



Conservation Measures and Dynamics of Breeding Birds in Pomorie Lake for the Period 2021–2023

Dimitar V. Popov¹, Galina D. Meshkova¹, Irina Kirova¹ & Ivailo Klisurov²

¹Green Balkans NGO, www.greenbalkans.org, 4004 Plovdiv, 1 Skopie str., Bulgaria; Bulgaria, Plovdiv 4004, 1 Skopie str.

²Green Balkans – Stra Zagora NGO, 30 Boruygrad, Stara Zagora, Bulgaria

Abstract: Pomorie Lagoon is one of Bulgaria's most important breeding sites for bird species of order Charadriiformes. Various factors have impacted the breeding birds at the lagoon in recent years, leading to a gradual decrease in their numbers. Conservation activities to restore vital infrastructure for hydrological regime management and habitat for breeding birds were made in 2021-2023. A survey of key breeding bird species was conducted to evaluate the effect of these activities. The Pied avocet (*Recurvirostra avosetta*) and Common tern (*Sterna hirundo*) were the species that mainly benefited from the restored breeding habitat. The Little tern (*Sternula albifrons*) and Kentish plover (*Charadrius alexandrinus*) had a stable number of breeding pairs. The Black-winged stilt (*Himantopus himantopus*) was the species that had the most negligible benefit from restoration activities. Sandwich tern's (*Thalasseus sandvicensis*) breeding pairs have fluctuated throughout the study period, with the lowest number for the site recorded in 2023. Pomorie Lake is the most important site for the Sandwich tern in Bulgaria, meaning that negative impact threatens the species' breeding on a national level. Managing the hydrological regime is the leading conservation measure to protect breeding birds' populations.

Key words: Sandwich tern, Pied avocet, Common tern, Kentish plover, conservation measures, habitat restoration

Introduction

Lagoons are essential habitats for birds that act as valuable indicators for the condition and quality of these wetlands (FARINOS et al., 2003). Saltpans, with their human-made dykes, provide suitable breeding sites for the birds of order Charadriiformes that are nesting on the ground. Pomorie Lake is a natural hypersaline lagoon along the Bulgarian Black Sea coast, partly modified by human activities for sea salt harvest and medicinal mud use. The site's recently updated checklist comprises 297 bird species, 70 of which are breeding (POPOV et al. 2023).

A management plan for the site was developed in 2008-2010 (RADEV et al. 2010). Despite not being legally approved, it provided the scientific basis for setting conservation goals and objectives and identifying management actions for achieving them. These included a hydrological regime based on saline water circulation by the saltworks that provide a salinity gradient in the different basins and conservation actions for identified key species of the site. The plan described the lagoon as the only regular breeding site in Bulgaria for the Sandwich tern (*Thalasseus sandvicensis*) and second most important for the Pied avocet (*Recurvirostra avoset-*

*Corresponding author: dpopov@greenbalkans.org

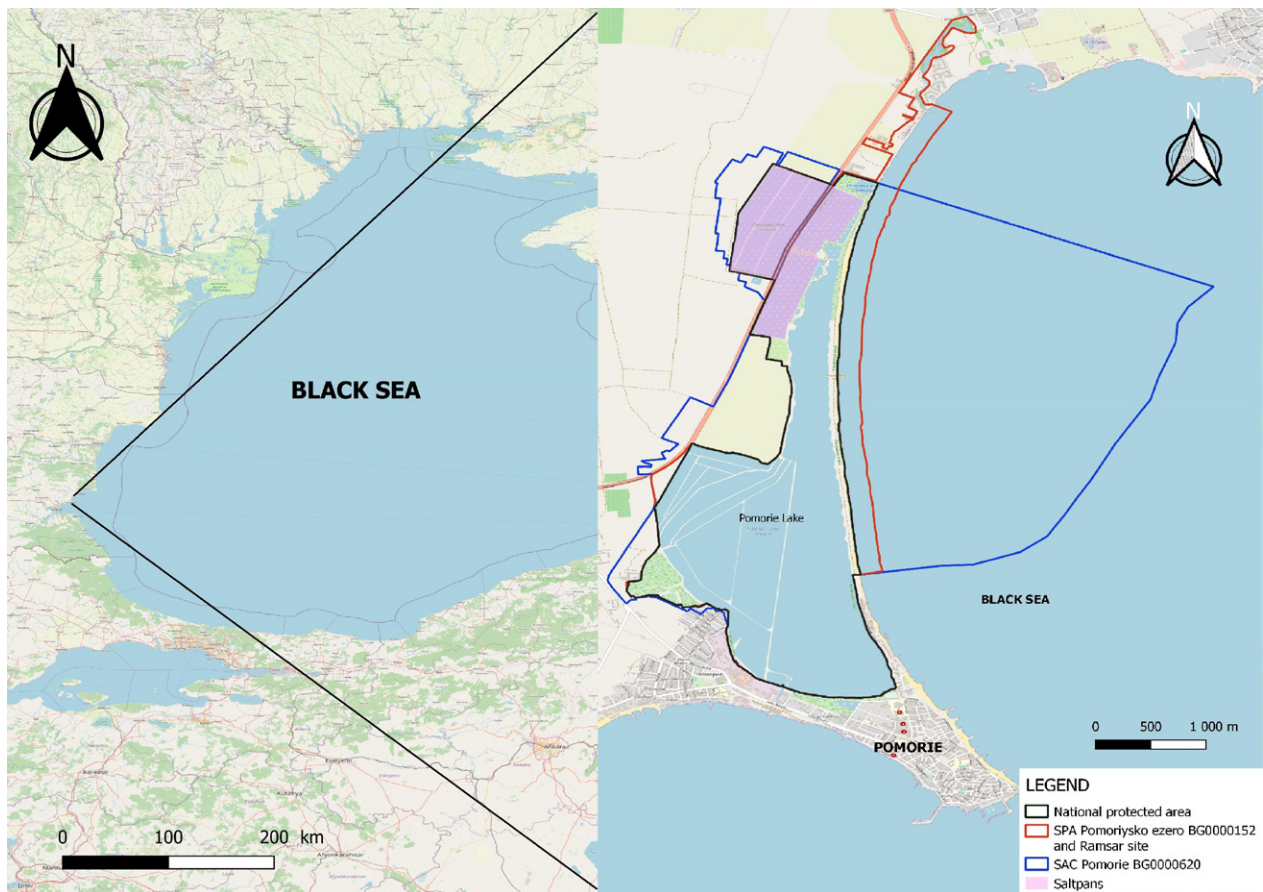


Fig. 1. Map of Pomorie Lake.

ta), Black-winged stilt (*Himantopus himantopus*), Kentish plover (*Charadrius alexandrinus*), Common tern (*Sterna hirundo*), Little tern (*Sternula albifrons*), and Shelduck (*Tadorna tadorna*) which were identified as key species for conservation (PROFIROV et al. 2010a).

Pomorie Lake has undergone negative changes in the past decade: heavy rains and floods in 2014 and 2015 have blocked protective bypass channels that drain surface fresh water and prevent its inflow into the lagoon. Mud and undesired vegetation blocked the channels, significantly decreasing their capacity and protection functions. The compromised infrastructure led to reduced salinity, which threatened the operation of the saltworks. The disrupted hydrological regime limited available habitats for breeding target bird species and caused a shift in bird species composition (from Charadriiformes to Anatidae) during migration and winter. To reverse these negative changes, protective drainage canals were restored from March 2021- April 2023. A habitat for breeding target bird species in the form of wood-silt islets was restored during conservation camps in September 2021 and 2022, and a new wooden platform was created in September 2022. The current

article presents the results from the survey on the nesting water birds of order Charadriiformes in Pomorie Lake in that period. The study aimed to evaluate the effect of the specific conservation measures implemented during the project targeting key breeding species of water birds at the site.

Materials and Methods

Study site

Pomorie Lake is part of the largest wetlands complex in Bulgaria – the Burgas Wetlands Complex on Southern Bulgaria’s Black Sea coast. The size of the lagoon is 760 ha. It is designated as a national protected area (Protected Site, IUCN Category V in 2001), Natura 2000 sites (Special Protection Area BG0000152 Pomoriysko ezero in 2009, Special Area of Conservation BG0000620 Pomorie in 2020), Ramsar site (2002) and Important Bird Area (1989). A significant part of the site is a shallow coastal hypersaline lagoon connected to the Black Sea by an artificial canal. Other associated wetland types are estuaries (River Akheloy to its north), salt marshes, sand dunes, reed beds, saltpans, large inlets, etc. A system of internal dykes, built for the

Table 1. Target values, data in SDF, and observed number of breeding pairs for key bird species.

Species	Target number of pairs	SDF of SPA Pomoriysko ezero	Number of pairs in 2021	Number of pairs in 2022	Number of pairs in 2023
Sandwich tern (<i>Thalasseus sandvicensis</i>)	1300-2000	176-1000	944	1436	283
Common tern (<i>Sterna hirundo</i>)	60-100	15-120	342	161	133
Little tern (<i>Sternula albifrons</i>)	10-20	15-40	42	38	53
Kentish plover (<i>Charadrius alexandrinus</i>)	5-20	6-20	12	14	14
Pied avocet (<i>Recurvirostra avosetta</i>)	60-100	31-64	36	95	123
Black-winged stilt (<i>Himantopus himantopus</i>)	40-80	5-35	26	23	53

saltworks' operation together with drainage canals collecting surface fresh waters (including Pazariolu/Kamenarska Stream) and a canal connecting the lagoon to the Black Sea, define this wetland's hydrological regime, managed mainly by the circulation of water for sea salt production (Figure 1).

Survey design and data collection

The survey used standard methodology to study ground-nesting birds in wetlands (O'BRIEN & SMITH, 1992). Visual observations by telescope covering all possible breeding sites were made three times per month in the period April – August to determine occupancy of suitable nesting sites – coast, internal dykes, islets, and wooden platforms. A complete tour on foot of the coast and suitable nesting sites (internal dykes) was made twice per month in the period May – June to lower possible disturbance. The survey covered three full breeding seasons in April 2021 – August 2023. In addition, a drone survey (DJI Mavic 2 Enterprise) of identified breeding colonies was carried out twice for each breeding season so that each observation could be confirmed and validated to avoid bias in the results – once at the beginning of the breeding season and once at its peak. The video and still images were collected to estimate several breeding birds better. The study aimed at the site's six key species: Sandwich tern, Pied avocet, Black-winged stilt, Common tern, Little tern, and Kentish plover. The first three species' breeding populations covered the Ramsar criteria (PROFIROV et al. 2010a), while the breeding habitat restoration actions were aimed at terns and avocet. Target values of breeding pairs for each species have been set based on existing data from previous similar study at the site (PROFIROV et al., 2010b).

Results

Table 1 presents the number of breeding pairs in all three years of the study, together with set target values and ecological information in the Standard Data Form (SDF) of SPA BG0000152 Pomoriysko ezero. Information for each of the key species is presented below.

Sandwich tern (*Thalasseus sandvicensis*)

During the study, the Sandwich tern showed large fluctuations in breeding numbers. In early June 2021, 1,094 pairs were registered at the site. Those were the main colony of 944 pairs on the existing wood-silt islet in the southern part of the lagoon, and approximately 150 pairs were observed on wooden platforms in the western part of the lagoon, which was abandoned a week later (Figure 2). Ultimately, the breeding population in 2021 was estimated to be 944 pairs.

The first restoration of the wood-silt islet in September 2021, combined with favourable meteorological conditions in the spring of 2022, resulted in a larger available nesting surface of 460 m². The number of breeding pairs of Sandwich terns in the colony in 2022 was 1,436, representing a more than 50% increase annually compared to 2021 (Figure 3). However, breeding success was low, and at the beginning of July, less than 100 alive chicks were counted, with numerous dead (more than 70). At the end of July, no adults were present, and mass mortality of chicks was recorded, with at least 100 dead. At the end of August, when the colony had permanently left the islet, a site visit was made, and a minimum of 320 dead chicks were counted together with 10 adults (one being ringed in Ukraine).



Fig. 2. Locations of Sandwich tern breeding pairs at Pomorie Lake in 2021-2023.



Fig. 3. Sandwich tern colony on a wood-silt islet in 2022.



Fig. 4. Sandwich tern colony on an old concrete wall in 2023.

The estimated mortality rate for chicks was approximately 90%.

Conditions in the winter and spring of 2023 were relatively good, but in May, the water level started to increase, flooding almost completely the restored islet. High water did not drop until August. The available surface was limited to less than 60 m². Sandwich terns have occupied remains of the old concrete wall adjacent to the islet (Figure 4), dykes in the Salt Museum's salt pans, and another small islet there with a total number of 283 pairs.

In 2023, the lowest number of Sandwich terns breeding in Pomorie Lake for more than 20 years was recorded. Some hatchlings were observed in mid-June, but heavy rain on June 20 led to the complete abandonment of the colony and failed breeding attempts.

Common tern (*Sterna hirundo*)

The Common tern was the second most numerous species in the current study after the Sandwich tern. In late May and early June 2021, we recorded 141 pairs. Wooden platforms in salt pans and the south-

western part of the lagoon hosted 64 (Figure 5). With the drying out of salt pans, the platform there was abandoned while the rest of the platforms were occupied shortly by Sandwich terns that chased away the Common terns. In the salt pans of the Salt Museum, 74 pairs were nesting – 42 on an islet and 32 along dykes – and the other 3 pairs were recorded on internal dykes. Heavy rains in June have caused flooding of nests, and in July, the number of pairs in the Salt Museum salt pans has decreased to approximately 50 pairs. At the beginning of July, thanks to a drone survey, another colony was detected on an islet formed from eroded dykes. An additional 292 pairs were mixed with approximately 40 Little terns. Summarised, breeding pairs in 2021 were estimated to be 342. A mid-August visit to the larger colony (292 pairs) on this islet revealed breeding success there was relatively low, with many abandoned nests and eggs (at least 50%).

At the beginning of June 2022, 161 Common tern pairs were recorded incubating at the SPA. The highest number was again occupying the islet formed from eroded dykes (76 pairs), and other

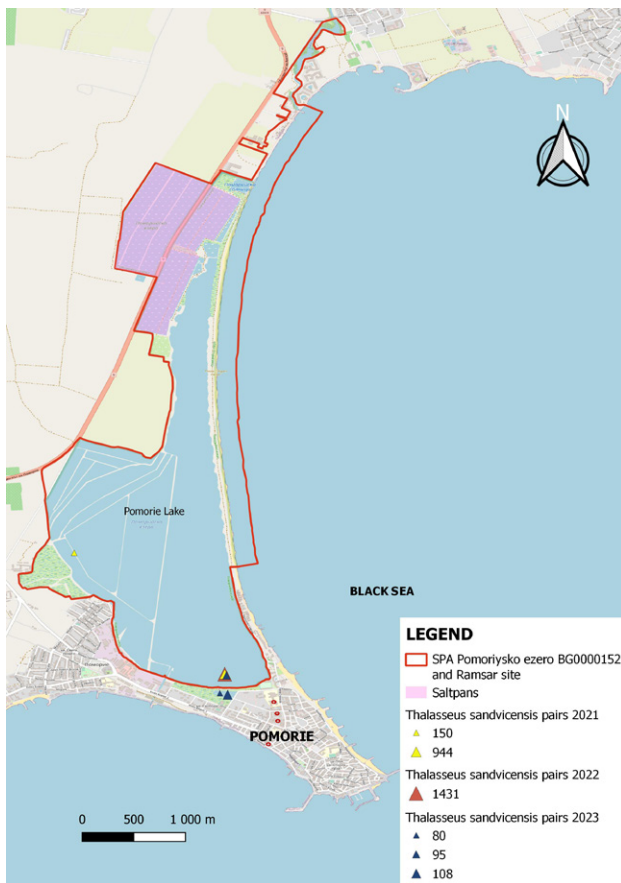


Fig. 5. Locations of Common tern breeding pairs at Pomorie Lake in 2021-2023.

concentrations were at the saltpans of Salt Museum (with 56 mainly using the small islet there) and the islet occupied by the Sandwich tern colony (23 pairs) (Figure 5).

At the end of May 2023, a total of 133 pairs have been recorded at the SPA. The highest number was again occupying the islet formed from eroded dykes – 105 pairs, 12 pairs were nesting on the wooden platforms (10 of these on the newly-built one), 13 were nesting on the repaired wood-silt islet and only three were in the Salt Museum’s saltpans. At the beginning of July, the eroded dykes’ islet was abandoned entirely, and the majority of pairs (66) moved to the restored wood-silt islet while in the museum’s saltpans number of pairs increased to 16 (Figure 5).

Little tern (*Sternula albifrons*)

At the end of May 2021, 19 pairs of Little terns were observed in single pairs or groups of 2 and a maximum of 5 nests. The unstable weather in June caused failure in breeding for most of these. At the beginning of July, a higher number of pairs was observed (42) on an islet formed by eroded dykes together with Common terns (Figure 6). Later inspec-

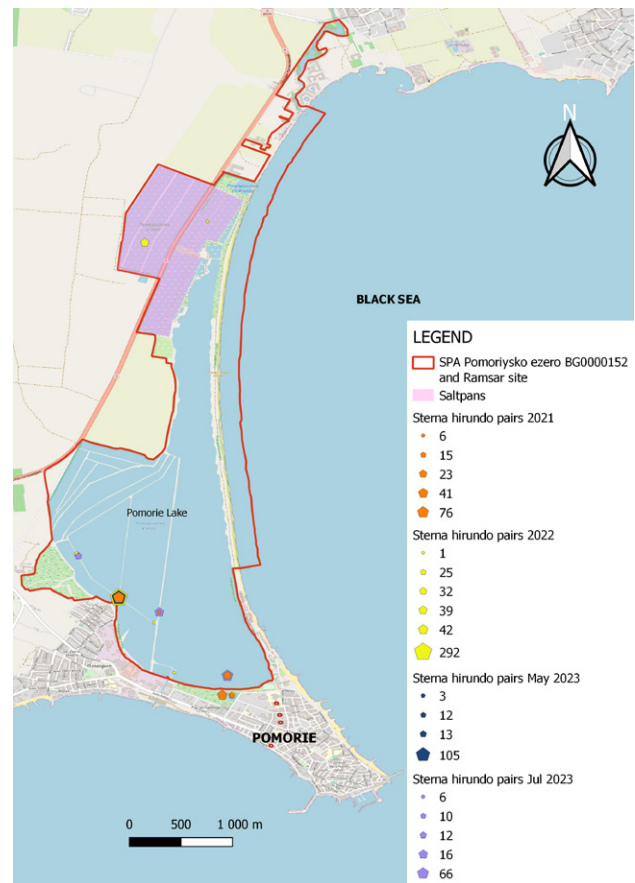


Fig. 6. Locations of Little tern breeding pairs at Pomorie Lake in 2021-2023.

tion in mid-August revealed that about 30% of the nests were abandoned. Breeding pairs for 2021 were estimated to be 42 in total.

Weather conditions in 2022 have been favourable, and at the beginning of June, 38 pairs of Little terns were observed. Most of these were nesting again on the eroded dykes islet, and smaller numbers nested in the saltpans of the Salt Museum and along one of the internal dykes in the lagoon (Figure 6).

Although bad weather conditions in 2023 heavily affected the Sandwich terns’ colony breeding on the wood-silt islet, the number of breeding pairs of Little terns did not decrease. At the end of May, we counted 59 breeding pairs (80% nested on the eroded dykes’ islet while the rest were at Salt Museum’s saltpans) (Figure 6).

Pied avocet (*Recurvirostra avosetta*)

During the 2021 breeding season, only 36 pairs of Pied avocets were registered. The main breeding sites were the wood-silt islet and Salt Museum’s saltpans (Figure 7) due to adverse weather conditions (low temperatures and heavy rains) that caused mass failure in breeding in May when only 21 were

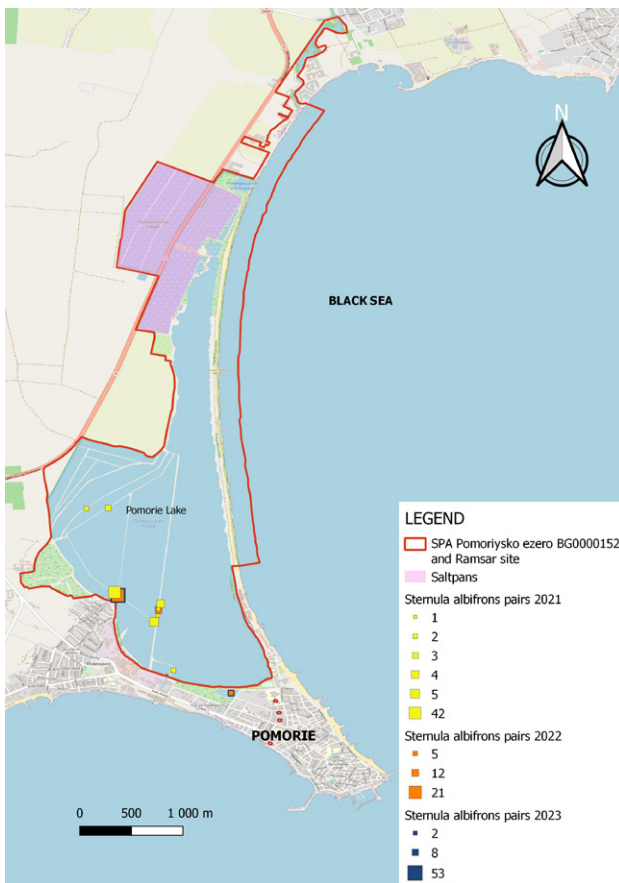


Fig. 7. Locations of Pied avocet breeding pairs at Pomorie Lake in 2021-2023.

found in the site being the lowest number for that time of the year in the past 20 years. The 8 pairs attempted to breed on wooden platforms but were soon chased away by Sandwich terns. No nests have been registered on the inner dykes of the lake, which are usually the main nesting habitat of the species.

The breeding season in 2022 was much more successful for the Pied avocets at Pomorie Lake. The restored islet provided the main nesting site for the species, with 49 pairs breeding there. Additional important sites were again the wooden platforms and the salt pans of the Salt Museum, with respectively 7 and 11 pairs (Figure 7).

In 2023, the positive trend for the recovery of breeding numbers of Pied avocets at Pomorie Lake has been kept. Islet formed by eroded dykes was the main nesting location, where 58 pairs were counted at the end of May. The total number of nesting pairs in Pomorie Lake in 2023 was recorded as 123 – the highest during the study (Figure 7). The newly-created wooden platform during the conservation camp in 2022 was occupied by 12 pairs, with another 19 using the three older platforms nearby (Figure 8).

Black-winged stilt (*Himantopus himantopus*)

During the breeding season of 2021, 26 pairs of Black-winged stilts were registered in the SPA. This



Fig. 8. Pied avocets and Common terns breeding on a new wooden platform in 2023.

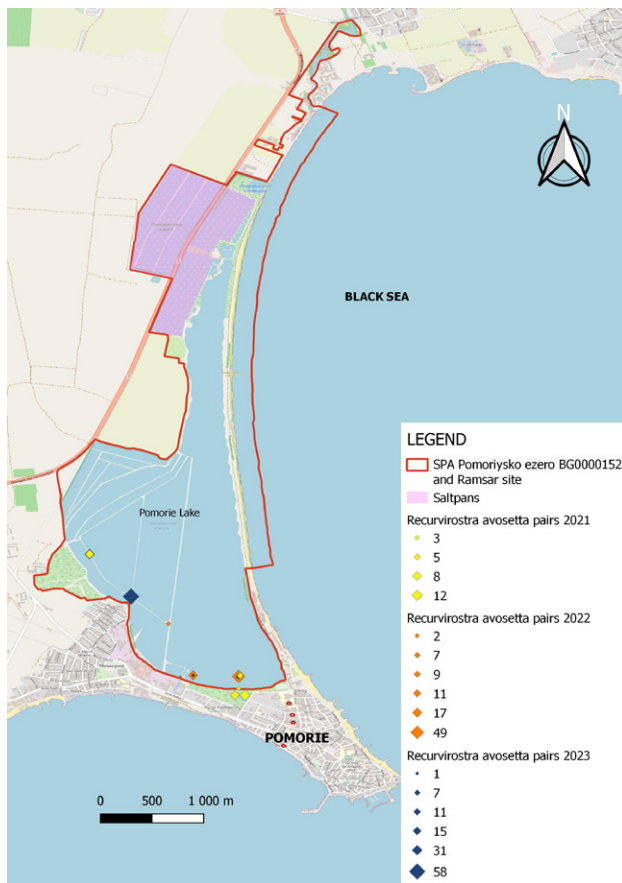


Fig. 9. Locations of Black-winged stilt breeding pairs at Pomorie Lake in 2021-2023.

number later decreased by 80%, with nests seeming affected by predation or flooding, as no chicks were detected.

The next breeding season, 2022, confirmed the negative trend, and only 23 pairs were recorded in the SPA. Distribution was similar to in 2021, with most nests situated in the southern part of the lagoon, including the salt pans of the Salt Museum.

In total, 53 pairs were recorded at the site in 2023, with 80% of these nesting on the islet formed by eroded dykes (Figure 9). Despite that relatively high number of nesting pairs, the breeding success was low as that islet was completely abandoned at the beginning of July.

On the restored islet in front of the Salt Museum, two pairs nested each of the three years.

Kentish plover (*Charadrius alexandrinus*)

During the breeding season in 2021, there were 12 pairs of Kentish plovers registered in the SPA. Most of these (7 pairs) were in the salt pans, where chicks were also observed, and the rest were recorded along the sand spit separating the lagoon from the sea (Figure 10).

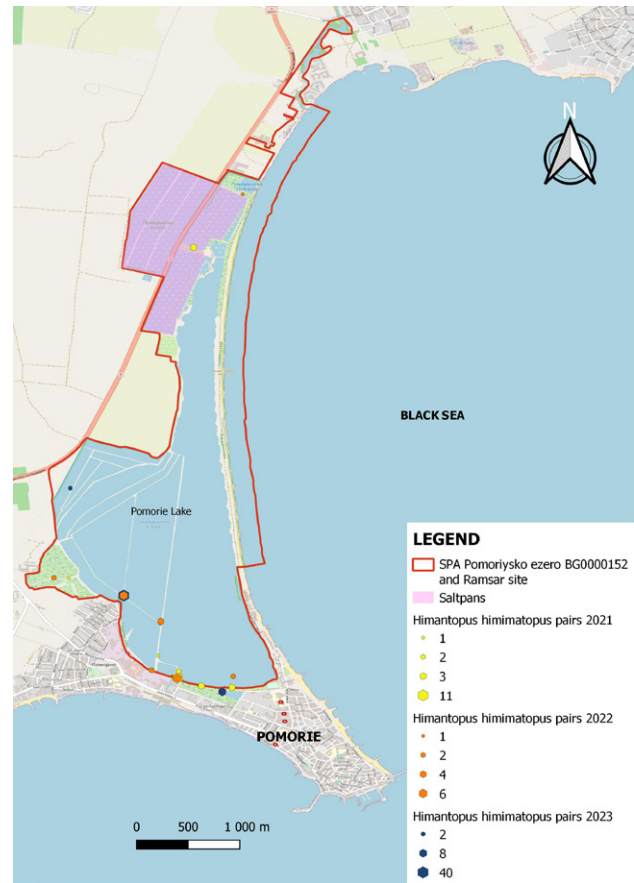


Fig. 10. Locations of Kentish plover breeding pairs at Pomorie Lake in 2021-2023.

During the breeding season in 2022, 14 pairs were registered in the SPA all along the sand spit and dunes. No breeding pairs were observed in the dry salt pans (Figure 10).

During the 2023 breeding season, in the second part of May, 14 pairs were again registered in the SPA. A visit at the beginning of May showed more than 20 pairs in the sand spit and dunes (Figure 10), demonstrating breeding behaviour, but probably some of these birds were still on migration.

Discussion

Habitat loss is a primary factor in the decline of bird species in many regions globally (KIRBY et al. 2008). Water-level management is widespread and illustrates how contemporary climate can interact directly and indirectly with numerous biological and abiotic factors to influence the nesting success of bird species (COSTA et al. 2016). In 2021, it was the first year when the Pomorie saltworks had not operated, and the water circulation was stopped entirely. The main reason for that disruption of the hydrological regime was the construction of a new road just west

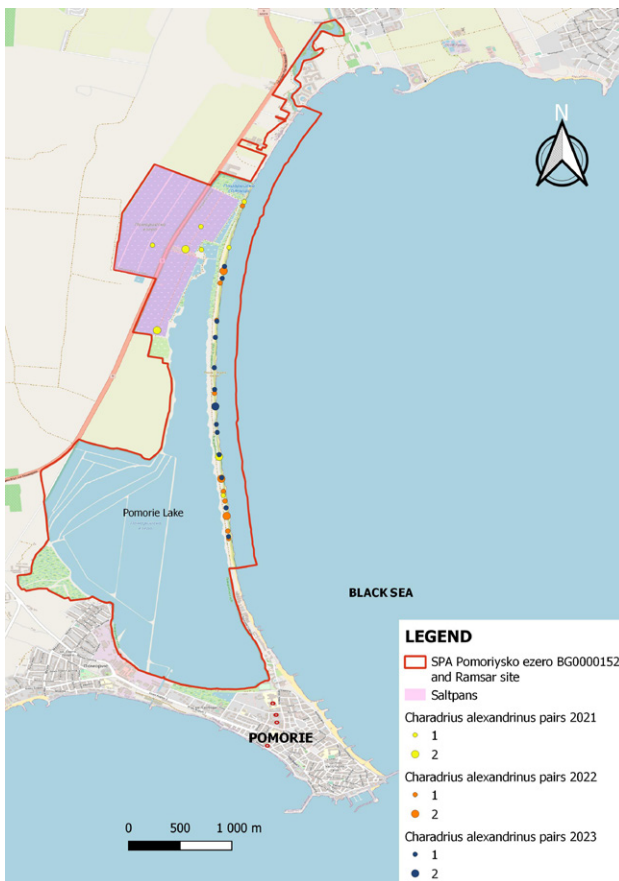


Fig. 11. Sandwich tern colony on a wood-silt islet in 2021.

of the lagoon and the destruction of a swamp acting as a retention basin. In addition, the Pazariolu/Kamenarska Stream was diverted to flow directly into the lagoon, causing a significant decrease in water salinity. That undermined significantly the restoration of protective drainage canals. During the study, it was noted that the saltpans progressively dried out by evaporation, and since May 2021, these basins (saltpans) have been completely dry. Consequently, the water level in the main part of the lagoon was not regulated due to a surplus of water that was not pumped into the saltpans. That was evident in 2021, when the available area of wood-silt islets was only 220 m² (Figure 11).

A small area combined with relatively cold spring and high rainfall was the main reason for a low number of breeding Sandwich tern pairs in 2021. In 2022, mass mortality of chicks in the Sandwich tern colony was observed. One hypothesis for that was related to the highly pathogenic Avian Influenza outbreak that has heavily affected Sandwich tern colonies in Northwestern Europe (Knief et al., 2024). Another potential factor that should be considered was the Russian invasion of Ukraine, which started in February 2022. The negative impact of the

war on several coastal protected areas was reported by Ukrainian researchers (Tsaryk & Kuzyk 2022). The largest Sandwich tern colonies in the basin are located along the Ukrainian Black Sea Coast and the Sea of Azov coastline. A low number of locally observed hatched and ringed birds (only 5 compared to a mean of 17 in the previous decade) at Pomorie Lake in 2022 could be caused by the occupation of the islet, mostly by birds originating from the northern part of the Black Sea that were displaced and colonised areas with no disturbance by warfare before the arrival of the native colony. In 2023, the lowest number of Sandwich tern pairs in the past 20 years was recorded at the site. Although up to 1,000 Sandwich terns were observed at the islet in late April and early May, the limited available surface negatively impacted that species as they prefer larger colonies that provide higher security against predators (Langham 1974). Several factors caused this negative result. One hypothesis is related to bird flu, which was confirmed to have spread into the Mediterranean Sea and caused mass mortality in the Sandwich tern colony at Venice Lagoon, Italy (M. Basso pers. comm.). That might explain the low number of pairs that attempted breeding at Pomorie Lake in 2023. Among the breeding Sandwich terns in 2023, rings from Poland, Romania, Ukraine, and Denmark were observed, indicating a larger share of foreign individuals that eventually replaced the local birds lost due to the flu.

Large fluctuations of Common tern pairs were observed during the 3 years, with abandonment of nesting sites and loss of clutches exceeding 50% in 2021 and 2023. In these years, late or second broods were observed on 15 September, and hatchlings were observed to be 10-12 days old. Initial nest loss is the common reason for late nesting, a kind of compensation measure for the species. Although typically single-brooded, Common tern pairs occasionally attempt to raise a second brood (Hay 1984). Later egg laying and hatching can also be linked to the colder start of the nesting season. In recent studies, flooding has been a leading cause of nest failure for various species, especially those that nest on the ground (Koffi-Jberg et al. 2016). Flooding is inflicting loss of chicks and eggs due to low temperature and interruption of embryo development. This was a major problem observed during the current study in the 2021 breeding season. For many species, the survival rate of nests is influenced by the laying date and nesting period (laying versus incubation) (Cuervo 2005). An epidemic of non-determined agents was reported to have caused mass mortality of Common (99%) and Little tern (70%) chicks in Atlit Saltpans,

Israel, in 2022 and 2023 (Y. ΚΙΑΤ, pers. comm.). The chance that the epidemic will affect breeding terns at Pomorie Lake is high, as numerous recoveries of ringed Common terns confirm a link between the two sites.

Food availability also affects the reproductive success of animal populations (WHITE 2008). This includes quantity and access to prey items, which vary due to environmental factors (CHASTANT & GAWLIK 2018). The deteriorated hydrological conditions in Pomorie Lake hindered the access of the nesting species to food resources and, at the same time, changed their abundance, thus becoming the reason for low breeding success. That was the potential explanation for the extremely low number of nesting Pied avocets in 2021. That species strongly depends on the hydrological regime and water salinity (LENGYEL 2006). The use of dykes and embankments as nesting grounds by colonial water birds has been a well-documented ecological trap (ROCHA 2015). The impact of terrestrial predators is severe and may be why Common and Little terns, Pied avocets, and Black-winged stilts abandoned nesting sites. Terrestrial predators – jackals, foxes, stray dogs, and cats have been considered a severe problem in the Pomorie Lake area for years, given the close proximity of the wetland to the town (RADEV et al. 2010). The current study confirmed that the problem is present by witnessing tracks and observations of stray dogs, jackals, and foxes. The relatively early breeding of Kentish plovers (before mass beach tourism) ensures low disturbance at the sand spit. In recent years, a regular sports event has been organised in early May on the sand spit, and despite efforts being made to inform organisers to avoid the dunes, that was to no avail.

Conclusions

Three of the study species (the Common tern, Little tern, and Kentish plover) exceeded the respective target values in all three years of the study, demonstrating a stable trend. The Pied avocet was the species that mainly benefited from the habitat restoration activities performed on the restored islet in 2022 and the newly created wooden platform in the following year.

The Black-winged stilt was the species that has the least benefited from the restoration activities and is the least inclined to occupy human-made habitats like islets and platforms. The breeding season 2023 was the only one when the target value of 50 breeding pairs was achieved. The most beneficial measure was the controlled hydrological regime. However,

the external strong negative effect due to the road construction and destroyed swamp led to an uncontrollable hydrological regime. That had significant negative impact on the sandwich tern which is a species that has demonstrated strong philopatry at the site. Pomorie Lake is the most important site for the species in Bulgaria, meaning that this negative impact threatens the species' breeding at the national level. It is important to underline that competent authorities are required to take urgent action to restore the damage caused by the road construction and the destroyed swamp.

Acknowledgements: This paper is the result of efforts made within the project LIFE19 NAT/BG/00804 LIFE FOR POMORIE LAGOON, co-financed by the EU through the LIFE program and implemented by Pomorie Salinas Ltd, Green Balkans NGO, Bulgarian Biodiversity Foundation, and biological station Tour du Valat (France). We are grateful to all the volunteers who participated in the conservation camps of Green Balkans NGO at Pomorie Lake.

References

- CHASTANT J. & GAWLIK D. 2018. Water level fluctuations influence wading bird prey availability and nesting in a subtropical lake ecosystem. *Waterbirds* 41(1): 35-45.
- COSTA M., BORGHESI F., CASINI L., FIDLÓCZKY Z. & MIGANI, F. 2016. Guidelines for the environmental management of the Mediterranean and Black Sea saltworks (management model) in the Natura 2000 network. Technical report. LIFE10 NAT/IT/000256 project.
- CUERVO J.J. 2005. Hatching success in Avocet *Recurvirostra avosetta* and Black-winged Stilt *Himantopus himantopus*, *Bird Study* 52(2): 166-172.
- FARINOS P., ROBLEDANO F., PERONA C. & SOTO A.J. 2013. Lagoons as a waterbird habitat: communities' response to human impact and management across space and time scale. In: MWINYIHIJA M. (Ed.): Lagoons: habitat & species, human impacts & ecological effects. New York, USA: Nova Science Publishers, 2-51.
- HAY H. 1984. Common terns raise young from successive broods. *Auk* 101: 274-80.
- KIRBY J., STATTERSFIELD A., BUTCHART S., EVANS M., GRIMMETT R., JONES V., O'SULLIVAN J., TUCKER G. & NEWTON I. 2008. Key conservation issues for migratory land- and waterbird species on the world's major flyways. *Bird Conservation International* 18(S1): 49-73.
- KNIEF U., BREGNBALLE T., ALFARWI I., BALLMANN M.Z., BRENNINKMEIJER A., BZOMA S., CHABROLLE A., DIMMLICH J., ENGEL E., FIJN. R & FISCHER K. 2024. Highly pathogenic avian influenza causes mass mortality in Sandwich Tern *Thalasseus sandvicensis* breeding colonies across north-western Europe. *Bird Conservation International* 34: e6. doi:10.1017/S0959270923000400
- KOFFIJBURG K., FRIKKE J., HÄLTERLEIN B., REICHERT G. & ANDRETTZKE, H. 2016. Breeding birds in trouble: A framework for an action plan in the Wadden Sea. *Common Wadden*

- Sea Secretariat, Wilhelmshaven, Germany, 24 p.
- LANGHAM N.P.E. 1974. Comparative breeding biology of the Sandwich tern. *The Auk* 91(2): 255-277.
- LENGYEL S. 2006. Spatial differences in breeding success in the pied avocet *Recurvirostra avosetta*: effects of habitat on hatching success and chick survival. *Journal of Avian Biology* 37: 381-395.
- O'BRIEN M. & SMITH K.W. 1992. Changes in the status of waders breeding on wet lowland grasslands in England and Wales between 1982 and 1989. *Bird Study* 39(3): 165-176.
- POPOV D., PROFIROV L., KIROV D. & MESHKOVA G. 2023. The birds of Pomorie Lake. Status and Checklist. Revised and updated second edition. Green Balkans NGO, Plovdiv. 48 p.
- PROFIROV L., KIROV D., NIKOLOV H., MICHEV T. & STOYANOV G. 2010a. Bird fauna of Pomorie Lake. In: RADEV R., HIEBAUM G., MICHEV T. & PROFIROV L. (Eds.): Collected reports for the Integrated Management Plan of SPA Pomoriysko ezero BG0000152 and pSCI Pomorie BG0000620 (In Bulgarian). Plovdiv, Bulgaria: Green Balkans NGO, 117-140.
- PROFIROV L., KIROV D., NYAGOLOV K., GRADEV G., STOYANOV G., DIMITROV M. & MICHEV T. 2010b. The Birds of Pomorie Lake: Status and Check List. First edition. Plovdiv: Green Balkans NGO. 40 p.
- RADEV R., HIEBAUM G., MICHEV T. & PROFIROV L. 2010. Integrated Management Plan of SPA Pomoriysko ezero BG0000152 and pSCI Pomorie BG0000620. Plovdiv, Bulgaria: Green Balkans NGO. 287 p.
- ROCHA A. 2015. Living in human-created habitats: the ecology and conservation of waders on salinas. PhD Thesis, University of Coimbra, Coimbra, Portugal, 182 p.
- TSARYK L. & KUZUK I. 2022. Russian-Ukrainian war: environmental aspect. *Scientific Notes Ternopil National Volodymyr Hnatyuk Pedagogical University. Series: Geography* 53 (2): 100-106.
- WHITE T.C.R. 2008. The role of food, weather, and climate in limiting the abundance of animals. *Biological Reviews* 83: 227-248.

