

# Monitoring of the Greater flamingo *Phoenicopterus roseus* in Mauritania

Yelli Diawara<sup>1</sup>, Antoine Arnaud<sup>2</sup>, Camara Mohamed<sup>1</sup>, & Arnaud B chet<sup>2</sup>

<sup>1</sup> Parc National du Banc d'Arguin, BP 5355 NouakChott, R publique Islamique de Mauritanie.

E-mail: yelli-pnba@mauritania.mr

<sup>2</sup> La Tour du Valat, le Sambuc, 13 200 Arles, France

## Abstract

The Greater Flamingo (*Phoenicopterus roseus*) is one of the most abundant waterbirds in Mauritanian coastal wetlands. It is observed year round, from the tidal mudflats of the Banc d'Arguin in the north to the freshwater and salt marshes of the Aftout es Saheli, Chatt Boul and Diawling National Park in the Senegal delta in the south. Breeding has been recorded several times in the Banc d'Arguin, where there has been a recent relocation of the colony from a low-lying island to the high rocky plateau of the Kiaone islands. The number of breeding pairs has varied from 8,200 in 2003 to a maximum of 16,600 in 2005, with breeding success varying from 43% to 83%. Ninety two percent of the flamingo rings resighted in Mauritania have been from birds hatched in Spain, supporting the hypothesis of an heterogeneous dispersal from Mediterranean breeding sites to West Africa, via a western flyway from Andalusia to Mauritania.

## Introduction

The Greater Flamingo is one of the most abundant waterbirds in Mauritanian coastal wetlands. It is observed year round, from the tidal mudflats of the Banc d'Arguin in the north to the freshwater and salt marshes of the Aftout es Saheli, Chatt Boul and Diawling National Park in the Senegal delta in the south. Breeding has been recorded several times in the Banc d'Arguin, where there has been a recent relocation of the colony from a low-lying island to the high rocky plateau of the Kiaone islands (Trotignon 1976, Campredon 1987, C zilly *et al.* 1994, Gowthorpe *et al.* 1996, Diawara *et al.* 2007).

Since the creation of the Diawling National Park (PND) and the Chatt Boul Natural Reserve in the delta of the Senegal River, Greater Flamingos are observed there every winter, including juveniles which are especially abundant from October to March (Hamerlynck 1997). Breeding was only observed there at the end of the 80's, following heavy winter rainfall that broke the sandbank south of Chatt Boul and flooded the Aftout es Saheli (Gowthorpe *et al.* 1996).

Since 1977, a program of banding flamingos with individually-coded PVC bands has been conducted in the Camargue, France (Johnson 2000). This type of program has also been conducted in Spain since 1986 and in Italy since 1994. Greater Flamingos banded in these three countries have been observed regularly in Mauritania, in all seasons, since 1978 (Trotignon and Trotignon 1981, Johnson 1989). These observations have lead to the hypothesis that there were genetic exchanges between the Mediterranean and Mauritanian populations, and this has been confirmed recently by the observation of Mediterranean birds feeding chicks on Kiaones Island (Diawara *et al.* 2007). In this paper, we update the results presented in Diawara *et al.* (2007) and propose some avenues for future investigation.

## Study area

The Banc d'Arguin National Park is located near the 20th parallel and extends >180 km along the Mauritanian coast. It includes an area of 12,000 km<sup>2</sup>, with an equal proportion of coastal and terrestrial habitats (Figure 1). The Banc d'Arguin itself is a very shallow tidal mudflat (*e.g.* only five meters deep 50 km from the coast) crossed by channels and covered with submerged grass beds. This exceptional ecosystem is flooded by upwellings of cold water rich in nutrients. The simultaneous presence of grass beds and upwellings creates high biological productivity, which explains the dense populations of birds, fish, invertebrates and marine mammals.

In the southern region of Mauritania, coastal wetlands are concentrated around the Senegal River delta, between 16°02'N and 16°35'N (Figure 1). Until recently this delta was alternatively inundated by fresh and marine water, favoring the growth of an extremely rich biodiversity (Hamerlynck 1997). Since 1970, lack of rainfall and the building of several dams in the valley of

the Senegal River have considerably degraded this unique ecosystem. To attenuate the effects of these developments, a conservation plan has been encouraged for the lower delta which has resulted in the creation of the Diawling National Park (PND) in 1991 and the Chatt Boul Natural Reserve, now both included in a Biosphere reserve which additionally includes Aftout es Saheli.

## Methods

Aerial surveys of flamingos, using pre-defined transects, were conducted at the Banc d'Arguin National Park and the Senegal Delta between 2003 and 2007. The Banc d'Arguin surveys were conducted between the 9th of April and the 7th of May. The surveys of the Senegal River delta were conducted from the end of November to the beginning of December. In 2006 and 2007, three terrestrial expeditions were also conducted in the Aftout es Saheli.

During the aerial surveys all flamingos were counted, and the breeding colonies were photographed using a 24x36 reflex camera with a 50-70mm zoom. Incubating birds and chicks were counted using a digital pen on the photograph film, enlarged to 75x50 cm, or using MapInfo on digitalised photographs. In years when some chicks had already hatched at the time of the survey, we estimated the number of breeding pairs by adding the number of chicks to the number of incubating birds counted on the photographs.

Terrestrial expeditions to the Grande Kiaone colony in the Banc d'Arguin have been conducted during the first half of June each year since 2003. Observations were made by getting close to the colony with a mobile hide on a sandbank during the 2-3 hours of low tide. Observation periods were chosen to be during high tide periods at the end of the day to coincide with the return of the adults to the colony for feeding their chicks (Cézilly *et al.* 1994). The peak laying date was estimated based on the age of the chicks at the crèche. At Kiaone Island, flamingos breed among other waterbird species, such as *Sterna caspia*, *Ardea cinerea*, *Sterna anaethetus*, *Gelochelidon nilotica*, *Phalacrocorax africanus* and *Platalea leucorodia balsaci*. We took all necessary precautions to avoid disturbing the birds, and in particular, we did not climb onto the island.

## Results

### *Greater Flamingo breeding at the Banc d'Arguin*

From 2003 to 2006, we estimated the peak laying date between 1st and 25th of March.

**Table 1.** Banc d'Arguin aerial and terrestrial survey dates and estimated peak laying dates of Greater Flamingos breeding on Grande Kiaone Island.

Year	Aerial survey	Terrestrial survey	Est. peak laying date
2003	26 April	26-30 May 12-16 August	10-15 March
2004	7 May	2-6 June	1-10 March
2005	9 April 3 June	4-7 June	25 March
2006	10 June	8-12 June	25 March
2007	17 April	12-15 June	1-10 March

Greater flamingos are now regular breeders on Grande Kiaone Island, where they find the lack of disturbance required for successful breeding. The number of breeding pairs varied from 8,200 in 2003 to a maximum of 16,600 in 2005 (Figure 2), with breeding success ranging from 43% to 83%. We suspect that the high number of breeding pairs recorded in 2005 could have resulted from the absence of breeding at Fuente de Piedra, the main Spanish breeding site. In contrast, a similar effect was not found in 2007 when there was no breeding in the Camargue.

From 2003 to 2007 we made a total of 160 resightings of 148 different birds, with 11 of them shown to be breeders, as they were feeding a chick in the crèche on Kiaone Island (Table 2). In 2003, the only banded breeder we saw had been marked as an adult in Spain, so its age and natal origin were unknown. In 2004, the two banded breeders observed were eight and seven years old respectively and had never before been observed breeding. In 2005, we observed a

much higher number of Mediterranean birds than were usual observed, and especially seven Spanish birds feeding chicks.

**Table 2.** Observation effort, number of bands resighted, origin of the resighted bands (number breeding), and percentage of the resighted birds that had not been sighted previously at Kiaone Island, Mauritania.

Year	Observation effort	Observation effort (days)	Bands read	Origin of bands			New bands (%of total read)
	(hours)			Spanish	French	Italian	
2003	25.5	7	16	11 (1)	4	1	16 (100%)
2004	27.5	5	29	20(1)	9(1)		27 (93%)
2005	21,15	5	50	47(7)	3		44 (88%)
2006	16.30	4	24	20(2)	4		17 (71%)
2007	14.30	4	36	33 (0)	3		25 (69%)

### Surveys of the Aftout es Saheli

A breeding attempt was observed in December 2004, but a terrestrial survey suggested that this breeding attempt failed, probably because of disturbance and/or poaching. The sites where flamingos had previously bred were empty of water at the time of our surveys in following years.

### Juvenile dispersal

In 2007, we noted the quasi-absence of juveniles from the previous year in Banc d'Arguin National Park. In contrast, in May 2007, more than 20,000 flamingos were counted in the Aftout es Saheli, most of which were juveniles. However we cannot be certain that these juveniles come from Banc d'Arguin National Park.

### Discussion

The large majority (92%) of bands observed at the Grande Kiaone colony were from birds hatched and banded in Spain. This suggests the existence of a Spain-to-Mauritania flyway. Hence the link between the Mediterranean and West African populations of Greater Flamingos is mainly due to Spanish birds, with 11 of them found breeding in the Banc d'Arguin.

The crèche and adults appeared to be less and less disturbed by the observers. In 2007, the crèche was very far down the cliff on Kiaone Island, enabling observers to have more opportunities to read bands, but at the same time making access more difficult.

### References

- Campredon, P.** 1987. La reproduction des oiseaux d'eau sur le parc national du Banc d'Arguin (Mauritanie) en 1984-1985. *Alauda*, 55(3):187–209.
- Cézilly, F., Gowthorpe, P., Lamarche, B. and Johnson, A. R.** 1994. Observations on the breeding of the greater flamingo, *Phoenicopterus ruber roseus*, in the Banc d'Arguin national park, Mauritania. *Colonial Waterbirds*, 17:181–183.
- Diawara Y., Arnaud, A., Araujo, A. and Béchet, A.** 2007. Nouvelles données sur la reproduction et l'hivernage des flamants roses *Phoenicopterus roseus* en Mauritanie et confirmation d'échanges avec les populations méditerranéennes. *Ostrich*, 78(2):469–474.
- Gowthorpe P., Lamarche, B., Binaux, R., Gueye, A., Lehlou, S. M., Sall, M. A. and Sakho, A. C.** 1996. Les oiseaux nicheurs et les principaux limicoles paléarctiques du parc national du banc d'arguin (mauritanie). Dynamique des effectifs et variabilité dans l'utilisation spatio-temporelle du milieu. *Alauda*, 64(2):81–126.
- Hamerlynck, O.** 1997. Plan Directeur d'aménagement du Parc National du Diawling et de sa zone périphérique de 1996 à 2001. UICN PND, Nouakchott. Extent of Work: 63pp.