



## Observations on endangered frigatebirds (*Fregata ariel trinitatis* and *F. minor nicolli*, Suliformes: Fregatidae) at Trindade Island, Brazil

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**Abstract.** This study reports information on the abundance, distribution and breeding evidence of *Fregata ariel trinitatis* and *F. minor nicolli* in Trindade Island, from February 19 to April 19, 2013.

**Key words:** oceanic island, endangered seabirds, Southern Atlantic, Great frigatebird, Lesser frigatebird

**Resumo. Observações sobre fragatas ameaçadas (*Fregata ariel trinitatis* e *F. minor nicolli*, Suliformes: Fregatidae) na Ilha da Trindade, Brasil.** Este estudo reporta informações sobre a abundância, distribuição e evidências de reprodução de *Fregata ariel trinitatis* e *F. minor nicolli* na Ilha da Trindade, entre fevereiro e abril de 2013.

**Palavras-chave:** ilha oceânica, aves marinhas ameaçadas de extinção, Atlântico Sul, tesourão-grande, tesourão-pequeno

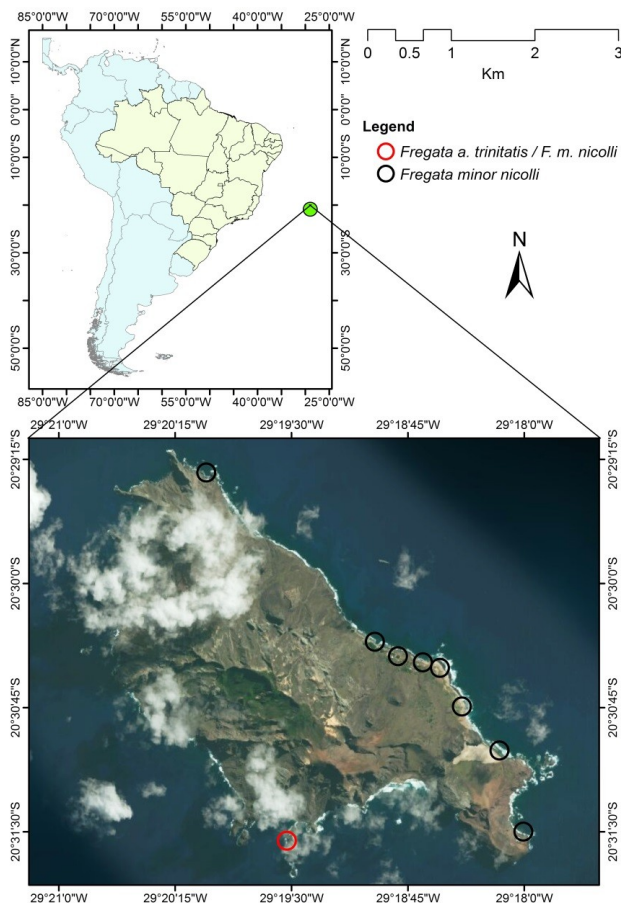
The seabird family Fregatidae is composed of five species, all in the genus *Fregata* Lacepede, 1799 (Sibley and Monroe, 1990; Schreiber and Burger, 2001; Kennedy and Spencer, 2004). Three species have a wide distribution: Magnificent frigatebird *Fregata magnificens* Mathews, 1914 is distributed along tropical and subtropical stretches in the Atlantic and Pacific coasts of the Americas, Great frigatebird *Fregata minor* (Gmelin, 1789) and Lesser frigatebird *Fregata ariel* (Gray, 1845) have a similarly wide distribution in the tropical Pacific and Indian Oceans. The other two species have restricted distributions, Christmas frigatebird *Fregata andrewsi* Mathews, 1914 nests and roosts only on

Christmas Island (eastern Indian Ocean) and Ascension frigatebird *Fregata aquila* (Linnaeus, 1758) nests and roosts only on Ascension Island (Atlantic Ocean).

In Brazil, *F. magnificens* is distributed along most of the coast (Sick, 2001); and the subspecies *F. minor nicolli* Miranda-Ribeiro, 1919 and *F. ariel trinitatis*, (Mathews, 1914) are endemic to oceanic islands, Trindade Island and Martin Vaz Archipelago in the Atlantic Ocean (Harrison, 1985; Luigi, 1993; Schreiber and Burger, 2001). This study reports information on the abundance and distribution of *F. a. trinitatis* e *F. m. nicolli* in Trindade Island, and shows breeding evidence of these species on the

island. Both subspecies are endemic and considered Critically Endangered in Brazil (MMA, 2014).

Trindade Island is an oceanic island about 1,140 kilometers east of the mainland coast of Brazil. It has a terrestrial area of 9.28 km<sup>2</sup>, and a maximum altitude of 620 m; ocean depths around the island reach 5,500 m (Fig. 1) (Alves, 1998; Castro, 2009).



**Figure 1.** Location of Trindade Island in relation to mainland Brazil (the green circle indicates the position of the island without scale), and satellite image of the island (Google Earth™). Locations of all sightings of Great frigatebird *Fregata minor nicolli* and Lesser frigatebird *Fregata ariel trinitatis*, between February 19 and April 19 2013, at Trindade Island. The red circle also indicates the location of confirmed nesting areas of the two species, according Olson (1981) and Luigi (1993).

Since 1984 (Brasil, 1984) Trindade Island has been under the jurisdiction of the Brazilian Navy (1st Naval District) which maintains an Oceanographic Station (POIT) and a Meteorological Station (EMIT) on the island (Alves, 1998). Currently, the Program of Scientific Research on Trindade Island (PROTRINDADE) supports scientific investigation on the island, administered

by the Secretariat of the Inter-ministerial Commission for Resources of the Sea (SECIRM) and an Executive Committee composed by several ministries and federal authorities (Mohr et al., 2009).

From February 19 to April 19, 2013, between 05:00 and 16:00 hrs (effort: 60 days = 660 hours), we visited (three researchers) all parts of the island on foot to locate nesting, roosting, and/or soaring frigatebirds. In addition, four surveys were conducted around the island, at a distance ranging between 100 and 500 m of the coast, in an inflatable boat (on February 20, March 6, March 13 and April 10). No surveys were made on Martin Vaz due to difficult access to the island, which is only possible using helicopter. Bird's observations were made using binoculars (8x42 and 8-24x50). Whenever one or more individuals were sighting, coordinates were recorded with a GPS device, and photographs were taken with a camera fitted with a 2.8-5.2/5.0-100.0 lens. Species identification was made in the field if diagnostic features were observed, and otherwise in the laboratory based on photographic records and literature (e.g., Lowe, 1924; Diamond, 1975; Harrison, 1985; McCormack, 2005; Valle et al., 2006; Juola et al., 2008). We identify adults (male or female) and juvenile individuals by characteristic plumage (see Diamond, 1975; McCormack, 2005; Valle et al., 2006).

During the expedition period we identified four individuals (two adult males, one adult female and one juvenile) of *F. m. nicolli* and six individuals (two adult males, two adult females and two juveniles) of *F. a. trinitatis*. These individuals were recognized based on the plumage, mainly the white parts and the size of the tail feathers. In total, there were 37 records of *F. m. nicolli* and 11 records of *F. a. trinitatis*. All sightings of *F. a. trinitatis* occurred along the Western face of a rocky elevation in the extreme South of the Trindade Island. Sightings of *F. m. nicolli* were also recorded from extreme south of the Trindade Island, but there were more records for this species from the Eastern side of the island. There were no records of either species from the West and Southwest portions of the island (Fig. 1).

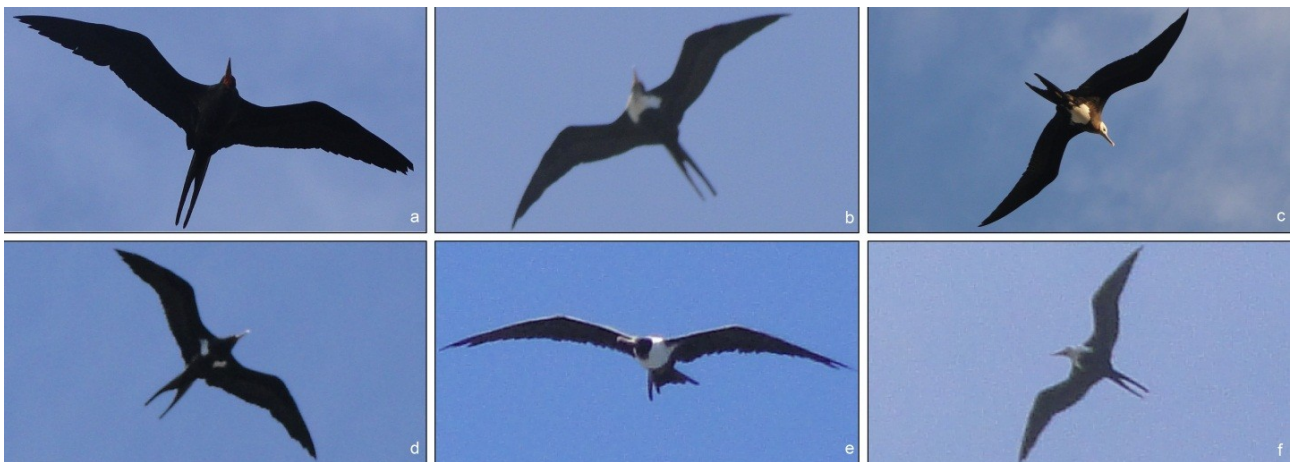
Most of *F. m. nicolli* sightings were adult birds (26 sightings of males and 5 sightings of females), as well for *F. a. trinitatis* (5 sightings of females and 3 sightings of males). Sightings of juveniles were scarcer: 6 for *F. m. nicolli* and 3 for *F. a. trinitatis*. Most of sightings involved birds in flight (*i.e.* soaring) (Fig. 2), although there were three records of individuals perched on rock outcrops: a male *F. m. nicolli* at "Praia da Calheta"

(29° 18' 39" W and 20° 30' 29" S) and two females *F. a. trinitatis*, on the Western face of a rocky promontory in the extreme South of the island (29° 19' 32" W and 20° 31' 33" S) (Fig. 3).

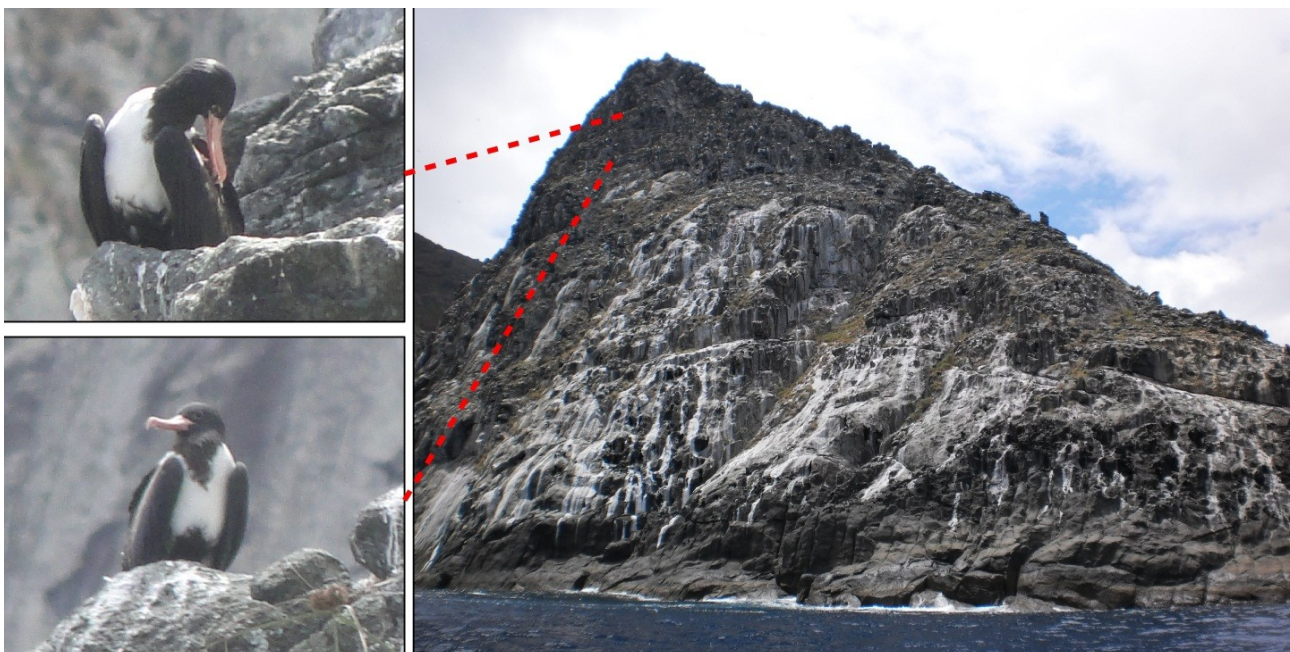
Most of the records of *F. m. nicolli* were solitary individuals soaring over the coast (61%); observations of groups of two or more birds were uncommon: two (26%), three (4%) and four (9%) individuals. Males flying alone accounted for the largest number of records (56%). Similarly, most of the records of *F. a. trinitatis* were solitary flying individuals (50%) and the largest group frigatebirds encountered during the sampling period was six birds (two males, two females and two juveniles) at

29° 19' 32" W and 20° 31' 33" S.

Most studies of birds at Trindade Island have been of short duration (Olson, 1981), except Fonseca Neto (2004) and Luigi *et al.* (2009). There is no specific investigations on the frigatebirds and the existing records are the results of general studies of the avifauna, or vertebrates in the island, or simply casual records of occasional visitors (e.g., Wilson, 1904; Murphy, 1915; Lobo, 1919; Ribeiro, 1919; Lowe, 1924; Simmons, 1927; Murphy, 1936a, 1936b; Novaes, 1952; Olson, 1981; Luigi, 1993; Fonseca Neto, 2004), which explains the information scarceness about their biology on this island.



**Figure 2.** Individuals of frigatebirds recorded at Trindade Island: Great frigatebird *Fregata minor nicolli* - a) male; b) female; c) juvenile; and Lesser frigatebird *F. ariel trinitatis* - d) male; e) female; f) juvenile.



**Figure 3.** Two females of Lesser frigatebird *Fregata ariel trinitatis* perching on the Western face of a rocky promontory in the extreme South of Trindade Island.

Breeding records on frigatebirds are even scarcer at Trindade Island. Regarding the nesting sites of both species, the oldest reports cited several localities at Trindade Island (Murphy, 1915, 1936a, 1936b; Lobo, 1919). However, the most recent records restrict the nesting of *F. m. nicolli* and *F. a. trinitatis* to a single location, with difficult access for humans at the Southern end of the island (Olson, 1981; Luigi, 1993). It was at this same location, during this study, that we recorded both species, with males and juveniles in flight and females of *F. a. trinitatis* landing on the rocks, but no evidence of nests or courtship was detected.

Regarding *F. m. nicolli* abundance, literature provides only general comments (Sharpe, 1904; Nicoll, 1906; Murphy, 1915; Barth, 1958; Olson, 1981; Luigi, 1993). Fonseca Neto (2004) reported about 100 individuals of the species between August 1994 and April 2000. Likewise for *F. a. trinitatis* abundance reports of Nicoll (1906), Luigi (1993) and Fonseca Neto (2004) are also nonspecific and Olson (1981) estimated a maximum of 50 individuals between December 1975 and February 1976. Thus, our result indicates a worrying decline for both species, although this conclusion should be seen with cautions, due to the lack of accuracy in species abundance and restriction of the observation period (two months). The apparently decline of frigatebirds at Trindade may be associated with various causes, as the consumption of eggs (Lobo, 1919), reduction of arboreal vegetation, as the species generally nests on trees (Murphy, 1915, Lobo, 1919; Silva and Alves, 2011), introduction of exotic vertebrates which predates eggs and chicks (Alves, 1998; Alves *et al.*, 2011) and increased fishing around the island (Alves, 1998; Pinheiro *et al.*, 2010; Coelho *et al.*, 2012), among others.

There is an urgent need for development and implementation of a conservation plan for *F. m. nicolli* and *F. a. trinitatis*, with priority studies related to the breeding biology and behavior. Moreover, the implementation of an environmental education program for military and civilian, which lives at Trindade Island, is essential to the success of any conservation action, in order to avoid interference from people on seabird's breeding, feeding and resting areas.

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