On the wrong side of the Atlantic: first record of wild Greater Flamingo Phoenicopterus roseus in Brazil and in the Americas?

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Source: Bulletin of the British Ornithologists' Club, 142(2) : 231-238

Published By: British Ornithologists' Club

URL: https://doi.org/10.25226/bboc.v142i2.2022.a7

On the wrong side of the Atlantic: first record of wild Greater Flamingo *Phoenicopterus roseus* in Brazil and in the Americas?

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Received 10 December 2021; revised 1 March 2022; published 3 June 2022

http://zoobank.org/urn:lsid:zoobank.org:pub:B9BD6A90-A29E-4F9E-9EB5-F963A9EE88E5

Summary.—We present the first report of Greater Flamingo *Phoenicopterus roseus* in Brazil, an individual at Araruama, Rio de Janeiro state, in late November 2021 until at least early April 2022, and discuss hypotheses to explain its appearance so far from the species' normal distribution. We believe that it was either an escapee from a captivity or a genuine vagrant that reached Brazil due to bad weather. We also reviewed earlier reports of this species in the Americas on citizen science databases, all of which pertained either to misidentifications, a single escaped individual, or taxonomic misclassification. Given the species' ability to make long-distance movements, including over-water dispersal, we contend that the *P. roseus* in Brazil was the first record for South America and the first wild bird in the Americas.

Phoenicopteridae comprises six modern species of flamingos in three genera: *Phoenicopterus*, *Phoenicoparrus* and *Phoeniconaias* (Gill *et al*. 2021). These pink to reddish tall-standing wading birds are well known for their unique body features, bright coloration and social behaviours (del Hoyo *et al*. 2020), being one of the most easily recognised bird groups among ornithologists, birdwatchers and the general public alike (Rose *et al*. 2014, Delfino & Carlos 2021). Greater Flamingo *Phoenicopterus roseus* is the most widespread and second most abundant species in the family, with a global population estimated at 680,000 individuals in the wild and 8,324 in captivity (FSG 2021). Distributed from southern Africa to southern Europe, India and the Middle East, it usually occurs at saline lagoons, lakes and other coastal wetlands (Balkız *et al*. 2007, 2010, del Hoyo *et al*. 2020). It is present year-round in a number of regions, but seasonal at some sites and is present only sporadically in others (Johnson 1989, Sanz-Aguilar *et al*. 2012, del Hoyo *et al*. 2020).

Greater Flamingo performs seasonal movements but also undertakes highly irregular patterns of displacement, varying among locations, populations and time of year (Johnson 1989, Balkız *et al*. 2007, 2010, Lees & Gilroy 2021). Significant seasonal movements occur among Mediterranean, North African and Middle Eastern populations in response to adverse weather conditions, with a certain degree of site fidelity (Johnson 1989, Balkız *et al*. 2010, del Hoyo *et al*. 2020). Nevertheless, some erratic or nomadic records are available, reflecting food availability and wetland condition (Johnson 1989, Kumssa & Bekele 2014, Bensaci *et al*. 2015, Kumar & Rana 2021, Lees & Gilroy 2021). In some cases, inclement weather (or other factors) can lead to birds appearing far outside the normal range, e.g., in Siberia, northern Europe and China (Johnson 1989, del Hoyo *et al*. 2020). Here, we report the first observation of a Greater Flamingo in Brazil and review other reports in the Americas. Possible explanations for the bird's appearance on the 'wrong' side of the Atlantic are discussed. We believe that it could be the first wild record in the Americas.

ISSN-2513-9894 (Online)

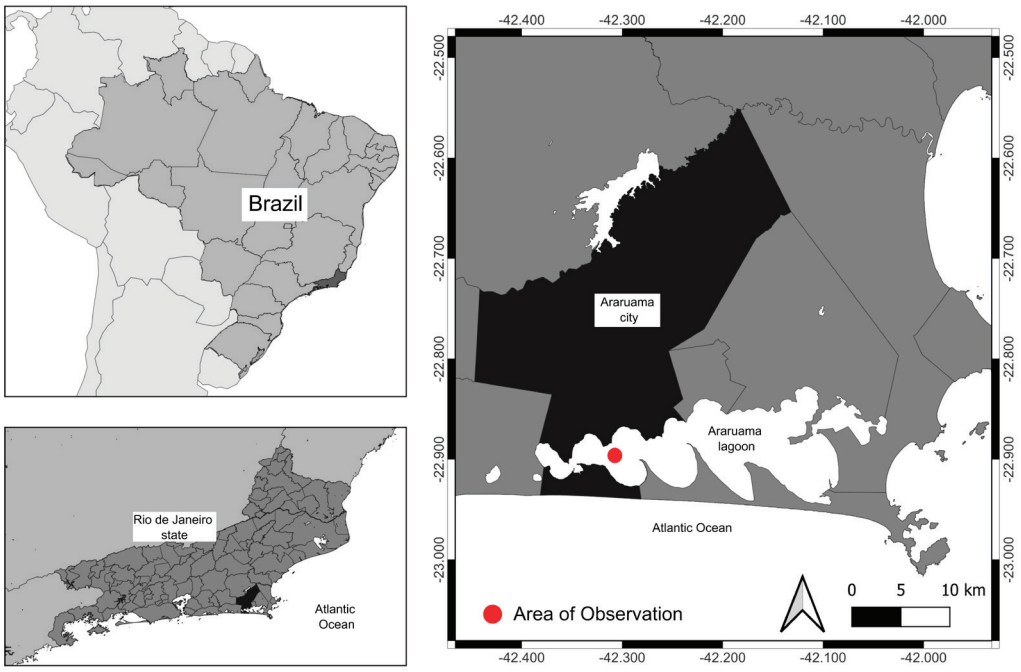

Figure 1. Lagoa de Araruama, the largest permanent hypersaline lagoon in the world, showing the location of the first record of Greater Flamingo *Phoenicopterus roseus* in Brazil, near Araruama.

First record of Greater Flamingo in Brazil

The first record of a Greater Flamingo in Brazil was near Araruama (22°54′54.2″S, 42°22′05.0″W), Rio de Janeiro state, on the south-east coast of Brazil, where it was first seen on 28 November 2021 (Fig. 1). It was found by a group of birdwatchers near Araruama saltpans, Praia Seca, close to Lagoa de Araruama, a hypersaline lagoon with 160 km of shoreline, 37 km long and up to 13 km wide. The mean depth of the lagoon is 2–3 m (Kjerfve *et al*. 1996) (Fig. 1).

Analysis of feather pattern and bare-parts coloration of the individual suggests it was a near-adult (Johnson *et al*. 1993), as the grey on the head, neck and chest indicates the bird was not fully mature, despite the colour of the bare parts and presence of full-coloured feathers on other tracts (Johnson *et al*. 1993, Shannon 2000, Chiale *et al*. 2018) (Fig. 2). Flamingos older than one year are already independent and can move long distances (Barbraud *et al*. 2003, del Hoyo *et al*. 2020).

Despite being similar to congenerics (Chilean Flamingo *P. chilensis* and American Flamingo *P. ruber*), the Greater Flamingo was identified by three distinctive characters (Fig. 2). (1) Greater Flamingo has a slightly larger bill, with the distal third black and the culmen ridge and basal region being white or slightly pinkish; Chilean and American Flamingos have the bill almost half black, with the basal half white (Chilean Flamingo) or orange (American Flamingo) (Jenkin 1957, Kear 1969, Mascitti & Kravetz 2002) (Fig. 2). (2) Greater Flamingo has entirely pinkish legs, with no difference in colour between the tarsometatarsus, tibiotarsus and intertarsal joint. The pattern is very similar to American Flamingo, but the latter has the joint slightly more pinkish or reddish than the rest of the leg; Chilean Flamingo has the tarsometatarsus and tibiotarsus yellow or grey, with only the intertarsal joint and feet pink (Kear 1969, Johnson *et al*. 1993, del Hoyo *et al*. 2020). (3) Greater Flamingo has pale pink or white feathers, with some reddish ventrally, but

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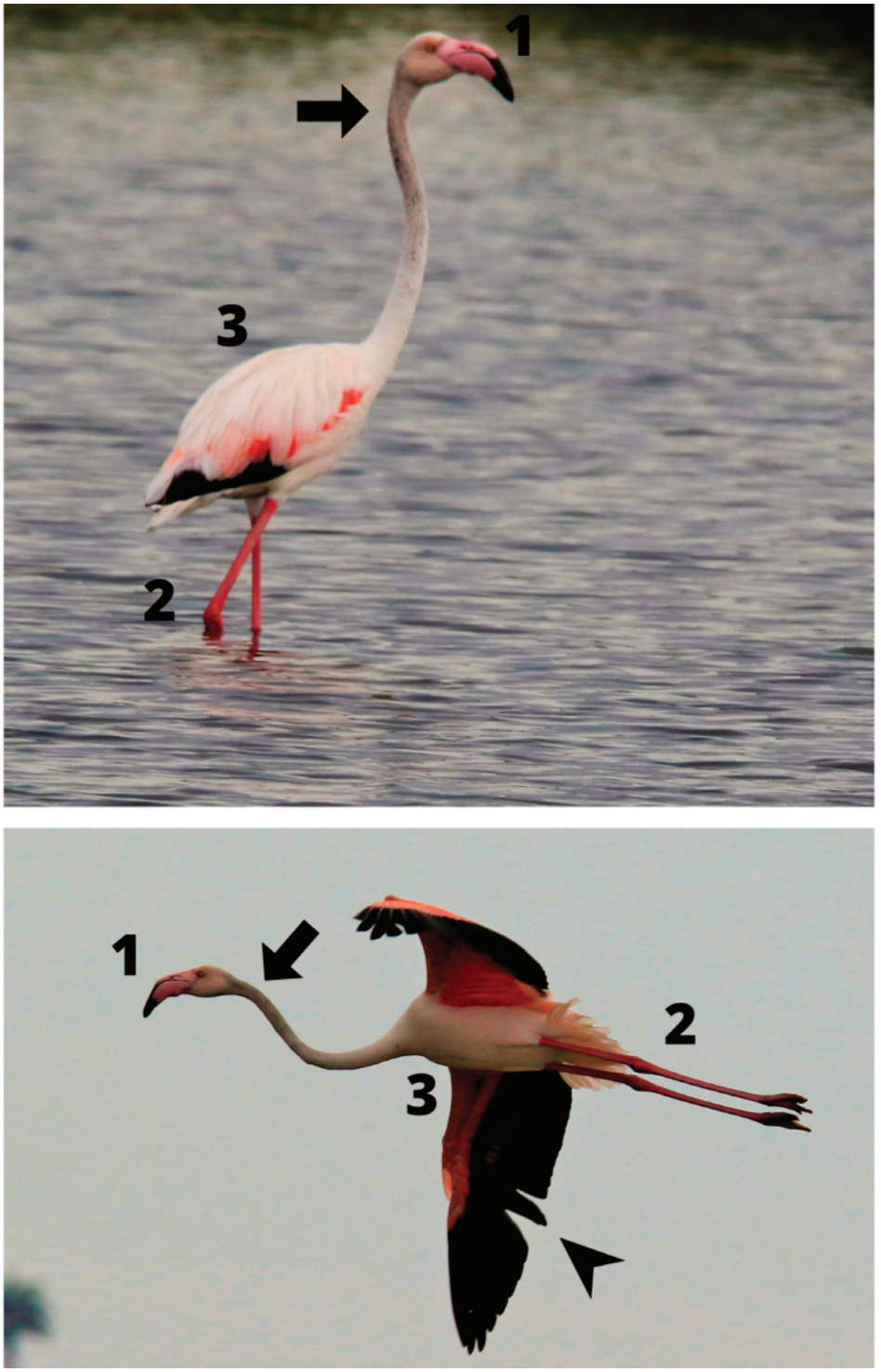

Figure 2. Greater Flamingo *Phoenicopterus roseus*, Lagoa de Araruama, Rio de Janeiro state, Brazil, showing three distinctive characters used for identification: (1) the colour and pattern of the bill, (2) the pink legs and ankles; (3) the pale pink feathers on the body; the arrows highlight the grey lower head and neck, used to estimate the individual's age, and the damaged feathers in the right wing (Hélio Pereira)

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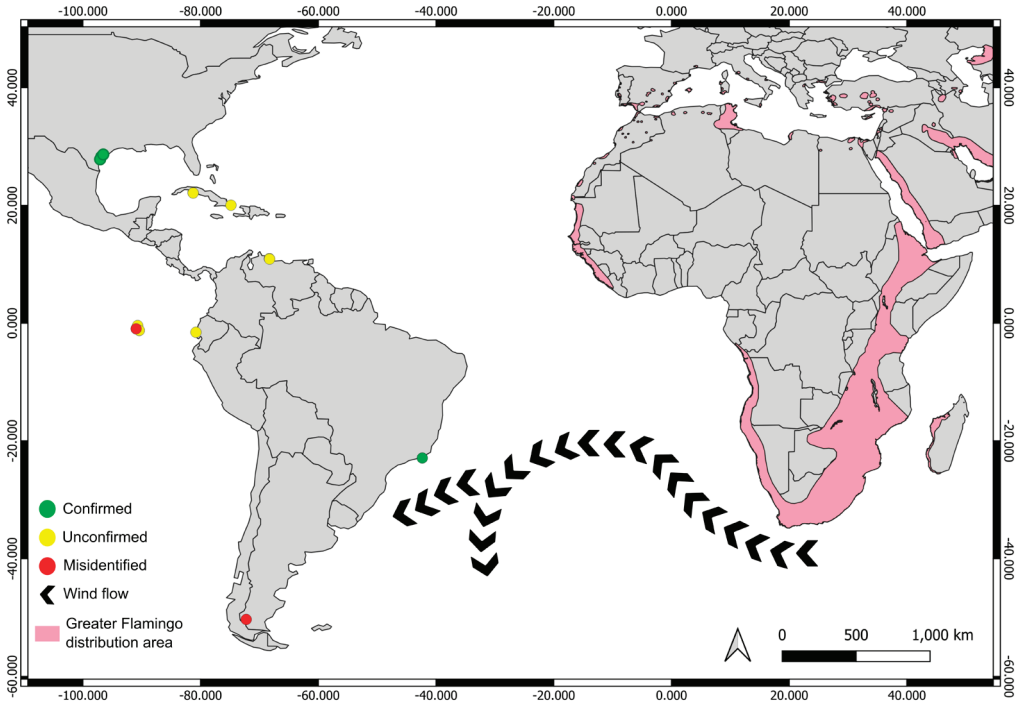

Figure 3. Map of previous records of Greater Flamingo *Phoenicopterus roseus* in the Americas, showing confirmed, unconfirmed and incorrect reports, together with the natural distribution of the species in Africa. The arrows indicate hypothetical wind-flows that could help the flamingo to arrive at the Brazilian coast.

American Flamingo has all of the body orange or red, and Chilean Flamingo has red only in the tail and rear body (Johnson *et al*. 1993, Amat & Rendón 2016, Freeman *et al*. 2016, Chiale *et al*. 2018) (Fig. 2).

The bird appeared very wary and flew off when approached too closely. Some remiges on the right wing were missing and others were damaged (Fig. 2), evidence of either molt, predation or aggressive interactions, but perhaps injury during flight (Matyjasiak *et al*. 2018). The bird joined a few Chilean Flamingos also present at Lagoa de Araruama, and was observed until at least 9 April 2022 (E. Pimenta; https://www.wikiaves.com.br/4793780).

Greater Flamingo in the Americas

Despite this being the first record for Brazil, it is not the first Greater Flamingo to be reported in the Americas. Via the Global Biodiversity Information Facility (GBIF; https://www.gbif.org/), eBird (https://ebird.org/) and WikiAves (https://www.wikiaves.com.br/) we found 19 reports of the species in the Western Hemisphere (Table 1) between 1993 and 2018, in Texas (USA), the Galápagos Islands (Ecuador), Venezuela, Cuba, and once in southern Argentina (Fig. 3). For 11 records, photographs permitted identification, but in one the photo was not very clear and in two the observers had misidentified the species (Table 1). For eight of these records the photos involved Greater Flamingos, all of them in Texas (USA). For the other eight records, no photograph or description was provided.

Because Greater Flamingo is easily mistaken for young American or Chilean Flamingos, photos or a description of distinctive characters is essential to correctly identify the species (Austen *et al*. 2016). Another probable cause of misidentification in digital platforms is use of the former taxonomic classification of Greater and American Flamingos, i.e., as two

ISSN-2513-9894 (Online)

TABLE 1
Reports of Greater Flamingos *Phoenicopterus roseus* in the Americas in two different databases: GBIF and WikiAves, and the new record for Brazil. Records were classed as undocumented (Undoc.) or documented (Doc.) and confirmed identification (Conf.), unconfirmed (Unconf.) or misidentification (Misid.) due to either observer error or, especially, outdated taxonomy.

Country	Date	Locality	Status	Photograph	Source
Argentina	17 Feb 2018	Laguna Nimez	Misid.	Doc.	GBIF (3389153657)
Brazil	28 Nov 2021	Lagoa de Araruama	Conf.	Doc.	WikiAves (WA4622214)
Cuba	10 Mar 2016	Parque Nacional Ciénaga de Zapata, Playa Larga	Unconf.	Undoc.	GBIF (1339221161)
	17 Nov 2016	Parque Nacional Ciénaga de Zapata, Playa Larga	Unconf.	Doc.	GBIF (1580260816)
	24 Nov 2016	Las Salinas	Unconf.	Undoc.	GBIF (1580273277)
Ecuador	30 Dec 1994	Punta Cormorant, Isla Floreana, Galápagos Islands	Unconf.	Undoc.	GBIF (1038766660)
	3 Jan 1995	Isla Rábida, Galápagos Islands	Unconf.	Undoc.	GBIF (1038765835)
	10 Apr 2003	Punta Cormorant, Isla Floreana, Galápagos Islands	Unconf.	Undoc.	GBIF (922868615)
	29 Feb 2012	Puerto Villamil, Isla Isabela, Galápagos Islands	Misid.	Doc.	GBIF (1835272665)
	8 Mar 2016	Puerto López, Galápagos Islands	Unconf.	Undoc.	GBIF (1339484501)
USA	26 Dec 2013	Texas	Conf.	Doc.	GBIF (2445083523)
	4 Jan 2014		Conf.	Doc.	GBIF (2423049643)
	24 Sep 2016		Conf.	Doc.	GBIF (3070478318)
	24 Sep 2016		Conf.	Doc.	GBIF (3058714305)
	26 Sep 2016		Conf.	Doc.	GBIF (2573963639)
	20 Nov 2016		Conf.	Doc.	GBIF (3058721315)
	26 Nov 2016		Conf.	Doc.	GBIF (3058741307)
	21 Dec 2016		Conf.	Doc.	GBIF (3058691305)
Venezuela	23 Mar 2013	Cuare Nature Reserve	Unconf.	Undoc.	GBIF (922920489)
	23 Mar 2013	Parque Nacional Morrocoy	Unconf.	Undoc.	GBIF (922877009)

subspecies of the same species, *P. r. ruber* and *P. r. roseus*. In some observations, the number of individuals reported was not consistent with a vagrant in the Americas, indicating that these records were misidentified (or misclassified) American Flamingos (Table 1). The observation in Argentina involved misidentified Chilean Flamingo.

The eight records in Texas involved the same individual, an escapee from Kansas Zoo, observed frequently since 2013 in the area, with a yellow ring on the right leg typical of that facility (https://edition.cnn.com/2022/04/01/world/escaped-flamingo-492-texas-scn/index.html). We believe that the Brazilian Greater Flamingo in 2021 is the first record of the species in the wild not only for Brazil but also South America. Two hypotheses could explain its presence: the bird was an escapee from a facility or private collection; or the bird was a natural vagrant.

Lost or escapee?

Brazil has strict regulations about breeding and keeping exotic bird species in private collections, which is permitted only for conservation and environmental education, mainly in captive facilities and zoos regulated by the Instituto Brasileiro do Meio Ambiente e Recursos Naturais (IBAMA), Instituto Chico Mendes de Biodiversidade (ICMBio) and

ISSN-2513-9894 (Online)

Ministério Brasileiro do Meio Ambiente (MMA) (Brazil 1967, 1998, IBAMA 2011). All birds kept legally must be registered and banded according to norms of the Centro Nacional de Pesquisa e Conservação de Aves Silvestres (CEMAVE) (ICMBIO 2021). As the Greater Flamingo in Rio de Janeiro was not ringed, and we have found no reports of a missing flamingo, the probability that it was from a zoo or captive facility seems low. There is the possibility of an escape from an illegal facility, but birds the size of a flamingo with such distinctive features would be very difficult to keep undetected.

The second and, in our estimation, more probable explanation is that the flamingo originated in Africa (or elsewhere in its regular range) and, due to adverse weather, reached Brazil. Flamingos can fly up to 600 km per night, being capable of travelling very long distances between colonies and non-breeding areas in a short period of time, with few stopovers (Johnson *et al*. 1989, Johnson & Cézilly 2007). Greater Flamingos are capable of over-water dispersal, moving significant distances over the Indian Ocean and Mediterranean Sea (Johnson *et al*. 1989), with sightings of the species in Madagascar, the Maldives and Seychelles (Johnson & Cézilly 2007). Nevertheless, crossing the Atlantic is very unlikely, except in adverse weather like strong winds, storms, or drastic changes in temperatures (Johnson 1989, Richardson 1990, Clairbaux *et al*. 2019). Such conditions can cause individuals to become lost.

Araruama is more than 5,600 km from Namibia, the nearest point on the African mainland. Southern Africa has a large number of wetlands, many of them used by Greater and Lesser Flamingos during November–February (del Hoyo *et al*. 2020). Furthermore, the west coast of Africa was affected by thunderstorms and winds up to 80 km/h during 21–27 November (SAWS 2021, NMS 2021), the week before the Greater Flamingo appeared in Brazil, possibly explaining the record (Fig. 3). In the Atlantic, south-east trade winds blow from *c*.30°S along the coast of Africa, then over the Atlantic to South America (Longhurst & Pauly 1987), which could have aided vagrancy to coastal Brazil, like other Old World birds such as Western Reef Heron *Egretta gularis* (Fedrizzi *et al*. 2007).

That the bird was a vagrant rather than an escapee is suggested by its behaviour: vigilant and avoiding humans, reinforcing the idea that the bird was not used to human presence and probably wild (Yosef 2000, Beauchamp 2006), because captive birds are often more habituated to humans and have lower reaction distances (Delfino & Carlos 2021).

Conclusions

The record of a Greater Flamingo in coastal Rio de Janeiro, Brazil, is the first in the country, South America and potentially the first wild individual in the Americas. It was probably a young adult that flew over the Atlantic due to storms on the west coast of Africa, showing the capacity of the species, and flamingos in general, to make long-distance movements (Balkız *et al*. 2007, 2010, del Hoyo *et al*. 2020).

We also draw attention to the importance of correct identification of birds on citizen science platforms, preferably with updated taxonomy, and photographs, to support identification and locate potential errors. Such platforms are important tools, not only contributing to conservation and management programmes but helping to identify future occurrence patterns, habitat use and distribution expansions (Greenwood 2007).

Acknowledgements

We thank Hélio Pereira, Guilherme Serpa and Eduardo Pimenta for sharing details of the Greater Flamingo record in Rio de Janeiro, especially Hélio Pereira for use of his photographs. The manuscript benefitted from the comments of Dr Alexander Lees and Dr Paul Rose, and editorial advice provided by Guy Kirwan. Our studies are supported by fellowships from the Conselho Nacional de Desenvolvimento Científico e Tecnológico (HCD) and the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CJC), Brazil.

ISSN-2513-9894 (Online)

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ISSN-2513-9894 (Online)