

SOME CONSIDERATIONS REGARDING THE PRESENCE OF THE SPECIES *Pelecanus onocrotalus* Linnaeus, 1758 ON LAKE BISTREȚ (SOUTHWEST ROMANIA)

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Abstract. The study highlights the role of the Bistreț Lake located within the Danube Floodplain (southwestern Romania) as an important wetland for *Pelecanus onocrotalus*, as well as for many other species of aquatic birds. Based on personal observations and specialized literature, we try to contribute to the knowledge of the territorial dynamics of the common pelicans and of the dynamics of the flocks that stop on Bistreț Lake for feeding. In 2020, juvenile specimens of *P. onocrotalus* appear in large numbers, along with adult specimens. The large number of young specimens (who should have been in their wintering places) and the unusual coloration of some specimens may suggest certain changes in the behaviour and phenology of West Palearctic pelicans, or even the hypothesis, yet undocumented, that among the pelicans present on the Bistreț Lake there might have been present specimens belonging to the African taxon *P. o. roseus*. Although the explanation regarding the origin of these young pelicans and the mechanism of their occurrence in large numbers can only be drawn up after complex international studies (genetic research, massive ringing, satellite tracking, etc.), it is certain that, for feeding and, implicitly, for the sustainable conservation of this species, the Bistreț Lake is among the wetlands of major importance for the Lower Danube.

Keywords: common pelican, *Pelecanus onocrotalus*, *P. o. roseus?*, Lake Bistreț.

Rezumat. Câteva considerații privind prezența speciei *Pelecanus onocrotalus* Linnaeus, 1758 pe lacul Bistreț (sud-vestul României). Studiul reliefează importanța lacului Bistreț amplasat în lunca Dunării (sud-vestul României), ca zonă umedă importantă pentru *Pelecanus onocrotalus*, respectiv pentru alte numeroase specii de păsări acvatice. Prin observații personale și din literatura de specialitate încercăm să contribuim la cunoașterea dinamicii teritoriale a pelicanilor comuni și a dinamicii efectivelor care staționează pe lacul Bistreț în deplasările lor de hrănire. De remarcat este apariția în număr mare, în anul 2020, a exemplarelor imature de *P. onocrotalus* venite alături de exemplarele adulte. Numărul mare de indivizi tineri (care ar fi trebuit să fie în cartierele lor de iernare) și colorația neobișnuită a unor exemplare, pot sugera explicația că s-au produs schimbări în comportamentul și fenologia pelicanilor vest-palearticci, sau chiar ipoteza, deocamdată nedocumentată, că printre pelicanii de la Bistreț nu este exclus să fie prezenți indivizi din taxonul african de *P. o. roseus*. Deși explicația cu privire la originea pelicanilor tineri și a mecanismului apariției lor în număr mare nu poate să se contureze decât după studii complexe de anvergură internațională (cercetări genetice, acțiuni de înelări masive, urmărire satelitară etc.), rămâne însă cert că pentru hrănirea și implicit pentru conservarea durabilă a acestei specii, lacul Bistreț se numără printre zonele umede de importanță majoră pe Dunărea de Jos.

Cuvinte cheie: pelican comun, *Pelecanus onocrotalus*, *P. o. roseus?*, lacul Bistreț.

INTRODUCTION

The Bistreț Lake – located in the south of the country, about 5 km north of the Danube River – has a significant role as a resting and feeding area for many species of birds, especially the aquatic ones (TĂLPEANU 1963, 1965; MUNTEANU, 2004; PAPP & FĂNTĂNĂ, 2008; RIDICHE & ORZAȚĂ, 2004; RIDICHE et al. 2006; RIDICHE & MURARIU, 2009; RIDICHE & KISS, 2011; RIDICHE & SĂNDOR, 2016; RIDICHE 2012, 2018). Until 1965-1967, the Bistreț Lake belonged to a complex of ponds of about 22,000 ha (Bistreț - Cârna – Nasta - Nedeea), but following the drainage and systematization works achieved in the second half of the last century, the lake was reduced to an area of 1,936 ha arranged for fish farming. After 2006, intensive fishing was abandoned, but the lake maintained its structure. Currently, the lack of management activities is felt, leaving room for the renaturation process. Given its importance for the birds and fauna, much of the lake surface (1,916 ha) has been integrated into the *Natura 2000* ecological network with the status of Special Avifauna Protection Area (code ROSPA0010Bistreț) (***. 2007) – Fig. 1.

The trophic competition among the species that live in this wetland is solved by the capitalization of the trophic resources from all the existing ecological niches: water surface, reed thickets, low and muddy shores, wet meadows, etc. (RIDICHE, 2012).

Intensively exploited for fish farming until 2006, the lake naturally became an area of attraction for ichthyophagous bird species belonging to the genera *Pelecanus* sp. and *Phalacrocorax* sp.

Both species of *Pelecanus* are listed in the Red Book of Vertebrates of Romania, having an overwhelming importance for biodiversity, as well as from the economic, cultural, and tourist point of view (MUNTEANU, 2005, 2009).

Globally, the species *P. onocrotalus* (further referred to as GWP) is represented by two large and distinct populations, one nesting in the Palearctic region (Southeast Europe and Asia) and the other in Central and South Africa. The Palearctic population migrates long distances southwards for wintering, while the African population is resident, although it gets widely dispersed in Central and South Saharan Africa (CRIVELLI & SCHREIBER 1984; CRIVELLI et al., 1991a; DEL HOYO et al., 1992).

The largest GWP colony in Europe is found in Romania, in the northern part of the Danube Delta the Buhaiova-Hrecisca lakes. Until 2016, the colony was estimated at 3,600-4,500 pairs, being the only one where GWP nests; it was also intermittently monitored over several decades. Following the research carried out with the help of

drones, this population was re-evaluated at approx. 17,000 nesting pairs, which means the number is 4 times larger than previous estimates, made by conventional techniques (MARINOV et al., 2016; KISS et al. 2019). The cited authors render in their studies the numerical fluctuations of the flocks and appreciate the number of nesting pairs at the level of 2016, but there are other issues related to GWP to be studied, such as youth phenology, moult timing, identification of migration routes, location of winter quarters, relationship of migratory individuals with the sedentary-dispersive ones, etc. The only study that used satellite tracking of the species in question, a first in the country due to technological conditions at the beginning of the century, aimed to track the movements of pelicans during the nesting period, but not transcontinental migration (KISS & NICHERSU, 2002). Consequently, only the ring marking method provided some data on the spatial and temporal pattern of postnuptial migration of GWP in the Danube Delta (CĂTUNEANU, 1999; CRIVELLI et al. 1997; KISS et al. 2020). Based on the reports of marked birds, it results that this pelican population uses the Via Pontica migration route (IANKOV 2014; FÜLÖP et al. 2018; MICHEV et al. 2011, 2018; SÁNDOR et al. 2018). The flocks follow the shores of the Mediterranean basin, reach the Red Sea at Gebel el Zeit (HILGERLOH et al. 2011) and head southwards through Egypt and Sudan. The pelicans follow the White Nile, being located at Lake Nasser, Jebel Aula Dam and Sudd Swamp. Above the Blue Nile, they reach Lake Roseires, then the system of lakes from the Great Rift Valley to Lake Turkana (CHEGE 2014; CRIVELLI et al. 1991a; DEL HOYO et al. 1992; IZHAKI et al. 2002; LESHEM Y. 2014. SHMUELI et al. 2014; EFRAT et al. 2019). The last point certainly reached by the GWP from Romania is in southern Sudan (CĂTUNEANU, 1999; CRIVELLI et al. 1997, KISS et al. 2020). Obviously, in their wintering quarters from Ethiopia, Kenya, and Tanzania, West Palearctic GWP populations overlap with the south-Saharan African populations (BROWN & URBAN 1969).

Through our study we try to contribute to the knowledge of the characteristics and dynamics of GWP populations, which are stationed on the Bistreț Lake during the feeding trips and, at the same time, we want to promote the importance of this wetland located in the Danube Flood Plain in the sustainable conservation of GWP.

MATERIAL AND METHODS

Study area

Our research took place both on the water basins included in the special avifauna protection area (I-IV) and on the basins outside the protected area (on the west side of the lake) – Fig. 1.

Data collection

The data processed in this study were collected during March-October from 2017 to 2020. We chose for observation 4 points due to their good visibility and density of birds (1 – the northern shore of basin II (belonging to Cârna locality); 2 – the confluence between the Desnațui River and the Bistreț Lake; 3 – the northern shore of basin I (Plosca locality); 4 – the Mălăieni dam located at the western limit of the site which enabled us to observe the stationary birds on the basin I and on the western basins that are not included in SPA Bistreț – Fig. 1.

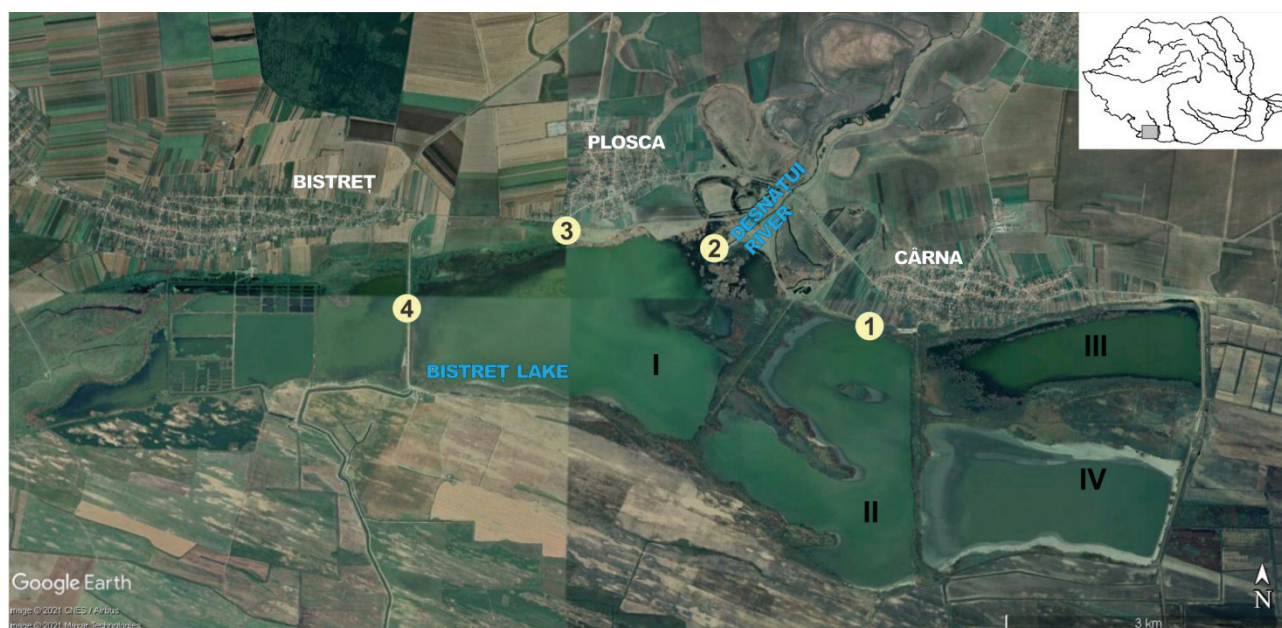


Figure 1. The map of Bistret Lake (Sources: Google Earth, processed).
I – IV: the water basins included in the ROSPA0010Bistret; 1 – 4: observation points.

For observations, we used the following optical devices: a binocular (Zeiss Jena 10x50), a telescope Leica (APO Televid 82 82 mm spotting scope, angled eyepiece; 25-50x WW ASPH Vario eyepiece), and cameras (Sony 15x and Nikon Coolpix p900).

RESULTS

The presence of the species belonging to the Order *Pelecaniformes* on the Bistreț Lake has become more and more remarkable in the last decade, in terms of both quality and quantity (RIDICHE, 2021 - in print). We note that, in the years and periods with low water levels, especially in the summer months, until the end of October, one or both species of *Pelecanus* (*P. onocrotalus* and *P. crispus*) appear, mostly in monospecific groups and, sometimes, in associated groups. When feeding, individuals cooperate and often associate with *Phalacrocorax* sp. Until 2010, *Pelecanus crispus* frequented the lake in large groups (up to 350 individuals), while GWP had a sporadic and less numerous presence, usually a few dozen individuals (RIDICHE, 2012). In recent years, a higher frequency and a significant numerical increase have been noticed in the case of GWP individuals. In Table 1, we present a summary of our observations from the last four years (2017-2020).

Table 1. Observations on the species *Pelecanus onocrotalus* between 2017 and 2020, Lake Bistreț (Southwest Romania).

Observation dates	Number of individuals	Location
June 17, 2017	200-220 specimens	Basin I – northern shore
September 9, 2018	80-100 specimens	The confluence between the Desnățui River and the Bistreț Lake (Basin I)
August 5, 2019	60-70 specimens	The confluence between the Desnățui River and the Bistreț Lake (Basin I)
June 4, 2020	About 50 (predominantly immature specimens)	Basin II
June 25, 2020	About 500 specimens, 80-100 of which immature specimens	Basin II
August 23, 2020	100-120 specimens	Basin II and in the confluence between the Desnățui River and the Bistreț Lake (Basin I)

An increase in the number of pelicans (GWP and Dalmatian Pelican - *Pelecanus crispus*) during summer was also found by some synchronous evaluations with international participation, but without being able to reveal the distribution of birds by age categories (S. O. R. 2016, 2017).

During the data collecting process, the pelicans observed on the Bistreț Lake were either resting on the shores of the water basins or fishing (Photos 1-3). During feeding, most of them (about 90%) fished synchronously in large groups of tens / hundreds of individuals and only a few remained separated, fishing alone.

The maximum number of individuals was registered on June 25, 2020, approx. 500. Of these, about 15-20% (80-100 individuals) were identified as immature individuals. The distinct plumage, noticed at young individuals separated from the large flock of feeding GWPs (Photo 2), raises questions about their presence here in early summer and possibly about their origin. Usually, juvenile pelicans from the current year leave their traditional colony by the end of August, in their brown plumage and, in a few weeks, they migrate south. As a rule, on the journey southwards, the young individuals from the Palearctic region remain in the wintering places where the maturation of plumage occurs gradually, and the birds return the following spring in the white-pink plumage characteristic to sub-adults and adults. With regard to the moult of pelicans in general and of GWP in particular, literary sources provide very little information (BRIDGE 2006; GLUTZ & BAUER 1987; ROSETTI-BĂLĂNESCU 1957); however, we consider that these are birds in the second year of life and no other categories of plumage have ever been observed in the research area.

DISCUSSIONS AND CONCLUSIONS

Several studies in recent decades show that young GWP populations from Eurasia have developed a behaviour that prevents them from migrating to their traditional wintering quarters in Africa. Instead, they spend the winter in the Balkans or in the eastern Mediterranean region, in Turkey (CRIVELLI, 1997; CRIVELLI et al., 1997; ONMUŞ, 2014) and especially in Israel, where some individuals stop without following the ancestral migratory routes (HATZOFÉ, 2014; IZHAKI, 1994; IZHAKI et al. 2002; LESHEM & YOM-TOV, 1996; SHMUELI et al. 2000, 2014). Satellite tracking has detected the return of immature individuals equipped with GPS tracking system in Israel, to the north in the spring; e.g. a young male pelican made two spring migrations to Southeast Europe (Bulgaria and Romania) and an autumn migration back to Israel where it spent the winter (IZHAKI et al., 2002).

We do not know the origin of the GWP populations that stay on Lake Bistreț, but it is known that, outside the nesting period, the common pelican makes feeding trips, flying in flocks of 50-500 individuals (adults and immatures), at long distances; they are able to travel about 300 km in 6 hours (CRIVELLI et al., 1997). Information is available regarding the presence of immature GWP during summer in Greece (CRIVELLI et al. 1991b) and even further north, in Hungary (KISS et al. 2019), but not in Romania and always in small numbers compared to our data.

Obviously, these movements of pelicans are influenced by significant changes occurring in their usual ecosystems or classic feeding places, with negative effects on birds, such as the drainage of wetlands or other water bodies, excessive anthropogenic disturbances, etc. Consequently, there are reasons why pelicans will disperse and look for other suitable feeding areas. GWP as a long-distance migratory species is considerably influenced by global climate

change (DOXA et al., 2012; JIGUET et al., 2008). Living creatures react to general changes by reshaping their survival strategies, in terms of phenology, reproduction, feeding, etc. The causes that involve young GWP individuals in the tiring and dangerous migration (especially for inexperienced birds) are unknown to us, but they are certainly pressing, thus justifying their unusually early return.

The increased mortality of young contingents during migration is known as it has already been observed in the case of other large, long-distance migratory species such as Spoonbill (*Platalea leucorodia*) or White Stork (*Ciconia ciconia*) (LOK, 2013; LOK et al. 2017; ROTICS et al., 2016).

The unusually high number of immature GWPs may revitalize a hypothesis from the last century decade, when, during summer, too many GWPs were noticed spread outside the colony compared to the 2,500-3,500 nesting pairs; they presented a pyramid of abnormal age. Starting from the idea that, in winter, migratory flocks of West Palearctic GWP overlap the feeding and resting sites of the African sedentary-dispersive species (*P. onocrotalus roseus*), it has been assumed that non-nesting sub-Saharan individuals integrate into northern flocks, traveling together to their nesting areas (KISS, 1992; KISS & CONDAC, 1992; MICHEV et al., 2011). Later, the last author revised his hypothesis, attributing the surplus of non-nesting GWPs to the undervaluation of nesting contingents (MICHEV et al., 2018). Two aspects can make us not abandon the aforementioned hypothesis. The immature GWPs from Bistreț did not fully integrate into the flocks of adults, as they usually rested or fished separately, but entered the flocks when flying. A similar behaviour was not observed in autumn in the case of birds that recently started flying, but we do not know the evaluation of their later behaviour in the wintering quarters. At the same time, it should be noted that GWP, at least in South African areas, has an unusual ecological plasticity for such an ancient taxon. Some populations have been able to change not only their food, but also their entire trophic behaviour; in the absence of fish, they started to consume slaughterhouse wastes from a pig farm or to attack the colonies of several species of seabirds, adopting an egg and chicken diet (DE PONTE MACHADO, 2007, 2009; DE PONTE MACHADO & HOFMEYR 2004; MWEMA, 2007; MWEMA et al. 2010). It is true that these are changes in the field of trophobiology and not phenological changes, but they prove the rapid ability of GWP to adapt to special conditions.

Regardless of the origin of the GWP individuals, our observations underline the fact that the Bistreț Lake represents an area of increasing importance for the non-nesting GWP contingents on the Lower Danube. So far, the area has met the food needs of these GWP populations, but we cannot assess whether the trophic supply of the lake will remain unchanged. There are no studies on the quantitative-qualitative composition of the current ichthyofauna of the Bistreț Lake and no quantitative assessment of the existing fish stock, but the presence of ichthyophagous ornithofauna attests the existence of an adequate trophic base. It is certain that, if the fish resources will maintain in the long term, the Bistreț Lake will be among the wetlands important for the feeding and, implicitly, for the sustainable conservation of the GWP species inside the country.

The problem of the presence of GWP individuals in large numbers during winter, as well as their possible belonging to different populations, highlights again the fact that there are still many gaps in the knowledge of GWP populations, such as the size of the contingents, the identification of migration routes and wintering quarters, moult and return of young birds to the nesting places.

These questions could only be answered after long-term research projects, ranging from the south-eastern European nesting colonies to sub-Saharan wintering grounds. The basic activities should be massive markings, equipping as many individuals as possible with satellite transmitters and DNA analyses along the route. The pelican, in addition to being an emblematic species, also presents a special interest in economic, cultural and tourist terms, which highlight the need for this international research.

Due to the existence of many unsolved problems, we consider it necessary to systematically continue the observations in the coming years.

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Photo 1. *Pelecanus onocrotalus* - immature specimens - June, 2020 (original).



Photo 2. *Pelecanus onocrotalus* - immature specimens with distinct plumage - June, 2020 (original).



Photo 3. *Pelecanus onocrotalus* - August, 2020 (original).