

## 7. Can the Greater Flamingo (*Phoenicopterus roseus*) be considered a breeding species in the Danube Delta Biosphere Reserve (Romania)?

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**Abstract:** In Romania, the Greater Flamingo (*Phoenicopterus roseus*) is considered an Extant & Vagrant species. However, this status asked to be reconsidered in the spring of 2021, when they began to appear in flocks in the south-eastern part of the country, in the territory of the Danube Delta Biosphere Reserve and its surroundings, especially over the lacunar complex. The first two flocks (with a total of 116 birds) appeared in May but the numbers increased gathering adults, immatures and juveniles. The highest number of flamingos recorded was 265, but the flock was not stable, usually splitting, moving or disappearing temporarily, dealing also with anthropogenic disturbances. One individual was ringed, what allowed us to state it was born in the south of France. Although some adult birds displayed rituals and behaviour characteristic for breeding, we did not find any colony or nesting place and the timing of the observations does not support a successful breeding attempt. It is quite plausible that most of these birds come from other colonies, most likely those on Lake Tuz, in Turkey, where this year an ecological tragedy caused the loss of the entire generation of chicks. Here we hypothesize that they might have nested in other unknown colonies outside the borders of Romania. In conclusion, we cannot confirm the breeding of flamingos in the studied area and we reaffirm the vagrant character of the species as non-nesting summer guests.

**Keywords:** flamingo, phenological changes, eventual nesting

### INTRODUCTION

Among the six remaining species of flamingo (Phoenicopteriformes, Phoenicopteridae, Aves), only one has ever been reported in Romania, the Greater Flamingo (*Phoenicopterus roseus* Pallas, 1811). According to the IUCN Red List categorization, it is considered an Extant & Vagrant species in this country.

The populations of this taxon have a huge range, from the western Mediterranean basin, between Europe and Africa, through Minor and Central Asia, until India, Bangladesh and Sri Lanka, the west and east coasts of Africa and western Madagascar (Johnson and Cézilly, 2007). The total population of the species is estimated at 550,000-680,000 individuals, with a conservation status of Least Concern (\*\*\*\* 2022) and the European population is estimated at approximately 45,000-62,400 breeding pairs, which corresponds to 89,900-125,000 adult birds (\*\*\*\* 2022).

The oldest sighting of flamingo on the territory of Romania dates from the beginning of the last century, when a group of 20 individuals was observed in Dobrogea on Lake Tuzla (Tuzla-ghiol). From that group, two juvenile birds were collected by Mihai Șuțu, the first recorded observer of the species in the country. We do not know if it was actually the historical and numismatic scholar, the academician Mihail Șuțu, but the fact that his name was mentioned and the birds arrived at Grigore Antipa Museum of Natural History, in the capital, supports this supposition. The author also mentions the information obtained by fishermen, that very rarely specimens of flamingos have been observed on the Dobrogean littoral, but without indicating exact data (Dombrowski, 1912). The year of the flamingos' appearance in Tuzla was not specified in the text from Mihail Șuțu. Instead, we found more about the event in a hunting magazine (Linția, 1944a) and even more details in the manual Păsările din R.P.R., vol. III (Linția, 1944b). However, the number of birds appears in the book incorrectly, indicating a flock of 40 birds (Linția, 1944b), this

error being taken over in many of the following publications. Since the twentieth century, there are several other reports, most of them about solitary birds, but once about 3 birds (Gache and Antonoaiea, 2000) in a total of 9 observation events (Kiss et Szabo, 2002; Postolachi, 2011). In the following years, there appeared some data about 1-2 flamingos, including from inside the country in the counties of Buzău, Dolj and Ialomița, except for a single group of 6 birds from the latter area (\*\*\*\* Rombird). In Dobrogea, the first report of a larger number, of 4 birds, appears in 2016 (Gavril et al., 2017; Kiss, 2016; Ridiche, 2017; \*\*\*\* Rombird). In 2020, the appearance of the first flamingo flock passing through Dobrogea is signalled, a number with two digits: 10 exemplars, on June 15<sup>th</sup> at Meleaua Sacalin, being considered then the group with the largest number of individuals observed in Romania in the present century (\*\*\*\* 2021a; \*\*\*\* 2020b). However, the year 2021 brought radical changes in the presence of this species in Dobrogea in general and on the territory of the Danube Delta Biosphere Reserve in particular.

## **MATERIALS AND METHODS**

Documentary trips on the occurrence of flamingos took place as part of a research topic: the revision of the management plan and the RBDD regulation, using the Institute's fleet and personal vehicles. The observations were made with the help of the Institute's and personal optical instruments (Swarovski Glasses 30x80 and Leica APO-Televid 82 25x50, Zeiss 10x40, 7 x 42, Swarovski binoculars 7 x 42 and 10x50, Nikon 10x40, Leica Ultravid 10x42 HD-Plus, Leica Ultravid 10x50HD-Plus, using the Nikon Coolpix P1000 camera). In order to locate a possible flamingo colony, an AUTEL EVO II Pro drone was used, equipped with a camera in the visible spectrum with the video format of 5472 x 3076 pixels and the photo format of 5472 x 3648 pixels. This camera, equipped by default on the drone in question, has a resolution of 20 MP and the sensor is 1 inch CMOS.

The control flight took place on September 21<sup>st</sup>, 2021, in the area of Lake Tuzla, where the most frequent and massive concentrations of flamingos happened, and targeted the reedbeds from the north-west of the lake to the south of the Saele sand levee, making a detailed footage. The flight was performed entirely by manual control and assisted by ornithologists in order to identify a colony, as well as other species present in this territory.

The field trips took place regularly from the first flamingos' sighting in late May until the middle of October 2021, with 1-2 field trips per week, at different times of the day, insisting in areas with repeated observations of the species. During this time, also the rangers of the Institute increased the attention to possible flamingo appearance. In addition, verbal information was taken also from other sources, considered appropriate, including rangers of the Danube Delta Biosphere Reserve Administration. The information on the Rombird website (\*\*\*\* Rombird) pages was particularly useful.

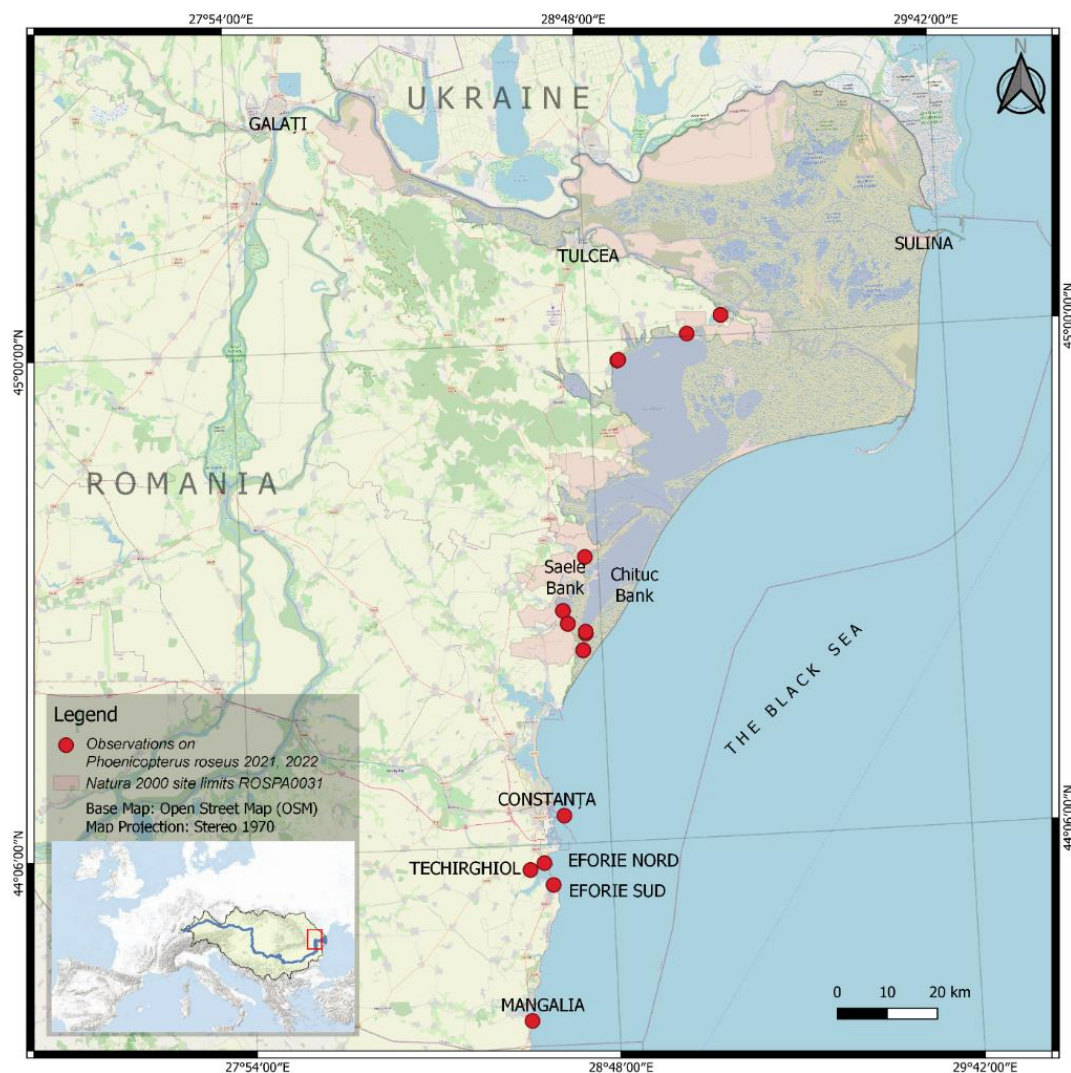
From the literature, in addition to well-known scientific publications, we also learned about the successive daily news, the media in a certain period being significantly concerned about the sensational appearance of flamingos, but also the press releases of various public institutions. We mention that until the elaboration of the present study, we do not have information about the appearance of other decent scientific studies in this respect.

A database of the observations was created and supplemented with the attached information on the more accurate location of the birds, as well as any remarks on the behaviour or determination of the age groups, if the attached photographs were relevant in this respect. To differentiate the sub-adult age groups, we used the word juvenile for the individuals born in the year and the word immature for older individuals whose plumage had not yet shown its final colour (Glutz von Blotzheim et al., 1987; Johnson et al., 1993).

## **RESULTS AND DISCUSSIONS**

The purpose of this paper is to document the presence of flamingos in Dobrogea, to follow the dynamic numerical, territorial and temporal tracking of the species and to interpret this information. The occurrence of flamingos in the country is not the subject of this study.

The period of maintaining the flamingos in Dobrogea includes a period of 247 days, between the appearance of the first 15 specimens in flight on 07.05.2021 in the village called 2 Mai, Constanța, followed by other birds on 24<sup>th</sup> May, and the last specimen was reported on 08.01.2022 in Vadu, Constanța.



**Figure 1:** Map of the coastal areas of North Dobrogea, where flamingos (*Phoenicopterus roseus* Pallas, 1811) were identified during 2021 and until the first days of the year 2022.

The presence of the species was generally delimited to the lagoon area of the Biosphere Reserve, in an extension of approximately 140 km N-S, between the localities of Murighiol and 2 Mai. We do not have any information inside the delta itself from this period.

The information is limited to the following localities: Murighiol, Sarinasuf, Sabangia, Sarichioi, Sinoe, Istria, Nuntași, Traian, Vadu, Constanța, Techirghiol, Eforie Nord, Eforie Sud, 2 Mai, marked from north to south on Fig. 1.

The exact number of birds could not always be specified, due to their chaotic movements in the supervised territory, the overlapping or absent reports and even the difficulty of estimating the exact size of flocks that are too compact or spread over large areas.

The vast majority of flamingos gathered on the southern edge of the Razim-Sinoe lacunar complex of the RBDD. The salt marshes of Murighiol, where a group of flamingos attempted to establish, belong both hydrogeographically and territorially to the Danube Delta Biosphere Reserve.

Also, beyond its limits there are several other eccentric and minor locations, where flamingos were accidentally reported: Constanța, Techirghiol, Eforie Nord, Eforie Sud, 2 Mai, in the first and last location only in low flight. The maximum number of individuals for a single observation was 263 on September 9<sup>th</sup> in Lake Tuzla, the working group of the Institute reported a maximum of 234 on September 13, also on Lake Tuzla.

The habitats preferred by flamingos are shallow lakes with alkaline or saline waters, so in our case most of the observations come from the saltwater areas of Lake Nuntași.

The studied area borders the Dobrogean Plateau to the west, separating it from the Black Sea through a system consisting mainly of lakes, sand levees and several higher relief formations. Specifically, most of the reports took place on Lake Nuntași. It is part of the Razim-Sinoe lacunar complex and covers an area of 8.51 km<sup>2</sup>. Due to the clogging of the connection canals, it completely dried up in 2020, but during the same year it was refilled with the waters received from Lake Sinoe through Lake Istria.

The lake has a north-south orientation of 6 km in length, with a maximum width of 2.2 km. The southern extremity narrows, forming at the end a bay with an irregular ovoid shape, of approximately 1.3 x 1.6 km.

This part is called Lake Tuzla, although in the Rombird website reports and some documentary the toponym Lake Traian is used, taking the name from the homonymous locality (Traian, Constanța) located at around 2.4 km distance.

The water body is bordered by a 30-100 m wide discontinuous reedbeds, delimited to the S and W by agricultural crops, and to the E by the Saele sand levee, having a typical vegetation of sand levee with salty ground.

The tree vegetation is missing, only a few hundred meters from the lake are the rarely scattered willows. The depth of the water does not exceed 1 m so flamingos can look for food almost everywhere.

It can be confusing that although both on the maps and in most of the photo reports in the daily press, this body of water appears with the name of Lake Tuzla, but there is also the Tuzla Pond.

This second water body measures approximately 0.5 x 0.35 km and is part of a river-sea estuary, relatively recently bounded by a dam on Lake Techirghiol. However, we consider that in this case the toponym of the first historical signal would have been the actual Lake Tuzla and not the Tuzla Pond.

The debut in 2021 of the flamingos in Dobrogea was signalled on May 7<sup>th</sup> from the coast, near the locality of 2 Mai, a flock of 15 exemplars flying to the north above the sea. For 17 days there were no other reports, although on the Rombird site (\*\*\*\* Rombird) are listed other rare species from this interval, as proof that the area was not completely unattended.

Large flocks of 50 to 60 exemplars were noticed on May 25<sup>th</sup> and 26<sup>th</sup> on Lake Tuzla and Sărăturile in Murighiol, and after that they were present in greater or lesser numbers until the first decade of January 2022.

We can only have hypotheses about the origin of the flamingos in the Dobrogea lagoon area.

The only marked specimen was observed on 11.9.2018, on Lake Tuzla being ringed on the right leg with white plastic ring KVTB and on the left with the metal ring XA 435, at Salinas d'Aigues-Mortes - France in a non-flying chick stage and seen at 11.09.2021, so exactly three years ago, at a distance of 1965 km in a straight line between the two points (Source: Romanian Ornithological Center, Bucharest).

Although the dispersal trend of western Mediterranean flamingos is very obvious (Amat et al., 2005; Balkız et al., 2009a, 2009b, 2009c; Boucheker et al., 2011; Johnson, 1989; Johnson and Cézilly, 2008; Rendon-Martos et al., 2008) suggesting the possible origin of flamingos that appeared in Romania also in the Mediterranean basin, so far this is the only proven case of a specimen from that area.



**Figure 2:** Flamingo (*Phoenicopterus roseus* Pallas, 1811) marked in France in 2018 as a chick, found on Lake Tuzla three years later. (Photo made in Tuzla: Cotorogea C.).

The western Mediterranean flamingo metapopulation, which also includes the identified specimen, is well monitored on the coasts of Europe, Asia and North Africa.

The first flamingo ringing debuted in 1947 in the Camargue, southern France, gaining bigger importance in the Tour-du-Valat since 1975, where every year approximately 800 non-flying chicks are ringed.

Other countries in the circum-Mediterranean area have been involved in the program since the 1990s. Following the international ringing actions, more than 100,000 individuals were marked and there is an average of around 25,000 ring readings or reports per year (\*\*\*\* Tour-du-Valat).

We present a concrete example based on personal observations that supports this regard. In the photos taken in March 2002 in Saintes-Maries-de-la-Mer, France, of a 150 birds size flock of flamingos, several of them were marked and 8 could be identified.

Of the two in the picture, the one marked with BFAX had 98 retrievals/readings, the maximum distance from the marking place being 4436 km, and the DVDV ring was identified 76 times, up to 2204 km, in both cases for ten years.



**Figure 3:** Two flamingos (*Phoenicopterus roseus* Pallas, 1811) marked in France, which were identified 98 and 76 times, respectively, in ten years. The inscription on the ring worn by the third signalled bird (on the top, further) is illegible in this photo (Photo made in France: Kiss J.B.).

According to the ANIMAL LIFE EXPECTANCY website and to Draughn (2015), flamingos are among the longest-lived birds, living in the documented free nature up to 44-50 years, and in captivity is known the case of an exemplar which due to old age sequelae, was euthanized at the age of 83 (\*\*\*\* 2014; Draughn, 2015). Accordingly, if the flamingos observed in Dobrogea reported in this article were coming from the western Mediterranean, logically there should have been significantly more specimens marked in the colonies from the Mediterranean basin.

The existence of a single ringed flamingo of a minimum total of 250 birds counted simultaneously, leads to the hypothesis that the flocks come from several colonies, of which only a few specimens belong to the western Mediterranean population.

The European flamingo population shows a stable or increasing trend (\*\*\*\* 2022; Johnson and Cézilly, 2008), forming new colonies in areas where before the species was present only in passage, or seasonally. Some of these areas are: the wetland complex of Oum El Bouaghi (Bensaci et al., 2011), El Goléa (Khelifa et al., 2009) and Chott Merouane, (Samraoui et al. 2006), in Algeria; as well as Akrotiri Salt Lake, in Cyprus (\*\*\*\* 2020a); Agios Mamas, a salt marsh of Chalkidiki peninsula, in Greece (Aslanidou, 2020); Diaccia Botrona and Venice, in Italy (Baccetti et al., 2008); Aftout es Saheli, in Mauritania (Diawara et al., 2008); Salina Ulcinj, in Montenegro (Rubinić et al., 2019; Savelji, 2015); Odiel Marshes, in Spain (Rendon-Mártos et al. 2008); Korba Lagoon, in Tunisia (Azafzaf and Feltrup-Azafzaf, 2015); and Syvasch Lake, in Ukraine (Petrovich and Nastachenko, 2017, Popenko and Andryushchenko, 2017). The appearance of an unusual colony of specimens belonging to several species of flamingos, some of which escaped from gardens and zoological parks, took place in Germany, at Zwillbrocker Wenn nature reserve (Treep, 2000), being also the northernmost in the history of ornithology: 53°03'N, 06°42'E.

Given these examples, the tendency of a flamingo group to settle in Dobrogea also becomes a plausible possibility, especially since in the Circumpontic territory there is at least one recent case, the formation of a colony in the Crimean Peninsula, where the species raised chicks (Petrovich and Nastachenko, 2017; Popenko and Andryushchenko, 2017).

The geographical coordinates and distances from Lake Traian, Constanța, of the nearest flamingo colonies, regardless of whether they have been active or not in recent years, are as follows: Syvash Lake in Ukraine (46°05'N, 34°46'E), at 475 km; Gediz Lake in Turkey (38°55'N, 29°28'E), at 625 km; Agios Mamas marsh in Greece (40°14'N, 23°11'E), at 650 km; Tuz Lake in Turkey (38°45'N, 47°72'E), at 745 km; Salina Ulcinj in Montenegro (41°54'N, 19°17'E), at 818 km; and Akrotiri Salt Lake in Cyprus (40°37'N, 32°58'E), at 1155 km.

Apart from the individuals certainly coming from the western Mediterranean metapopulation, we believe that the origin of the birds here reported could be Central Asia, or Minor Asia, the Anatolian Plateau. Even in Western and Northern Europe, especially in the first half of the last century, there were some incursions of non-Mediterranean flamingos, in several cases involving specimens from Central Asia (Glutz von Blotzheim et al., 1987).

In this case, it seems plausible that the origin of some of the birds that appeared in Dobrogea is in the Anatolian Plateau, Lake Tuz. This lake is considered one of the largest hypersaline lakes on Earth, with an area of 1,665 km<sup>2</sup>, a historic nesting area for flamingos (\*\*\*\* 2019) where in 2018, for example, 12,746 chicks were registered, and in 2021 a total number of 20,381 individuals. In 2021, the number of chicks was estimated at 5,000 although all of them died, along with a certain number of adults, when the water body gradually disappeared until it dried up (Hansen, 2021).

This phenomenon has also occurred in previous years (Balkiz et al., 2009a), partially due to the climate change that has hit the region, as well as the wrong agricultural policies applied for decades (\*\*\*\* 2021b; \*\*\*\* 2021c; Fraser and Guzel, 2021). The feeding range for flamingos is particularly large compared to other species. Research in southern Spain documents movements of 200-400 km from the colony, but are also able to perform non-stop flights up to distances of 850-1000 km (Amat et al., 2005; Johnson and Cézilly, 2007).

Execution of phases of nuptial dance, including mating and nest building attempts documented by photographs and filming in late May (\*\*\*\* 2021e; Țaga, 2021; \*\*\*\* 2021d; Marina 2021), also suggest an interrupted reproduction. Accepting the information that the nesting period on Lake Tuz begins in April (Johnson and Cézilly, 2007), and the replacement clutch appears in 1-3 weeks after the loss of the brood (Glutz von Blotzheim et al., 1987; Johnson and Cézilly, 2007), the appearance in May of flocks of flamingos in Dobrogea, when the effects of the drying up of the lake in Anatolia became arduous, and also considering that the distance between the two areas is below the maximum possible (approx. 745 km) for this species, pleads for this hypothesis. Clarifications will be able to bring about the planned genetic analysis of feathers, compared to samples from other colonies.

The calendar of observations shows that the first small flock of flamingos appeared on Mai 7<sup>th</sup>, 2021. Then, after a gap of 17 days on May 24<sup>th</sup> and 25<sup>th</sup> a bigger flock reached the south of Lake Sinoe, Lake Tuzla and Murighiol-Sărăturile, in total over 180 birds (\*\*\*\* 2021a). Birds everywhere are followed by curious, photographers and film operators, along with their boats and drones and also disturbed by dogs, among other things that make the reserve security staff unable to ensure the necessary peace for their eventual reproduction.

In this way, Murighiol is abandoned on May 27<sup>th</sup> (Gavrilaș, 2021; Marina, 2021), but the flocks gather further south, on lakes Nuntași and Tuzla. The arrival of flamingos starting from May 24<sup>th</sup>-25<sup>th</sup> had an invasive appearance, with agglomerations of over 250 birds at a single observation, massive flocks that periodically appear and disappear without being able to establish any obvious reason or identification of their location. The phenological dynamics of flamingos in Dobrogea in 2021-2022 is presented in Table 1.

**Table 1:** Phenological dynamics of flamingos (*Phoenicopterus roseus* Pallas, 1811) in Dobrogea in 2021 and the first decade of January 2022.

No	Date	Zone	No ex.	Notes	Observers
1	07.05.2021	2 Mai	15	Low flight to the north above the sea	Dehelean, L., Dehelean Andreea
2	24.05.2021	Lake Tuzla	61	Flamingos present in the area	Daróczi, Sz., Dósa, A., Páll, L.
3	24.05.2021	Lake Tuzla	61	Nuptial dance, mating	Cotorogea, C.
4	25.05.2021	Lake Tuzla	63	Nuptial dance, mating	Brad, G., Călugăreanu, F.
5	25.05.2021	Lake Tuzla	63	Courtship	Cotorogea, C.,
6	25.05.2021	Lake Tuzla	63	Nuptial dance, mating	Brad,G., Cotorogea, C.
7	25.05.2021	Murighiol salt marsh	53	Visual observation	Daróczi, J. Sz., Dósa, A.
8	25.05.2021	Lake Sinoe south, north of Vadu	62	Flamingos present in the area	Alexe, V., Marinov, M.
9	26.05.2021	Lake Tuzla		The flamingos left the area	Cotorogea, C.
10	26.05.2021	Murighiol salt marsh	52	Nuptial dance phases, nest building	Baciu, M., Baciu, Valentina
11	26.05.2021	Murighiol salt marsh	Min. 50	Some pecking the sand of the island with their beaks	Kiss, Elena, Kiss, J.B.
12	27.05.2021	Murighiol salt marsh	Min. 50	After disturbance (curious people) the birds left at 6 p.m.	Kiss, Elena, Kiss, J.B.
13	28.05.2021	Lake Tuzla	77	Flamingos present in the area	Popovici, C.I., Popovici, Florea
14	28.05.2021	Lake Tuzla	77	Possible merged with the birds of Murighiol	Cotorogea, C.
15	28.05.2021	Lake Tuzla	110	Mating of several pairs	Cotorogea, C.
16	29.05.2021	Lake Traian	107	Mating of several pairs	Tudor, F. A., Tudor, Diana
17	31.05.2021	Lake Tuzla	110	Strong disturbance (drone, floating photo hide)	Rombird website
18	31.05.2021	Lake Tuzla	3	Flamingos present in the area	Dehelean, L., Dehelean Andreea
19	31.05.2021	Lake Tuzla	103	Flamingos present in the area	Drăgan, O.
20	31.05.2021	Lake Nuntași	110	Flamingos present in the area	Dehelean, L., Dehelean Andreea
21	02.06.2021	Lake Tuzla		Flamingos left the area	Unverified source
22	10.06.2021	Lake Sinoe, near Vadu	1	Solitary immature flamingo	Cotorogea, C.
23	11.08.2021	Lake Tuzla	2	A female with a flying juvenile. No more specifications	Șuba. C.



24	13.08.2021	Lake Tuzla		Flamingos are not present anymore in the area	Cotorogea, C.
25	16.08.2021	Lake Tuzla, southern edge	2	Flamingos present in the area	Alexe, V., Marinov, M.
26	21.08.2021	Lake Tuzla	30	Flamingos present in the area	Veress, N.
27	21.08.2021	Lake Sinoe, near Vadu	58	Minimum 8 juvenile in the flock	Veress, N., Cotorogea, C.
28	21.08.2021	Lake Sinoe, south	Approx . 50	Flamingos present in the area	Cotorogea, C.
29	22.08.2021	Lake Tuzla	60	Flamingos present in the area	Kovács, I., Kis, Réka Beáta
30	22.08.2021	Lake Tuzla	71	Disturbed by a White-tailed Eagle ( <i>Haliaeetus albicilla</i> )	Cotorogea, C.
31	23.08.2021	Lake Tuzla	84	Also 10 juveniles in the flock	Cotorogea, C.
32	23.08.2021	Lake Tuzla	86	Flamingos present in the area	Baciu, M., Cotorogea, C.
33	25.08.2021	Murighiol salt marsh	1	Flamingo present in the area	Alexe, V., Marinov, M.
34	25.08.2021	Vadu	86	Also 10 immature birds in the flock	Baciu, M., Cotorogea, C.
35	26.08.2021	Lakes Sinoe and Tuzla		Flamingos left the area	Cotorogea, C.
36	28.08.2021	Lake Tuzla	108	Also 13 flying juveniles in the flock	Cotorogea, C.
37	29.08.2021	Lakes Nuntași, Sinoe and Tuzla		Flamingos are not present anymore in the area, before noon	Cotorogea, C.
38	29.08.2021	Vadu	?	The flock appears after noon	Unverified source
39	30.08.2021	Lake Tuzla	?	A big and very compacted flock. One of the juveniles is smaller than the others	Cotorogea, C.
40	31.08.2021	Lake Sinoe, south	41	Flamingos present in the area in the morning	Baciu, M.
41	31.08.2021	Lake Tuzla	171	Flamingos present in the area in the morning	Baciu, M.
42	31.08.2021	Lake Tuzla	178	Flamingos present in the area in the afternoon	Baciu, M., Cotorogea, C.
43	31.08.2021	Lake Sinoe, south		Flamingos not present in the area in the afternoon	Cotorogea, C.
44	01.09.2021	Lake Tuzla	222	A flock with immature birds and 15 juveniles	Baciu, M., Cotorogea, C.
45	02.09.2021	Lake Sinoe	5	Flamingos present in the area	Páll, L.
46	03.09.2021	Sarinasuf	1	Flamingo present in the area	Alexe, V. Marinov, M.
47	04.09.2021	Vadu	5	Flamingos present in the area	Daróczi J. Sz.
48	04.09.2021	Lake Tuzla	263	The males are courting the females. Same number of juveniles	Cotorogea, C.

49	05.09.2021	Lake Tuzla	254	Flamingos present in the area	Cotorogea, C.
50	07.09.2021	Lake Nuntași	171	Flamingos present in the area	Federeac, B., Federeac Rita
51	08.09.2021	Lake Tuzla	88	Flamingos present in the area	Cotorogea, C.
52	08.09.2021	Lake Sinoe, south		Flamingos are not present anymore in the area	Cotorogea, C.
53	09.09.2021	Lake Tuzla	191	Morning	Kovács, Sz., Oláh, J.
54	09.09.2021	Lake Tuzla	Min. 260	Some juveniles in the flock. Afternoon.	Cotorogea, C.
55	12.09.2021	Sabangia	27	A flock with a juvenile and an immature	Baciu, M., Kiss, J.B.
56	13.09.2021	Lake Sinoe, Eastern shoreline, in front of the fortress ruins	1	Flamingo present in the area	Alexe, V., Kiss, J.B., Marinov, M.
57	13.09.2021	Lake Tuzla, western shore	10	A group of immature birds	Alexe, V., Kiss, J.B., Marinov, M.
58	13.09.2021	Lake Tuzla, center	234	All adults and 10 immature birds	Alexe, V., Kiss, J.B., Marinov, M.
59	18.09.2021	Lake Sinoe north, in front of the locality	9	A group of immature birds	Cotorogea, C.
60	21.09.2021	Lake Sinoe north, in front of the locality	9	A group of immature birds	Alexe, V., Kiss, J.B., Marinov, M.
61	21.09.2021	Lake Tuzla		After disturbance, they left the area for approx. 10 days	Cotorogea, C.
62	22.09.2021	Sabangia, ponds, basin 5	46	Adults with 3 juveniles	Alexe, V., Kiss, J.B., Marinov, M.
63	25.09.2021	Techirghiol	27	Flamingos present in the area	Rusu, G.
64	25.09.2021	Techirghiol	27	Flamingos present in the area	Spac, D.
65	28.09.2021	Lake Sinoe, center-west	200	Flamingos present in the area	Cotorogea, C.
66	08.10.2021	Lake Nuntași north	65	Flamingos present in the area	Svatos, J., Rosmus, J.
67	21.10.2021	Constanța	19	Flying above the shore	Duțu, P.
68	22.10.2021	Vadu	15	Minimum 8 juvenile and immature birds	Plăeșu, D.
69	02.11.2021	Lake Tuzla	43	Adults and immatures	Alexe, V. Marinov, A.
70	05.11.2021	Lake Tuzla	1	Flamingo present in the area	Szabó, J., Pál, L.
71	06.11.2021	Lake Tuzla	2	Flamingos present in the area	Szabó, J., Pál, L.

72	06.11.2021	Lake Tuzla	5	With 1 juvenile and 1 immature	Pintilioaie A.-M. Silviu...
73	11.11.2021	Lake Tuzla	3	Minimum 1 immature	Șuba. C.
74	11.11.2021	Sabangia	35	Flamingos present in the area	Alexe, V. Marinov, A.
75	11.11.2021	Sabangia	7	Juveniles and immatures	Alexe, V. Marinov, A.
76	27.12.2021	Vadu, northern basin	1	Solitary immature	Brad, G., Călugăreanu, F.
77	30.12.2021	Vadu	1	Solitary immature	Veres, N., Veres-Szászka Judit
78	02.01.2022	Eforie Sud, Lake Techirghiol	3	Immature birds	Baltag, E., Petrencu, L.
79	04.01.2022	Eforie Sud, Lake Techirghiol	3	Immature birds	Baltag, E., Petrencu, L., Petrencu, Lidia, Pantiru, S., Pantiru, Lidia, Cotorogea, C., Cotorogea Jenica
80	06.01.2022	Eforie Sud, Lake Techirghiol	3	Immature birds	Brad, G.
81	06.01.2022	Eforie Sud, Lake Techirghiol	3	Immature birds	Dehelean, L.
82	08.01.2022	Vadu, northern basin	1	Immature bird, possibly the one from Vadu on 27.12.2021	Cotorogea, C.

The table includes the data on the presence of flamingos in Dobrogea during 2021 and the attempt to wintering of some specimens in 2022. For verification, we kept all the observations from Rombird (\*\*\*\* Rombird) even if they were repeated, coming from the same day but from different sources, also reproducing the information from the texts or information about the lack of birds in the areas where they were usually observed.

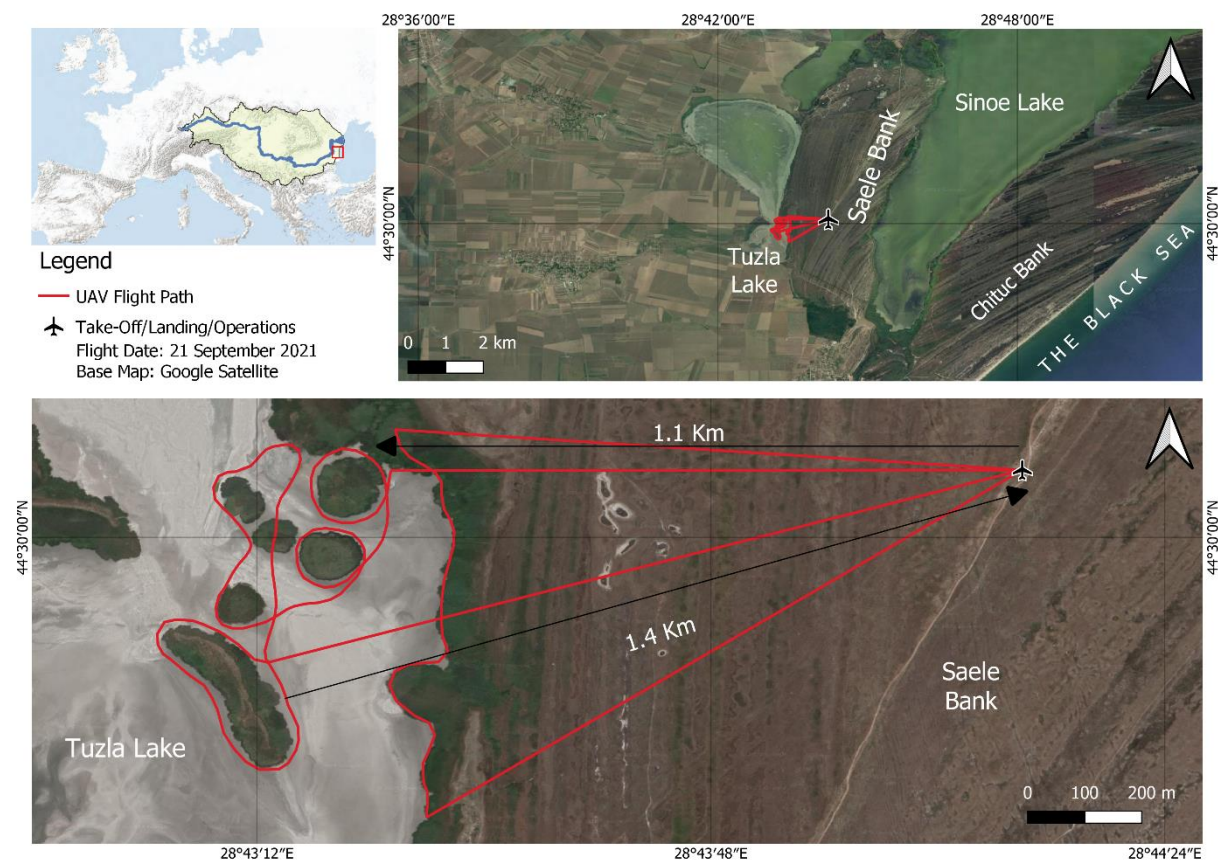
A change in the problem of the presence of flamingos in the researched area happened on August 11<sup>th</sup>, when there appeared an exemplar (probably female) with a juvenile already flying, and from August 21<sup>st</sup> in the observed flocks it was possible to count 8-11 juvenile or immature individuals from the previous year. It should be mentioned that the plumage of juveniles and immatures is extremely varied, being able to distinguish a minimum of 9 types (Johnson et al., 1993). Even if the inclusion in a certain age class was probably not always correct, certainly among the flamingo adults were present juveniles and immatures.

On August 26<sup>th</sup>, both the social media pages and the daily press published information about the success of the nesting of 74 flamingos and the appearance of 10-11 chicks (Luca, 2021; Spătaru, 2021). But is this information true? The main place where flamingos congregate, Lake Tuzla is relatively small and lacks of sandbanks and islets, where it could have established a colony without being noticed, especially since during hatching one of the partners is always present and later, when the chicks are gathered in the nursery, a number of adults are constantly around, watching them. The colony is permanently occupied, day and night, until the end of the breeding season. This could not have happened without it being noticed.

After the launch of the successful nesting theory in the press on August 26<sup>th</sup>, 2021, an attempt was made to locate the possible colony, using the equipped drone AUTELE EVO II Pro, with the most appropriate technical characteristics and the assistance of ornithologists. Although during the investigations there were favourable flight conditions and optimal light, without strong wind and precipitation, the investigations for 60 minutes did not bring a positive result. Obviously, neither the agricultural lands in the east of the lake, nor the salted ridge with its characteristic relief and vegetation

in the west, are suitable for the reproduction of flamingos. In the controlled area, no conditions could be found to meet the requirements of the species for the location of a colony, known from the literature, or to locate the conical nests characteristic of the species. Therefore, the conclusion is that these birds did not nest in the nearby, but certainly elsewhere.

The locations of the drone search flights are shown in Fig. 4.



**Figure 4:** Drone flights on September 21, 2021, operated from the Saele sand levee, in order to identify the location of the possible flamingo colony (*Phoenicopterus roseus* Pallas, 1811) around Lake Tuzla.

Given the timing of the events (Table 1), it appears that the interval between the occupation of some areas of the lagoon system by the flamingos and their massive departure is too short for a successful nesting and raising chicks until they start to flight. After the arrival at the place of the colony of a group of flamingos physiologically willing to reproduce, it would take 1-9 days (on average 3.4 in France and Spain) until the laying of the first eggs. The actual hatching in the wild lasts 29 days. The fledging of the chicks lasts around 62-85 days, in the conditions of the Rhône delta in France, 80 days (Johnson and Cézilly, 2007). All these intervals combined make 92-117 days.

There are 96 days from the signalling in transit of the first flock on May 7<sup>th</sup> to the appearance of the juvenile flying on August 11<sup>th</sup>, but from the actual establishment of the flocks on May 24<sup>th</sup> we have only 79 days, which does not ensure the necessary time for a successful reproduction.

Therefore, it remains the option of nesting in other colonies, unknown, outside the borders of Romania, from where the juveniles arrived after taking flight. We quote here, from the monography about flamingos, a passage regarding the colour of the observed juveniles and as a reference to their origin in the Dobrogea lagoon area: “Juvenile flamingos have mottled warm-buff plumage with white underparts and little or no pink in the wing-coverts. They have a grey base to the bill and either black or grey legs with darker tarso-metatarsal joints. At this stage, they are between 2.5 and 10 months of age and have not reached full size. One can be sure that they are young of the previous breeding season, even though they may be observed hundreds of kilometers from where they were hatched” (Johnson and Cézilly, 2007).

By accepting the idea that the adult flamingos that arrived in Dobrogea are partially from the Mediterranean basin and the Anatolian Plateau, the issue of the origin of the chicks remains open, especially when the information from Turkey (\*\*\*\* 2021b; \*\*\*\* 2021c; Fraser and Guzel, 2021) support the total loss of the annual generation of chicks from Lake Tuz. It remains the variant of the existence of other unknown colonies, perhaps even farther away than those listed above, from which could have come the weaker flying juveniles, stopping or not, in stopover intermediate sites, also unknown. Using favourable winds, flamingos can travel extremely long distances, up to 4,800 km, of which 800-1000 km above sea level, so non-stop (Johnson, 1989; Johnson and Cézilly, 2008). Given this idea, we can not exclude the Central Asian origin of these birds, the most likely possible population being the one from Tengiz in Kazakhstan (50°42'N, 68°34'E), 3,070 km away.

Regarding the acceptance of these birds as nesters in Romania, more specifically in the Danube Delta Biosphere Reserve, we orient ourselves according to The EBACC Atlas of European Breeding Birds. There, in the table regarding "Breeding categories and codes", the category C: Confirmed breeding requires the fulfilment of 7 criteria, out of which only one (10: Distraction-display or injury-feigning) (Hagemeijer and Blair, 1997), was here observed and documented. This single criterion does not yet argue the classification of the species as breeding in Romania.

The appearance of flamingos in the studied area consolidates the need to reconsider the flamingo in the Extant & Vagrant category into non-breeding summer guests. The events discussed here are most probably representative of the expansion of the breeding range of the Greater flamingo, driven by the climate change and accelerated by anthropogenic disasters.

## CONCLUSIONS

To conclude, we quote from an American essay on avian movements and wetland connectivity in landscape conservation, as appropriate in this case: "*The current conservation crisis calls for research and management to be carried out on a long-term, multi-species basis at large spatial scales. Unfortunately, scientists, managers, and agencies often are stymied in their effort to conduct these large-scale studies because of a lack of appropriate technology, methodology, and funding. This issue is of particular concern in wetland conservation, for which the standard landscape approach may include consideration of a large tract of land but fail to incorporate the suite of wetland sites frequently used by highly mobile organisms such as waterbirds (e.g., shorebirds, wading birds, waterfowl). Typically, these species have population dynamics that require use of multiple wetlands, but this aspect of their life history has often been ignored in planning for their conservation*" (Haig et al., 1998).

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## REFERENCES:

- Amat J. A., Rendón M. A., Rendón-Martos M., Garrido A., Ramírez J. M., 2005. Ranging behaviour of greater flamingos during the breeding and post-breeding periods: Linking connectivity to biological processes. *Biological Conservation*. 125, pp. 183-192.
- Aslanidou K., 2020. 'Flamingo babies in Agios Mama, Halkidiki.' [Post] *Athina*. Available at: <https://www.athina984.gr/en/2020/07/07/mora-flamingko-ston-agio-mama-chalkidikis/> (Accessed: 07/07/2020)
- Azafzaf H. & Feltrup-Azafzaf C., 2015. Recent data on the breeding of the Greater Flamingo *Phoenicopterus roseus* in Tunisia. Poster presented at: *3rd International Flamingo Symposium*. DOI:10.13140/2.1.3932.4484
- Baccetti N., Panzarin L., Cianchi F., Puglisi L., Basso M., Arcamone E., 2008. Two new Greater Flamingo (*Phoenicopterus roseus*) breeding sites in Italy. *Flamingo*. 16, pp. 24-27
- Balkiz Ö, Béchet A., Rouan L., Choquet R., Germain C., Amat J.A., Rendón-Martos M., Baccetti N., Özsesmi U., Pradel R., 2009a. Metapopulation dynamics of the Greater Flamingo

- Phoenicopterus roseus* in the Mediterranean: implications for conservation. *Flamingo, Special Publication 1*, pp. 12-16.
- Balkiz Ö, Özsesmi U., Pradel R., Germain C., Sıkı M., Amat J.A., Rendón-Martos M., Baccetti N., Béchet A., 2009b. An update of the status of the Greater Flamingo *Phoenicopterus roseus* in Turkey. *Flamingo, Special Publication 1*, pp. 30-33
- Balkiz Ö, Özsesmi U., Pradel R., Germain C., Sıkı M., Amat J.A., Rendón-Martos M., Baccetti N., Béchet A., 2009c. Range of the Greater Flamingo, *Phoenicopterus roseus*, metapopulation in the Mediterranean: new insights from Turkey. *Journal of Ornithology*. 148(3), pp.347-355. DOI: 10.1007/s10336-007-0136-2
- Bensaci E., Bouzegag A., Guergueb E., Bounab C., Brahmia H., Nouidjem Y., Zeraoula A., Bouaguel L., Saheb M., Metallaoui S., Mayache B., Bouselama Z., Houhamdi M., 2011. Chott Merouane (Algérie): un nouveau site de reproduction du Flamant rose *Phoenicopterus roseus*. *Flamingo*. 18, pp. 33-37.
- Boucheker A., Samraoui B., Prodon R., Amat J., Rendón-Martos M., Baccetti N., Esquerre F. V., Nissardi S., Balkiz Ö., Germain C., Boulhssaim M., Béchet A., 2011. Connectivity between the Algerian population of Greater Flamingo *Phoenicopterus roseus* and those of the Mediterranean basin. *Ostrich*. 82 (3), pp. 167-174
- Diawara Y., Siddaty Z., Béchet A., 2008. Découverte de deux colonies de Flamants roses dans l'Aftout es Saheli, Mauritanie le 29 février 2008. *Flamingo*. 18, p. 28
- Dombrowski R.R., 1912. Ornithologiae Romaniae. Die Vogelwelt Rumanien's. Systematisch und Biologisch-Geographisch Beschrieben. București, România: Buletinul Societății Științifice. 19, pp. 675-677
- Draughn H., 2015. '*Phoenicopterus roseus* greater flamingo'. Animal Diversity Web. [Website] Available at: [https://animaldiversity.org/accounts/Phoenicopterus\\_roseus/](https://animaldiversity.org/accounts/Phoenicopterus_roseus/) (Accessed: 15/01/2022)
- Fraser S. & Guzel M., 2021. 'Turkey's Lake Tuz dries up due to climate change, farming'. AP NEWS. [Post] Available at: <https://apnews.com/article/climate-science-business-droughts-environment-137e6f52a8fe14db981a45d19e8907d1> (Accessed: 28/10/2021)
- Gache C. & Antonoaiea R., 2000. Contribuții la studiul avifaunei din perimetrul Agiea - Eforie Nord - Techirghiol. *Analele Universității din Oradea. Biologie*. 7, pp. 129-140
- Gavril V.-D., Petrescu A., Chișamera G.B., Cobzaru I., Mihai C., 2017. Review on the presence of Greater flamingo (*Phoenicopterus roseus* Pallas, 1811) in Romania. Poster presented at: The Ninth International Zoological Congress of "Grigore Antipa" Museum, 22-25 November 2017, Bucharest. Book of abstracts, p. 125
- Gavrilaș C., 2021. 'Pasarile Flamingo, asaltate si deranjate de turista. „Au intrat dobitocește în lacurile unde căutau hrană”.' [Post] *Adevărul de Constanța*. Available at: [https://adevarul.ro/locale/constanta/pasarile-flamingo-asaltate-deranjate-turisti-au-intrat-dobitoceste-lacurile-cautau-hrana-1\\_60b4d9305163ec42719d5387](https://adevarul.ro/locale/constanta/pasarile-flamingo-asaltate-deranjate-turisti-au-intrat-dobitoceste-lacurile-cautau-hrana-1_60b4d9305163ec42719d5387) (Accessed: 31/05/2021)
- Glutz von Blotzheim U.N., Kurt M., Bauer K.M., 1987. Handbuch der Vögel Mitteleuropas. Aula-Verlag GmbH. Wiesbaden 1, pp. 455-472
- Hagemeyer E.J.M. & Blair M.J. (eds.), 1997. The EBACC Atlas of European Breeding Birds: Their distribution and Abundance. London, UK: T & A.D. Poyser.
- Haig S.M., Mehlman D.W., Oring L.W., 1998. Avian movements and wetland connectivity in landscape conservation. *Conservation Biology*. 12 (4), pp. 749-758. DOI:10.1046/j.1523-1739.1998.97102.x
- Hansen K., 2021. 'Disappearing Lake Tuz: Large Lake Is Now Just a Puddle'. SciTech Daily. [Post] Available at: <https://scitechdaily.com/disappearing-lake-tuz-large-lake-is-now-just-a-puddle/>
- Johnson A.R., 1989. Movements of Greater flamingos (*Phoenicopterus ruber roseus*) in the western Palearctic. *Revue d'écologie – la Terre et la Vie*. 44, pp. 75-93
- Johnson A. & Cézilly F., 2008. The greater flamingo. London, UK: T & ADT & AD Poyser, p. 336
- Johnson A., Cézilly F., Boy V., 1993. Plumage development and maturation in the Greater flamingo *Phoenicopterus ruber roseus*. *Ardea*. 81(1), pp. 25-34
- Kiss J.B., Szabo L., 2002. The Greater Flamingos (*Phoenicopterus ruber roseus* Pallas 1911) in Romania. Scientific Annals of the Danube Delta Institute for Research and Development. 9 pp. 112-114
- Kiss J.B., 2016. Flamingók Romániában. Erdélyi Nimród. [Post] <http://erdelyinimrod.ro/archivum/300272> (Accessed: 08/05/2017)
- Khelifa R., Youcefi A., Bouzid A., Boucheker A., Boulhssaim M., Samraoui B., 2009 - A new breeding site for the Greater Flamingo *Phoenicopterus roseus* in Algeria. *Flamingo*. 17, pp. 44-47
- Linția D., 1944. O raritate ornitologică. Carpați. 2, pp. 49-50

- Linția D., 1944. *Păsările din R.P.R. Vol 3*. București, Romania: Editura Academiei Republicii Populare Româniă, p. 55-56
- Luca A., 2021. 'Păsările flamingo cuibăresc în Dobrogea pentru prima dată'. [Post] *Discover Dobrogea*. Available at: <https://discoverdobrogea.ro/pasarile-flamingo-cuibaresc-in-dobrogea-pentru-prima-data>
- Marina G., 2021. 'După imaginile spectaculoase din Deltă, păsările flamingo au fost hăituite de turiști cu bărci sau cu drone, așa că au părăsit zona.' [Post] *Digi24*. Available at: <https://www.digi24.ro/stiri/sci-tech/natura-si-mediu/dupa-imaginile-spectaculoase-din-delta-pasarile-flamingo-au-fost-haituite-de-turisti-cu-barci-sau-cu-drone-asa-ca-au-parasit-zona-1547069>
- Petrovich Z.O. & Nastachenko A.S., 2017. Greater Flamingo (*Phoenicopterus roseus*) is a new breeding species in the fauna of Ukraine. *Berkut*. 26(1), pp. 5-7
- Popenko V.M. & Andryushchenko Y.A., 2017. Nesting of Greater Flamingo (*Phoenicopterus roseus*) in Ukraine. *Branta*. 20, pp. 221-223. DOI: <https://doi.org/10.15407/branta2017.20.220>
- Postolachi V., 2011. Flamingo în România și în Republica Moldova. *Despre Păsări*. 1, p. 17
- Rendon-Martos M., Garrido A., Chávez J., Méndez J.M., Sayago J.M., 2008. Odiel Marshes: A new breeding site for Greater Flamingos (*Phoenicopterus roseus*) in Spain. *Flamingo*. 16, pp. 23-24
- Ridiche M.S., 2017. The Greater flamingo (*Phoenicopterus ruber roseus* Pallas 1911), a rare piece in the patrimony of the Oltenia Museum Craiova (Romania). *Muzeul Olteniei Craiova. Oltenia. Studii și comunicări. Științele Naturii*. 33(1), pp. 215-217
- Rubinić B., Sackl P., Gramatikov M., 2019. Conserving of wild birds in Montenegro. The first inventory of potential Special Protection Areas in Montenegro. Budapest: AAM Consulting, p. 66
- Samraoui B., Ouldjaoui A., Boukhssaim M., Houhamdi M., Saheb M., Béchet A., 2006. The first recorded reproduction of the Greater Flamingo *Phoenicopterus roseus* in Algeria: behavioural and ecological aspects. *Ostrich*. 77(3-4), pp. 153-159
- Savelji D., 2015. 'Status of Marine and coastal birds of Montenegro: species listed under Annex II of the Barcelona Convention Protocol on Specially Protected Areas and Biological Diversity in the Mediterranean' in Yésou P., Sultana J., Walmsley J., Azafaz H. (eds.), 2016. *Conservation of Marine and Coastal Birds in the Mediterranean. Proceedings of the Unep-Mac-Rac/Spa Symposium*, Hammamet, Tunisia, p. 176
- Spătaru D., 2021. 'Păsările flamingo cuibăresc în Dobrogea pentru prima oară. Colonia are deja zece pui.' [Post] *RomâniaTV*. Available at: [https://www.romaniatv.net/pasarile-flamingo-cuibaresc-in-dobrogea-pentru-prima-oara-colonia-are-deja-zece-pui\\_5749208.html](https://www.romaniatv.net/pasarile-flamingo-cuibaresc-in-dobrogea-pentru-prima-oara-colonia-are-deja-zece-pui_5749208.html)
- Treep J.M., 2000. Flamingos presumably escaped from captivity find suitable habitat in Western Europe. *Waterbirds*. 23(1), pp. 32-37
- Țaga M., 2021. 'Peste 100 de păsări flamingo au fost observate în Delta Dunării' [Post] *Adevărul de Tulcea*. Available at: [https://adevarul.ro/locale/tulcea/peste-100-pasari-flamingo-fost-observate-delta-dunarii-1\\_60ae41c05163ec427172b4c0/index.html](https://adevarul.ro/locale/tulcea/peste-100-pasari-flamingo-fost-observate-delta-dunarii-1_60ae41c05163ec427172b4c0/index.html)
- \*\*\*\* 2014. BBC NEWS. 'World's oldest flamingo dies in Australian zoo at 83'. [Post] Available at: <https://www.bbc.com/news/world-asia-25976523>
- \*\*\*\* 2019. Daily Sabah. 'Flamingos invade Lake Tuz, creating very scenic view'. [Post] Available at: <https://www.dailysabah.com/life/2019/06/14/flamingos-invade-lake-tuz-creating-very-scenic-view>
- \*\*\*\* 2020a. BirdLife Cyprus. 'Flamingo breeding in Cyprus: will our handsome pink visitors ever make it?' [Post] Available at: <https://birdlifecyprus.org/flamingo-breeding-in-cyprus-will-our-handsome-pink-visitors-ever-make-it-2/>
- \*\*\*\* 2020b. Realitatea de Brăila. 'FOTO VIDEO| Apariție exotică în Delta Dunării. Cel mai numeros grup de păsări flamingo observat în ultimul secol'. [Post] Available at: <https://realitateadebraila.net/foto-video-aparitie-exotica-in-delta-dunarii-cel-mai-numeros-grup-de-pasari-flamingo-observat-in-ultimul-secol/>
- \*\*\*\* 2021a. ARBDD. 'Revenirea păsărilor flamingo în RBDD.' [Post]. Available at: <https://www.facebook.com/ARBDD/posts/2396880380456515> (Accessed: 26/05/2021)
- \*\*\*\* 2021b. BIA News Desk. 'Hundreds of baby flamingos die in Turkey's Lake Tuz' [Post] Available at: <https://bianet.org/english/environment/247251-hundreds-of-baby-flamingos-die-in-turkey-s-lake-tuz>
- \*\*\*\* 2021c. Daily Sabah. 'Mass flamingo deaths grip drying Turkish lake'. [Post] Available at: <https://www.dailysabah.com/turkey/mass-flamingo-deaths-grip-drying-turkish-lake/news>

- \*\*\*\* 2021d. HotNews. 'De ce păsările flamingo nu-și vor face cuiburi în Delta Dunării: "Au fost hăituite continuu".' [Post] Available at: <https://www.hotnews.ro/stiri-esential-24829997-flamingo-delta-dunarii-cuiburi-turisti-poze.htm>
- \*\*\*\* 2021e. Tulcea Noastră. '62 de păsări flamingo observate în Delta Dunării miercuri'. [Post] Available at: <https://www.tulceanoastra.ro/delta/62-de-pasari-flamingo-observate-in-delta-dunarii/>
- \*\*\*\* 2022. BirdLife International. 'IUCN Red List for birds. Species factsheet: *Phoenicopterus roseus*.' Available at: <http://www.birdlife.org> (Accessed: 05/04/2022)
- \*\*\*\* ANIMAL LIFE EXPECTANCY Live Longer Live Better. Greater flamingo. *Phoenicopterus roseus*. [Website] Available at: <https://www.worldlifeexpectancy.com/bird-life-expectancy-greater-flamingo> (Accessed: 05/04/2022)
- \*\*\*\* Rombird. [Website] Available at: <https://rombird.ro/ro/obl/index?kereses=2&mfaj=70>
- \*\*\*\* Tour-du-Valat. All about greater flamingo. A research centre for the conservation of Mediterranean wetlands, pp. 2-15.