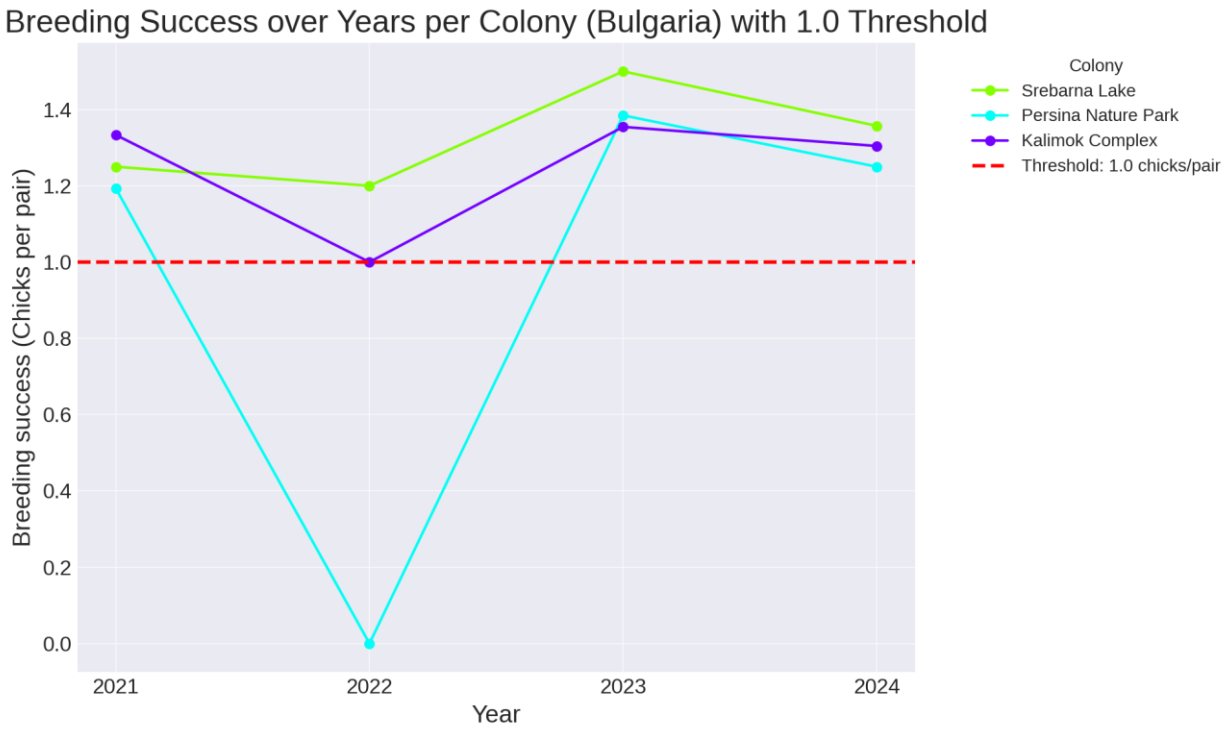

Figure 9: breeding success in Bulgarian monitored breeding colonies

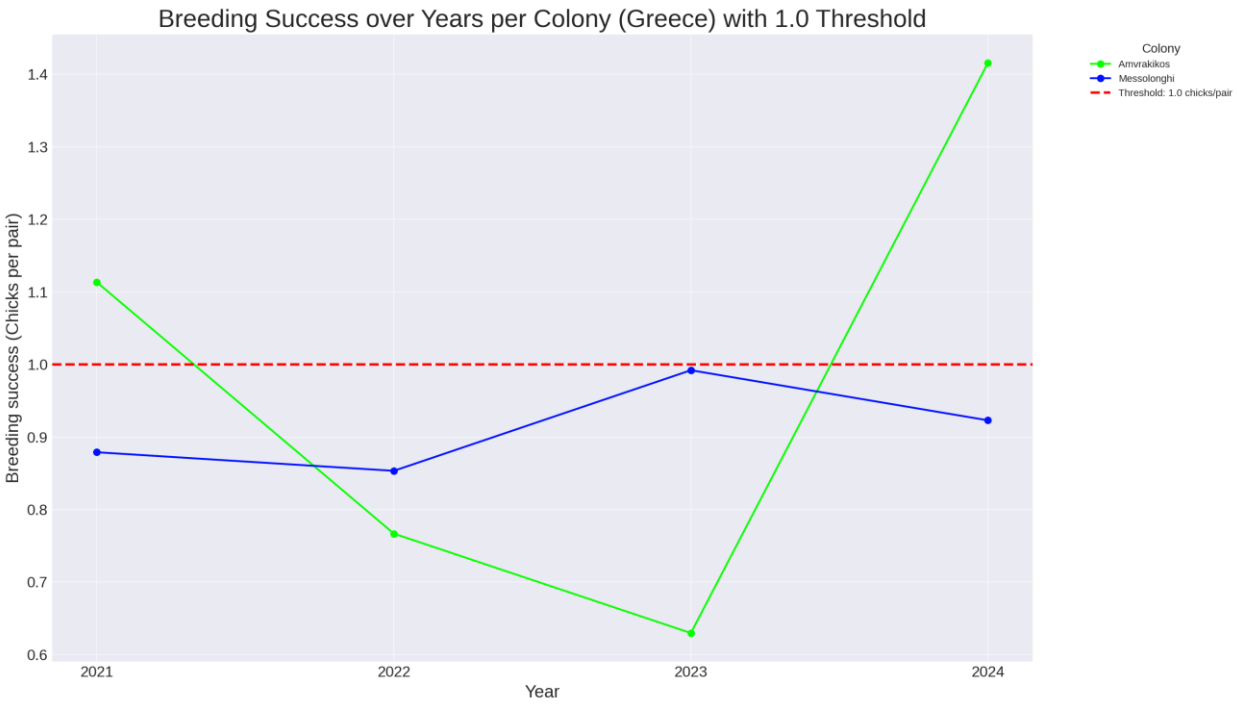

Figure 10: breeding success in Greek monitored breeding colonies

Spring census

In the frame of the project, the partners have been carrying out spring census every year in most of the wetlands across the distribution range of the Dalmatian pelicans, apart from the breeding grounds (i.e. wetlands used by birds for foraging or roosting, including those outside the project areas). The census provides an indicative of the total number of birds present in each country. In addition, the spring census were implemented also in the neighbouring countries (Albania, Montenegro, North Macedonia and Turkey), giving a good overall estimate of Dalmatian pelican population size in southeastern Europe. Population size in Greece suffered a large decrease in 2022 as a result of the HPAI outbreak. Although colonies included in this project (Amvrakikos and Messolonghi), didn't seem to be affected by the outbreak, the colony in Prespa Lake, the largest in Greece, along with others in northern Greece, were severely affected by the disease, and over 2,000 individuals were recorded dead, equating to approximately 40% of the population in Greece. Colonies in Bulgaria were not affected, while in Romania the total number of adult birds that died in the colonies amounted to 158, a figure that represents almost 1/5 of the nesting adults in the Romanian colonies. Most of these, namely 98 cases, were confirmed in the colonies located on Lake Sinoie, and 24 were recorded on Lake Taşaul. The rest of the carcasses were observed during aerial monitoring in the inaccessible colonies of the Danube Delta Reserve, especially on Lake Lejai. It should be noted that although numbers in Turkey may seem to increase over the project years, this merely reflects an increase in the monitoring effort (namely more wetlands were censused) and not a real increase in the population size. Note also that in Ukraine it was only possible to carry out a complete spring census in 2021 due to the current military restrictions.

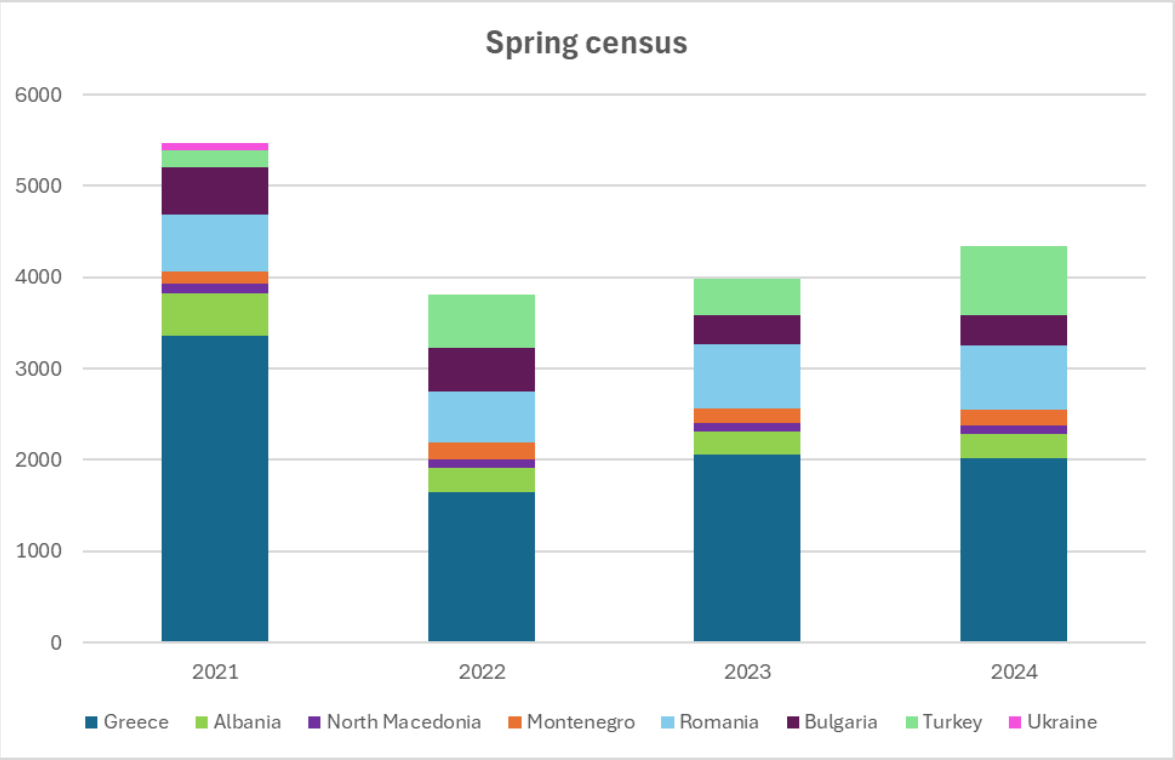

Figure 11: Results of the spring census carried out during the period 2021-2024 in southeastern Europe.

Monitoring of birds through the use of GPS telemetry

A total of 24 birds were tagged with patagial GPS-GSM transmitters, 11 in Bulgaria, 6 in Greece and 7 in Romania. Birds of all ages were tagged, nearly half of them juveniles (11), but also 9 immatures and 4 adults. Out of the 24 birds, 8 have died due to several reasons: entanglement in fishing nets (3), collision with power lines (1), collision with boats (1), shot (1), while for 2 the cause of death remains unknown. One other individual is probably dead too, but its body could not be recovered, so there is a chance the transmitter malfunctioned. All cases of fishing nets entanglement involved Bulgarian birds, but the actual entanglement took place in Bulgaria, Romania and Ukraine. No tagged birds have been found dead in these circumstances in Greece, but the project team has recorded this type of mortality in Greece, so we can conclude that this threat affects the species throughout its range in the Balkans. Although this threat was not totally unknown for the species, the tagging of these birds has helped confirmed the gravity of this threat. The same can be said of collision against power lines. Although only one tagged bird was confirmed to have died this way, a total of 57 Dalmatian pelicans have been recorded by the project team in Bulgaria, Greece and Romania (plus 37 Great White Pelicans in the same power lines).

Tagging birds also allowed us confirm movements among colonies. For instance, birds tagged in Amvrakikos and Messolonghi will visit both colonies and even travel further north to the Kalamas Delta or south to Strofilia wetland, all located on the western coast of Greece, but have never visited colonies in northeast Greece, meaning that the communication and interaction between these two sides of the population is very limited (it has been confirmed to happen, in very low numbers thanks to the use of colour rings). The same applies to colonies in Albania and Montenegro. Birds tagged in Bulgaria though show much more mobility, visiting different wetlands in Eastern Greece (one dying in a power line collision in Greece), Turkey, Ukraine, Serbia and

Romania. Birds tagged in Romania are highly mobile similarly to the ones tagged in Bulgaria, as part of the same population, covering sections of the Danube and adjacent lakes and wetlands along the eastern Black Sea coast ranging from Ukraine (close to Crimea) to Burgas area in Bulgaria. The longest distance travelled by any of the tagged birds was by a juvenile Romanian individual that journeyed 515 km (in a straight line) from the original breeding colony (Ceaplace island) in the lagoon area of the Danube Delta to reach the Iron Gates on the Danube stretch bordering Romania and Serbia.

Apart from the tagged birds, a total of 309 birds were ringed with colour plastic rings in Bulgaria, Greece and Romania. These rings provided several re-sightings, most of them within the same wetlands, but also proved movements to other wetlands within the same country (resightings of birds from Amvrakikos in Kerkini Lake) but even in other countries (a bird from Messolonghi observed in Lake Skadar in Montenegro).

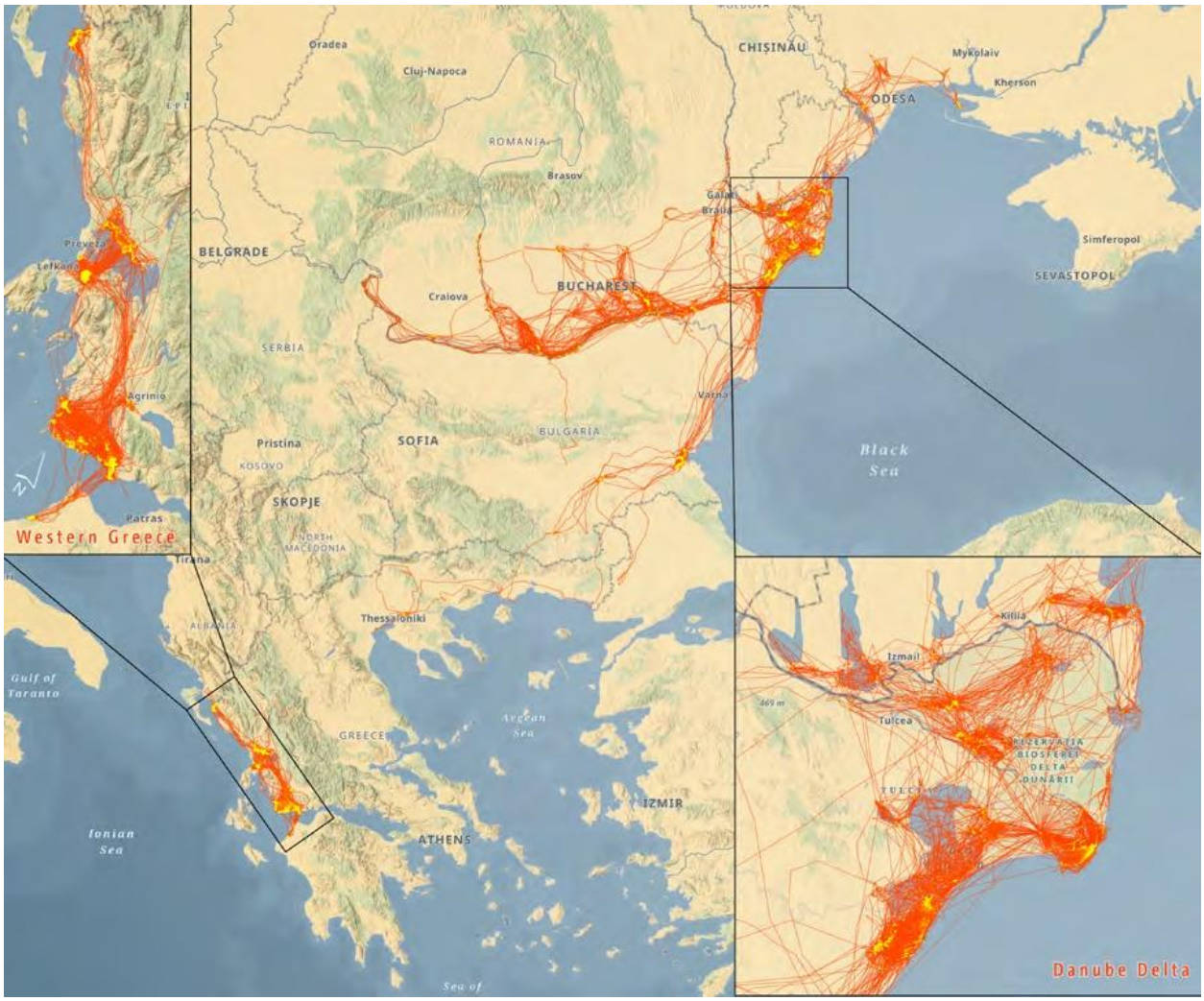

Figure 12: Map of movements of all GPS tracked pelicans to date.

5. Conclusions

Based on the results detailed in this report, it can be concluded that the conservation actions implemented in the project Pelican Way of LIFE, have benefitted the populations of the Dalmatian pelicans in Bulgaria, Greece and Romania.

- Disturbance should still be considered a threat for the breeding success of the species, although it appears to be more severe locally and not in all colonies. Particularly for those colonies where disturbance is more frequent, the patrolling system implemented by the project has helped solved several incidents that may have negatively impacted already breeding colonies, while the increased presence of surveillance surely has hindered other cases of disturbance.
- Direct persecution of pelicans does not seem to be a major threat for the species, although cases of persecution of other wetland species were recorded, as well as the shooting of a Bulgarian tagged bird in Ukraine. A more detailed study of this threat needs to be carried out in all Balkan countries in order to assess in much more detail the impact of this factor on the species. Recently a case was recorded of a GPS tagged Great White pelican shot in Turkey, and one can imagine that similar actions could also potentially impact Dalmatian pelicans.
- Illegal fishing is an underestimated limiting factor that could probably have a much larger impact on the species. Three of the eleven transmitter-tagged Bulgarian Dalmatian pelicans died as a result of entanglement in fishing nets in Bulgaria and Romania. More detailed investigation of this threat is required to reveal its regional scale.
- In Ukraine, the military action was probably the main disturbance to the Pelicans, on the other hand, ban for fisheries and civil visits to the outer delta have much decreased disturbance to the pelicans since 2022 by fisheries and tourism. However, two dead pelicans found in the outer delta during the course of the project might suggest impacts of military action, which needs to be further investigated when the access to the area will be restored.
- The establishment of nesting platforms at selected wetlands were adequate and safe natural nesting substrate is lacking or limited has proven to be a highly effective conservation action, increasing the number of breeding pairs to 146 in the Bulgarian project areas where they were used. These platforms also provide safe roosting areas for the birds, widely accepted by the birds. The need to create or enlarge the platforms already created should be assessed, particularly in the light of the avian flu disease.
- Actions such as the spring census have helped to coordinate and bring together pelican researchers and conservationists from neighbouring countries. It has allowed to gather systematic data not available until now and shed light on the presence and numbers of the species in areas were knowledge until now was limited (e.g. Turkey). The project has helped encourage pelican conservation in these countries and bring the species to the spotlight.
- Although total numbers of birds have decreased in the region due to the impact of the HPAI outbreak in 2022 particularly in Northern Greece, the majority of colonies where the project was implemented have succeeded to remain fairly stable and so has the breeding success.

The population size in Greece, the largest one in all the region, will take years to recover completely from the impact of the avian flu and reach the numbers prior to 2022, but thankfully, the first signs of recovery can already be noticed and as long as there are no other major outbreaks the slowly increasing trend is expected to continue.

- The trends of pelican numbers in the northern Danube Delta on the Ukrainian side remains unknown due to military actions and restrictions for visits to the most important areas for the Dalmatian pelicans in this part of the region. However, continued presence and occasional breeding (2019 and one young bird observed on the Danube lakes in 2024) suggest that this part of the range remains important for the population of Dalmatian pelican in the region.
- The project has provided insights into the movements of the birds across three countries and revealed limited exchange between certain colonies (for instance, colonies in Western Greece and the rest of Greece). It remains to be further studied if this could have any implications in genetic flow, but on the other hand, in the current situation of avian flu (and potentially other diseases) it could mean that risk of disease spreading among colonies may be restricted for some colonies.

6. Photographic Annex

Dalmatian Pelican breeding colony in Amvrakikos Gulf, Greece (photo: Natalie Clements/ RE).

Ringing of Dalmatian Pelican chicks in Amvrakikos Gulf, Greece (photo: Natalie Clements/ RE).

Dalmatian Pelican chick ringed in Amvrakikos Gulf, Greece (photo: Natalie Clements/ RE).

Tag and protocols used to tag Dalmatian pelicans (photo: Lila Deroungeri/ HOS).

Dalmatian Pelican juvenile tagged in Messolonghi Wetland, Greece (photo: Victoria Saravia-Mullin/ HOS).

Drone photograph of Dalmatian Pelican colony in Amvrakikos Gulf, Greece (photo: Aris Manolopoulos/ HOS).

Peschina Marsh (Persina Nature Park) with the wooden platforms (photo: Svilen Cheshmedzhiev/BSPB)

Patrolling activities along the Danube River in Bulgara (photo: Svilen Cheshmedzhiev)

Construction of a wooden platform in Kalimok-Brushlen Protected Are (photo: Georgi Georgiev/BSPB)

Breeding colony in Kalimok-Brushlen Protected Area (photo: Damayn Petkov/BSPB)

Breeding colony in Kalimok-Brushlen Protected Area (photo: Damyan Petkov/BSPB)

Construction of a floating platform on Ermakiv island in Ukraine (photo: Andriy Nekrasov/Rewilding Europe)

Two floating platforms built in the outer Danube delta in Ukraine (photo: Maxim Yakovlev/Rewilding Europe)

Drone image of the colony at Lake Tasaul in 2024 (photo: Sebastian Bugariu/SOR)

Aerial image for census of the colony at Ceaplace island in 2022 (photo: Sebastian Bugariu/SOR)

Aerial image for census of the colony at Lake Lejai in 2022 (photo: Sebastian Bugariu/SOR)

Assessing the mortality caused by the Avian Influenza outbreak in Lake Tasaul colony in 2022 (photo: Sebastian Bugariu/SOR)

Ultralight aircraft used for aerial surveys (photo: Sebastian Bugariu/SOR)

Ringing of chicks at Tasaul colony (photo: Ioana Cobzaru)

Tagging pelicans at Sinoe lake (photo: Sebastian Bugariu/SOR)