

Monitoring the breeding of the Greater Flamingo *Phoenicopterus roseus* at the Khnifiss Lagoon, southern Morocco

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Suivi de la reproduction du Flamant rose *Phoenicopterus roseus* à la lagune de Khnifiss, sud du Maroc.

Dans cet article, nous rapportons les résultats du suivi d'une colonie reproductrice de Flamant rose découverte dans la lagune de Khnifiss, au sud du Maroc, en nous concentrant sur le succès de reproduction et les menaces potentielles sur la colonie. Le site de nidification est une petite île qui est susceptible d'être submergée à marée haute et accessible aux prédateurs à marée basse. La combinaison de ces facteurs peut avoir causé le faible taux de succès de reproduction qui est de seulement 8 %. La présence de poussins morts suggère également une prédation par des mammifères terrestres et/ou des Goélands bruns. Nous recommandons quelques mesures de conservation urgentes afin d'améliorer le succès de reproduction et d'aider l'espèce à coloniser durablement le site.

Introduction

The Greater Flamingo is known in Morocco as a regular migrant and winterer. In winter, the species frequents more than 40 Moroccan wetlands (lagoons, bays, estuaries, dam lakes, sebkhas) with an average annual population of about 5000 individuals (El Agbani 2017; Qninba 2017; Ouassou 2017). The largest concentrations of wintering Greater Flamingo are observed in the Khnifiss Lagoon (max 6000 individuals), Oued As-Saqia Al Hamra in Laayoun, Baie d'Ed-Dakhla and Sebkha Zima (max 4000 individuals). During the summer season, several hundred birds, which are not of breeding age, summer in several Moroccan wetlands. The Greater Flamingos that are seen wintering in the Moroccan Atlantic Sahara come mainly from the West Mediterranean metapopulation of about 165,000 individuals, of which 55,000 pairs breed in Algeria (Saheb, 2006 ; Khelifa, 2009 ; Mesbah, 2014; Semraoui, 2015), Tunisia (Azafzaf, 2007, 2019), Spain, France, Italy (Baccetti, 2008) and probably also in Mauritania (Wetlands International 2006). Ring readings of breeding pairs in Algeria and Tunisia show that breeding individuals come from populations of Greater Flamingo that breed in Spain, France and Italy (Bouchecker, 2011; Geraci, 2012).

In Morocco, nesting of this species was observed in Lake Iriki (near Mhamide El Ghizlene, Zagora region) between 1957 and 1968. The number of breeding pairs varied between 500 and 1500 pairs (Panouse 1958, 1965; Robin 1966, 1968). Unfortunately, this species deserted this nesting site after Lake Iriki was drained following the construction of the El Mansour Eddahbi dam in 1971. It should also be noted that breeding attempts were reported at Saquiat Al Hamra (Daoura and Laâyoune) (Valverde 1957) and nesting was suspected at Khnifiss (Valverde 1957; Naurois 1961, 1967) and at SebkhaZima (Robin 1967).

In June 2022, a survey of the Khnifiss Lagoon revealed the reproduction of a Greater Flamingo colony (Radi et al, 2022) and the production of chicks.

Materials and methods

Description of the Khnifiss Lagoon. The Khnifiss Lagoon is located on the Moroccan Atlantic coast, about 80 km north of the city of Trfaya. With a surface area of 20,000 ha, this wetland, classified as a Ramsar site in 1980 and reviewed in 2005, is part of the Khnifiss National Park (Fig. 1). It corresponds to a complex of several wetlands hosting diverse habitats (Fig. 2):

- Coastal waters delimited by the sandy beach and sharp sand dunes.
- Lake waters corresponding to the bottleneck of the lagoon and the mouth of Wadi Awadri, characterised by eelgrass and spartina beds and intertidal sandbanks.
- Waters of the extension of the channels of the lagoon with salt-water meadows.
- Permanently submerged areas with algal matting.
- Flat areas of Sebkhia Tazra with temporary submersion during spring tides.
- Salt pans.

The nesting site is located in Sebkhia Tazra about 1.5 km north of the Tazra salt pans (Fig. 1).

The monitoring of this colony is spread out between 2 June and 9 September, with visits to the site being made in the morning between 10:00 and 13:00.

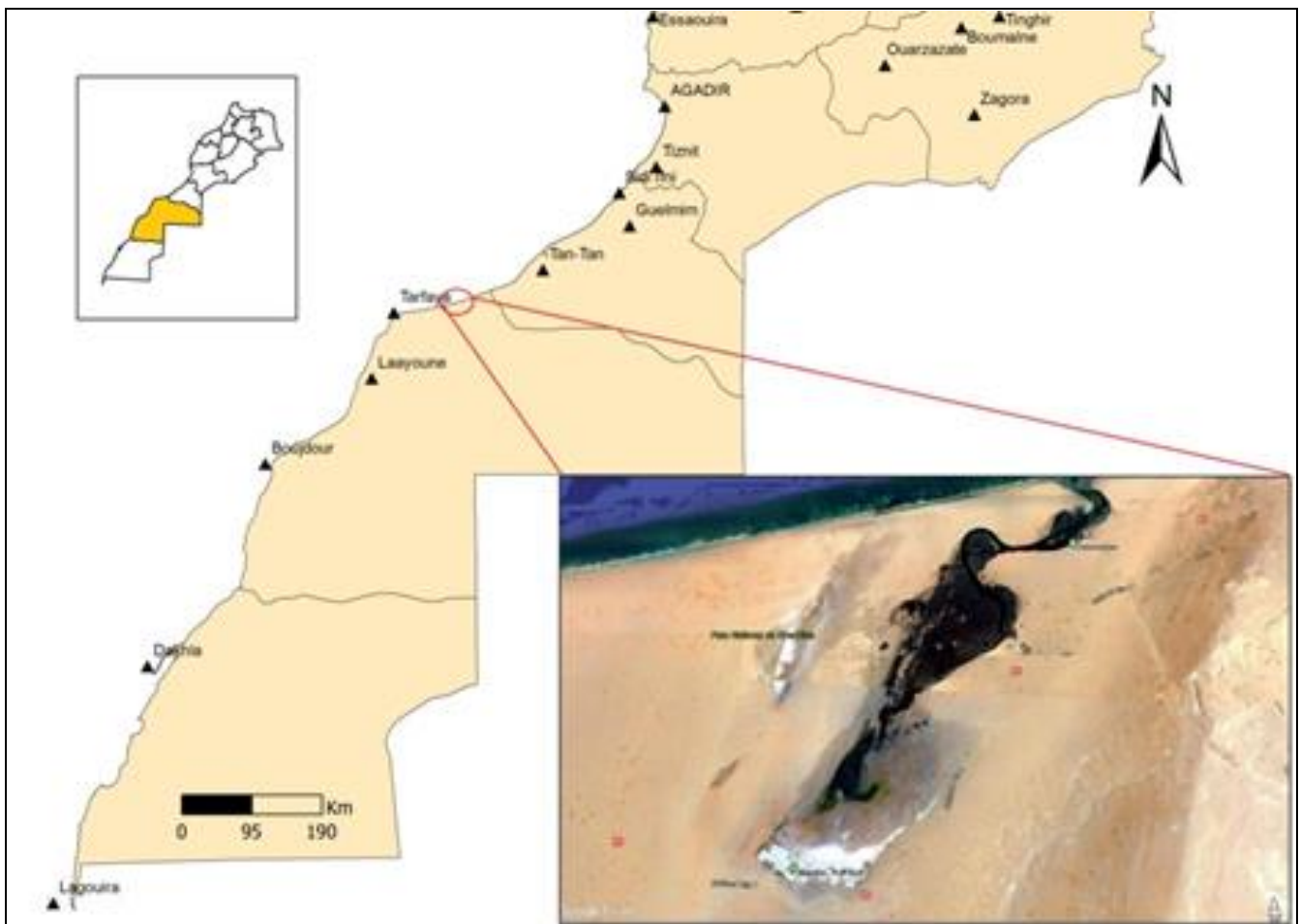


Figure 1. Location of the nesting site of the Greater Flamingo at the Khnifiss Lagoon.

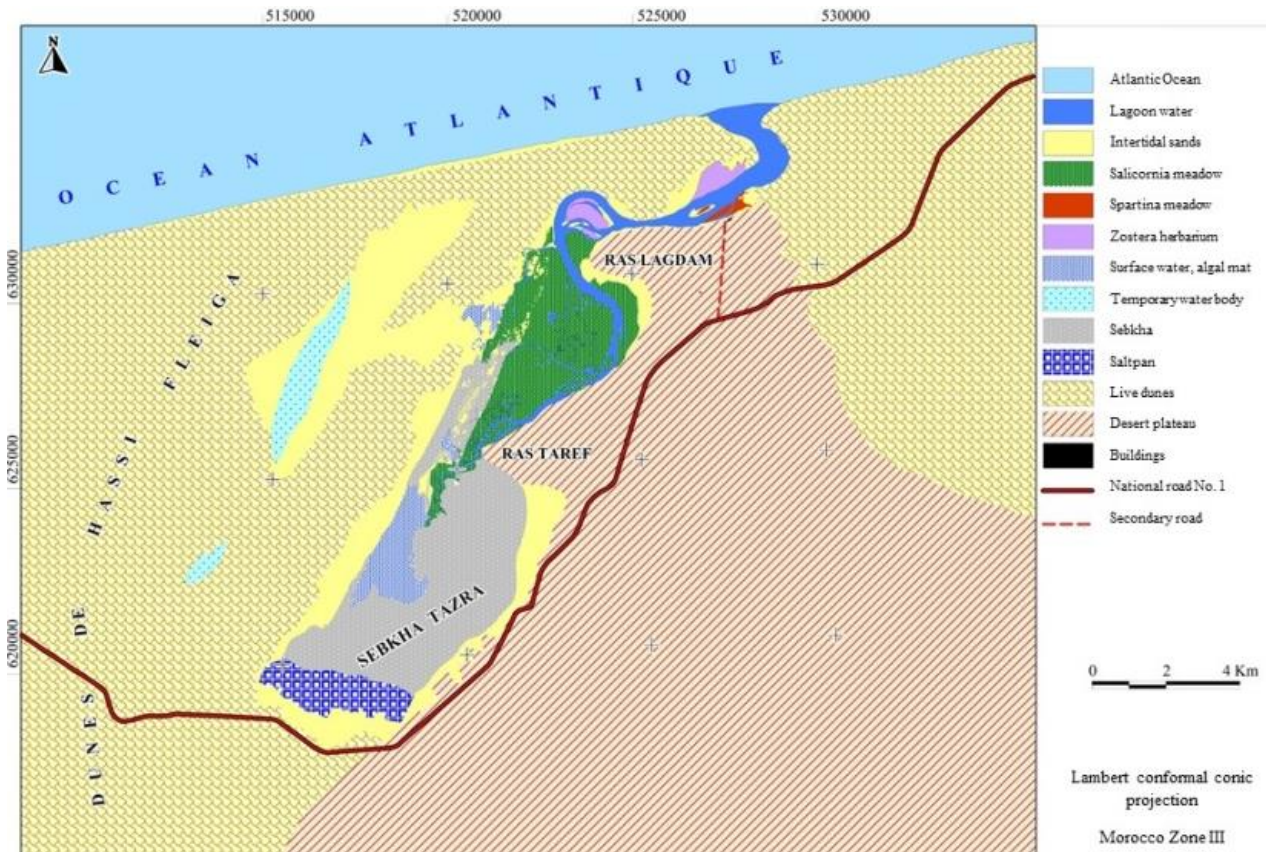


Figure 2. Mapping the habitats of the Khnifiss Lagoon (Direct digitalization on Google earth).

Results and discussion

The nesting island has a fusiform configuration of 30 meters in length and a maximum width of 4 meters (Photo 1, 2). Once on the nesting island, 274 nests were counted, some of which contained crushed chick corpses. Between the nests, other corpses littered the nesting site (Photos 3, 4). The total number of dead chicks reached 36 corpses. We noticed that some of the nests located on the periphery of the island are submerged by the waters of the high tide. At low tide, the nesting site is easily accessible.

The total number of Greater flamingos present in the vicinity of the nesting site is close to 1024 individuals, including 834 adults corresponding to 417 potential breeding pairs.



Photos 1 & 2. Nesting site with submerged nests.



Photos 3 & 4. Crushed and damaged carcasses of dead chicks at the nesting site.

The 22 chicks were observed for the first time on 17 July (photo 5, 6). They had grey down and heterogeneous sizes, which suggests a spread out hatching. The chicks were grouped together at the northern tip of the islet and as we approached, they moved into the water accompanied by adults.



Photo 5. Chicks at the nesting island



Photo 6. Adults accompanied by chicks.

No chicks were observed during the visit to the colony on 22 June. Considering that semi-nesting chicks leave the nest after 10 days and gather in a crèche, the observation of chicks on 17 July suggests that the probable date of hatching of the chicks is between the end of June and the beginning of July. Consultation of old Google photos (7, 8, 9), shows that the breeding island appeared from 2016, which proves that the installation of this colony on this island is recent.



Photo 7. Breeding site in 2013.



Photo 8. Breeding site in 2016.



Photo 9. Breeding site in 2018 & 2022.

Calculated for 22 live chicks, the breeding success rate of this colony is 8%. Assuming that each pair produces one egg, a production of 274 chicks is expected. The low number of hatched chicks is 58 (22 live and 36 dead), so 216 chicks are missing. This high loss of chicks and very low reproductive success rate may be related to the size of the nesting site (small area), the particular hydrology of the nesting site during high tides (submergence of nests) and the impact of terrestrial and aerial predators (disturbance). The possibility that only 58 of the 274 nests were functioning can be ruled out, as photos of the entire colony show that all nests were occupied by incubating Flamingos. Despite the presence of Lesser Black-backed Gulls in the vicinity of the nesting island, no predatory or harassing behavior of the Greater Flamingo was observed during our presence in the nesting site. However, fox prints were recorded on the banks.



Photo 10. The Greater Flamingo breeding colony at the Khnifiss Lagoon.

To explain this low productivity of this colony, we can consider that during the breeding season, a major disturbance occurred, leading to the cessation of breeding and the desertion of the nesting site, and the unbrooded eggs are predated, either by Lesser Black-backed Gulls (presence of about 600 individuals), or by terrestrial mammals, knowing that the nesting site is easily accessible at low tide. It can also be assumed that the nests are submerged and the eggs are washed away and predated. In both cases, the hatched chicks managed to survive. It should be noted that only one unenclosed egg is monitored at the nesting site.

A survey of nomadic populations that frequented the Khnifiss lagoon during the 1920s affirmed that a breeding colony of Greater flamingos (eggs and chicks) had been decimated by striped hyena. The presence of the latter species in the Khnifiss area is reported until the 1980s.

In the light of the bibliographical data and the testimonies collected from the nomadic population of the Khnifiss lagoon, we can conclude that the reproduction of the Greater Flamingo in the Khnifiss lagoon, in particular at Sebkha-Tazra, is very old and that this reproduction depends on the hydrological regime which determines the appearance and stabilization of the islets which constitute favourable sites for the reproduction of this species and on the disturbance by natural predators. With the exception of the salt extraction activity in the extreme south, the Sebkha-Tazra area is very little frequented by humans.

In order to perpetuate the presence of this breeding colony of the Greater Flamingo in the Khnifiss lagoon, particularly in Sebkha-Tazra, urgent conservation measures must be taken, namely:

- Construction of a fence to eliminate possible disturbances by terrestrial predators and especially stray dogs, which are increasing in the region.
- Enlargement and elevation of the islands to increase the number of breeding pairs and avoid submergence of the nests.
- Monitoring and guarding the Greater Flamingo colony.
- Scientific monitoring of the breeding of the Greater Flamingo during the next breeding season, in order to gather more data on the phenology of the breeding, the hydrological functioning of the nesting site and the impact of predation and disturbance on this breeding colony.
- Raising awareness of the local population, in particular the fishermen who frequent the various compartments of the Khnifiss Lagoon.

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