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Breeding distribution and status of Great Frigatebird *Fregata minor* in Chile

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Summary.—We clarify the breeding status of Great Frigatebird *Fregata minor* in Chile, and describe the discovery of a new breeding colony at the Islas Desventuradas, which becomes the species' south-easternmost outpost in the Pacific. However, recent suggestions that it breeds on Rapa Nui appear to be unconfirmed, and there are no records at all for the Juan Fernández archipelago. Based on currently available data, in Chile the species breeds in August–September and December–January, with some minor fluctuations in egg laying. Based on published and unpublished accounts, we estimate *c*.200–300 breeding pairs in Chile, with the largest population and main breeding site at Isla Salas y Gómez, and a small population far to the east on Islote González in the Islas Desventuradas.

Frigatebirds are highly aerial birds of mainly tropical distribution (Orta 1992, Nelson 2005). Adults have sexually dimorphic plumage, but a complex series of plumage changes can make identification at sea difficult prior to adulthood (Nelson 1976, Howell 1994). Great Frigatebird *Fregata minor* breeds on tropical and subtropical oceanic islands, and rarely feeds in coastal waters (Diamond 1973, Nelson 2005). Nests are flimsy platforms of small twigs and, depending on island and nesting substrate, can be placed on vegetation or the ground; the latter are often cemented with guano. They lay a single-egg clutch and have a long breeding cycle that lasts *c*.8 months with a long post-fledging dependency (Nelson 1976, 2005). Consequently, they do not nest annually and presumably breed only every two years (Nelson 1976).

Since at least 1870, it was known that a species of frigatebird occurs in waters around Rapa Nui. Its identity was determined as '*Tachypetes aquila*' based on the feathers used in the crown of a high-ranking islander, which were brought back to the Museo Nacional de Historia Natural, Santiago, Chile, by Ignacio Gana (Philippi 1873). At that time just two species of frigatebirds were recognised, but following the work of Mathews (1914) and Rothschild (1915) five species were generally accepted. Murphy (1936: 919) mentioned that, in a letter from J. T. Nichols, a frigatebird was observed in April *c*.1,480 km west of the island of San Félix; and indicated that a *Fregata* sp. nested on Salas y Gómez without specifying the species but considered it the easternmost breeding site for any frigatebird in the Pacific. This comment was based on MacFarlane's (1887) account of a visit to the last-named island. Lönnberg (1921) in his notes on birds of Easter Island did not mention the presence of frigatebirds at Rapa Nui. However, Chapin (1935) observed *c*.8–10 birds on 12–19 January 1935, and was the first to postulate that they were Great Frigatebird. In their main text Goodall *et al*. (1951) did not mention any frigatebird in Chile, but in the appendix reported that a *Fregata* was present on Salas y Gómez, based on a communication by Ottmar Wilhelm, who visited the island in 1937. Nevertheless, in the second supplement to *Birds of Chile* (Goodall *et al*. 1964) the species around Rapa Nui and Salas y Gómez was indicated to be Great Frigatebird, based on independent notes by Martin Moynihan and Thor Heyerdahl. However, in the absence of a specimen, Johnson (1965) stated that the

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birds around both islands could be either Great Frigatebird or Magnificent Frigatebird *Fregata magnificens*. King (1967) placed the individuals on Rapa Nui as Great, but it is unclear why; he included the species as a possible visitor. In the ornithological literature, it was not until Millie *et al*. (1969) took a specimen on Rapa Nui that the species concerned was identified definitively as Great and not Magnificent Frigatebird (also Johnson *et al*. 1970, Millie & Johnson 1970, Johnson *et al*. 1972). However, the species had been correctly identified considerably earlier, by Métraux (1940) in an ethnological paper overlooked by ornithologists. Thereafter, Devillers (1972) reported four specimens of Great Frigatebird, two each in Brussels and Paris, taken by Israel Drapkin on Motu Nui, off Easter Island, on 31 December 1934. These specimens formed part of a series of seabirds collected at Motu Nui, and mentioned by Métraux (1940), during the Franco-Belga Anthropological-Archeological expedition (July 1934–January 1935) to Easter Island, divided among several museums, including the Institut Royal de Sciences Naturelles de Belgique, Brussels, the Muséum national d'Histoire naturelle, Paris, Western Foundation of Vertebrate Zoology, Camarillo, CA, and perhaps others. Schlatter (1984) in his summary of the birds of Chile's oceanic islands included *F. minor* as a breeder on Salas y Gómez and visitor to Rapa Nui.

Here, our goal is to clarify the breeding distribution, phenology and status of Great Frigatebird in Chile, in light of some equivocal reports. Furthermore, we provide information on a new breeding colony.

Field work and Methods

The Chilean offshore islands include, from east to west, Rapa Nui, Salas y Gómez, the Islas Desventuradas and Juan Fernández archipelago. As part of avifaunal surveys of Chile's subtropical oceanic islands, we visited the Islas Desventuradas on three occasions, landing on San Ambrosio (26º19'S, 78º54'W) on 10–12 December 2019, and Islote González (26º18'S, 80º05'W) on 14–15 December 2020 and 23 August 2021. The avifauna of Islas Desventuradas is the least known of Chile's offshore groups. It consists of three main islands, San Ambrosio, San Félix and Islote González, and a series of rocky outcrops, the most important of which are the Bass islets and Roca Catedral. The easternmost island is San Ambrosio (26º19'S, 78º54'W) and the westernmost San Félix (26º16'S, 80º07'W). The centre of the archipelago is 927 km from the mainland at about the latitude of Caldera in northern Chile. All islands lack fresh water and have very scant vegetation. Until recently, San Ambrosio was much more vegetated but over a period of *c*.50 years (1970–2020) introduced goats and rabbits heavily grazed the island, and it will be many years before it is restored (see Marín *et al*. 2020, Marín & González 2021). MM visited Rapa Nui (27º07'S, 109º23'W) on 9–23 August 2009, and a general description and most findings were published in Marín & Caceres (2010), whilst RG visited Rapa Nui on 26 April–1 May 2018. Additionally, we compiled data from other recently available accounts. For Salas y Gómez (26º28'S, 105º21'W; often misspelled Sala y Gomez), we rely on published and unpublished sources. Given that many published positions and distances are equivocal, our data are all taken from marine charts: British Admiralty 4002, 4608, and SHOA (Servicio Hidrográfico y Oceanográfico de la Armada, Chile) 510, 2311, 2410, 2411 and 2510.

Results and Discussion

Since the arrival of humans at Rapa Nui, Great Frigatebird seems never to have been abundant there, perhaps because there was pressure to obtain the species' feathers, which were used in crowns of high-ranking individuals and therefore valuable (Philippi 1873). From the 1930s the few published and unpublished reports generally involve small numbers,

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with max. four at Rapa Nui, and most reports are from nearshore islets like Motu Nui and Motu Iti, albeit still usually of few individuals, e.g., Chapin (1935), Anon. (1993), Montero (1993), Marín & Caceres (2010) and references therein. However, Millie *et al*. (1969) noted 20–30 arriving to roost on Motu Nui in December 1968, Jaramillo *et al*. (2008) reported *c*.35 in March 2003 and Lazo (2010) saw 15 in February 2010. There is possibly some seasonality to the species' presence, but this is hard to assess using the available data; there are also some post-2010 reports on eBird (www.ebird.org) of larger numbers, however, several of these include birds from more than one area and some involve year-round observations, making analysis difficult. In 1993, some scenes in the film *Rapa Nui* (1994) required frigatebirds flying around in the background. Because of the lack of birds in the area, two ornithologists, M. Sallaberry and P. Harrison, were hired to transport frigatebirds from Salas y Gómez to Motu Nui. Initially, 34 individuals were brought and fed 150 kg of fish daily; according to Sallaberry 140 birds were eventually relocated, presumably via multiple trips (Anon. 1993). Consequently, this introduction temporarily bolstered the population at Rapa Nui. Most reports are from Motu Iti, Motu Nui and Motu Kao Kao, some of the islets off Rapa Nui and on which the birds roost.

All frigatebirds have an unusual breeding biology in several aspects including long incubation and nestling periods and nestling dependency. Great Frigatebird has an incubation period of *c*.55 days, a nestling period of 4–6 months and young remain at the colony another 5–12 months, so the species is capable of producing only one young every two years (Nelson 1976, 2005). In some colonies egg laying occurs over five to six months, but at others year-round (Nelson 1976, Metz & Schreiber 2002).

For Rapa Nui, there are several papers including biogeographical and ecological analyses that consider Great Frigatebird a breeder there, e.g., Flores *et al*. (2014) and Plaza *et al*. (2020), but Plaza *et al*. (2020) listed temperate-breeding species like Arctic Tern *Sterna paradisaea* and Southern Giant Petrel *Macronectes giganteus* as formerly nesting on one of the nearshore islets at some time in the 20th century, which is extremely unlikely. Such claims inevitably diminish their other results. Nonetheless, the initial report of nesting (Lazo 2010, 2011) was based on an observation of males, females and immatures on one of the islets and on Peninsula Poike on Rapa Nui itself, but Lazo (2010: 11) indicated that no real evidence, e.g., of a nest, was obtained. The presence of young birds does not necessarily prove local breeding, as young are highly mobile and can disperse >2,000 km (Weimerskirch *et al*. 2017). Salas y Gómez, the most likely source for the birds at Rapa Nui, is just 389 km to the north-east. If Great Frigatebird has indeed started to breed on Rapa Nui, this needs to be documented and not listed as fact based on conjecture, although it quite possibly did breed there in the past but abandoned the colonies after human arrival.

Salas y Gómez is seldom visited by ornithologists, however MacFarlane (1887) who visited on 5 March 1884 was probably the first to report a frigatebird breeding in Chile, which he identified as *Fregata aquila* (see above), but he did not specify if he found eggs or chicks. Firm evidence of breeding by frigatebirds at the island did not come until almost 100 years later, in early November 1981, when Narvarte & Cristino (1982) published photos of small nestlings (unidentified to species) in full white down being guarded / brooded by adults, indicating that they were between two and four weeks old (Metz & Schreiber 2002). No further information was given but based on the photos egg laying had probably started by mid / late August. Based on an unpublished report by P. Scott in 1972, Schlatter (1984) reported Great Frigatebird as breeding at Salas y Gómez, with *c*.100 pairs. Subsequently, Harrison & Jehl (1988) visited Salas y Gómez twice, in March 1985 and 1986. In 1985, they found 24 nestlings ranging from one-third grown to nearly fledged, and in 1986 they found the remains of 20 nestlings. Vilina & Gazitua (1999) visited the island on 6–11 December

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Figure 1. The northern end of Islote González, Islas Desventuradas, Chile, with Punta Bari, Isla San Félix, in the background; the arrow indicates the plateau where Great Frigatebirds *Fregata minor* were nesting (Manuel Marín)

Figure 2A–B. Two different nests of Great Frigatebird *Fregata minor*, Islote González, early December 2020, showing the quantity of plastic debris used as nesting material, including rope, plastic packaging, and metal wire, indicated by arrows (Manuel Marín)

1997 and found 101 active nests, 23.7% with eggs, 45.5% small nestlings and 30.6% large nestlings. Pedro Lazo visited in February and September 2011 (Lazo 2011); in February, he reported 115 nestlings, or a minimum of 115 pairs, i.e., a similar total to Vilina & Gazitua (1999). However, this presumably represents only part of the island's population given that there are usually two breeding periods (see above) probably involving different cohorts. Unfortunately, Lazo (2011) did not mention numbers in September, providing only a photo of an adult incubating an egg, as would be expected at that time, but Lazo (2014) suggested the presence of similar numbers in the December / January and August / September breeding periods. Overall, however, in the only table given by Lazo (2014) his totals are of little use, as they represent a three-year average of all birds counted during the course of

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Figure 3. The single Great Frigatebird *Fregata minor* nestling found on Islote González, Islas Desventuradas, Chile, 23 August 2021 (Rodrigo González)

each year and the combined numbers in two different areas (Rapa Nui and Salas y Gómez), and thus most likely involve duplication.

It is surprising that the species was added relatively recently to the avifauna of Islas Desventuradas by Aguirre *et al*. (2009), who also mentioned a secondhand report that it might breed there. We observed the species on all three of our visits and found it nesting on Islote González in August 2021. During our first visit to Islote González on 14–15 December 2020, on the west side *c*.100 m above sea level we accessed a small plateau with a sheer cliff to its north and east, and to the west a slope 20–30 m by 200 m at a 40–60º angle before dropping to the sea (Fig. 1). Here, we found seven empty nests from previous seasons, which had obviously been used multiple times as some had several layers of guano cementing them to the ground. They were built on rocks and were platforms of sticks and plastic debris, mainly string and rope of various sizes, and some contained metal wire, probably from the nearby naval base (see Fig. 2A–B). Also in December 2020, we observed a max. five Great Frigatebirds, an adult female and four immatures of different ages (no males were seen). In August 2021, in the same area we observed four adults, three females and one male, plus a well-grown nestling still in the nest, feathered but with much white down on the nape, breast, belly, flanks and shoulders (Fig. 3). It was five to six months old, suggesting eggs were laid late December–early January. Also in August 2021, one of the adult females regularly sat on a fresh nest (no guano in its top layer) and was perhaps preparing to lay.

Based on the literature, and the data compiled here, we can establish that in this region: (1) Great Frigatebird seems to have two distinct egg-laying seasons involving different cohorts, one starting in late August–September and the other in December–early January, probably with small inter-year variations. Therefore, colonies might show some activity year-round. (2) Currently there are only two islands where the species nests in Chile:

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Isla Salas y Gómez and Islote González. (3) At both sites, the species nests on the ground, whereas elsewhere in its extensive distribution Great Frigatebird usually nests on trees or bushes. (4) Speculation that the species breeds at Rapa Nui requires confirmation, as there is nothing to document this claim. (5) Islote González becomes the species' south-easternmost breeding site in the South Pacific (2,646 km east of Salas y Gómez).

The species is not numerous in Islas Desventuradas, but there are at least 8–10 pairs from different breeding cohorts. Such small numbers are the most likely explanation for the lack of records until recently. Based on the available evidence, we estimate a population of 200–300 breeding pairs in Chile, or more than double the total given by Schlatter (1984). Ideally, however, the colonies should be surveyed during both breeding seasons and across two consecutive years, to provide a more precise estimate of the population. For the Juan Fernández archipelago, to the best of our knowledge no frigatebird species has been reported there.

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References:

Aguirre, J. E., Johow, F., Seeger, H., Johow, J. C. & Rubio, M. 2009. Nuevos registros de aves nidificantes en las Islas Desventuradas, Chile insular. *Bol. Chileno Orn*. 15: 44–55.

Anon. 1993. Michel Sallaberry, ornitólogo en el filme: "no hubo ningún daño a las aves fragatas". *Diario La Segunda*, 22 marzo 1993.

Chapin, J. P. 1935. Field journal and notes from the Zaca cruise, Croker expedition 1934–35. Unpubl. Amer. Mus. Nat. Hist., New York.

Devillers, P. 1972. A small collection of sea-birds from Easter Island. *Gerfaut* 62: 273–275.

Diamond, A. W. 1973. Notes on the breeding biology and behavior of the Magnificent Frigatebird. *Condor* 75: 200–209.

Flores, M. A., Schlatter, R. P. & Hucke-Gaete, R. 2014. Seabirds of Easter Island, Salas y Gómez and Desventuradas Islands, southeastern Pacific Ocean. *Latin Amer. J. Aquat. Res*. 42: 752–759.

Goodall, J. D., Johnson, A. W. & Philippi, R. A. 1951. *Las aves de Chile su conocimiento y sus costumbres*, vol. 2. Platt Establecimientos Gráficos S.A., Buenos Aires.

Goodall, J. D., Johnson, A. W., Philippi, R. A., Behn, F., Millie, W. R. & Peña, L. E. 1964. *2º suplemento de las aves de Chile*. Platt Establecimientos Gráficos S.A., Buenos Aires.

Harrison, P. & Jehl, J. R. 1988. Notes on the birds of Sala y Gómez. *Condor* 90: 259–261.

Howell, S. N. G. 1994. Identification of Magnificent and Great frigatebirds in the eastern Pacific. *Birding* 26: 400–415.

Jaramillo, A., Johnson, M. T. J., Rothfels, C. J. & Johnson, R. A. 2008. The native and exotic avifauna of Easter Island: then and now. *Bol. Chileno Orn*. 14: 8–21.

Jehl, J. R. 1973. The distribution of marine birds in Chilean waters in winter. *Auk* 90: 114–135.

Johnson, A. W. 1965. *The birds of Chile and adjacent regions of Argentina, Bolivia and Peru*, vol. 1. Platt Establecimientos Gráficos S.A., Buenos Aires.

Johnson, A. W., Millie, W. R. & Moffett, G. 1970. Notes on the birds of Easter Island. *Ibis* 112: 532–538.

Johnson, A. W., Hughes, R. A., Goodall, J. D., Millie, W. R. & Moffett, G. 1972. *Supplement to the birds of Chile and adjacent regions of Argentina, Bolivia and Perú*. Platt Establecimientos Gráficos S.A., Buenos Aires.

King, W. B. 1967. *Preliminary Smithsonian identification manual, seabirds of the tropical Pacific Ocean*. Smithsonian Institution, Washington DC.

Lazo, P. 2010. Informe final, censo de avifauna en el Parque Nacional Rapa. Oficina Provincial CONAF, Isla de Pascua.

ISSN-2513-9894 (Online)

Lazo, P. 2011. Informe final, censo de avifauna en el Parque Nacional Rapa Nui, año 2011. CONAF, Rapa Nui.
Lazo, P. 2014. El más extenso patrullaje y monitoreo del SNASPE. *Rev. Chile Forestal* 370: 36–39.
Lönnberg, E. 1921. Notes on the birds of Easter Island. Pp. 19–24 *in* Skottsberg, C. (ed.) *The natural history of Juan Fernandez and Easter Island. Zoology*, vol. 3. Uppsala.
MacFarlane, J. R. H. 1887. Notes on birds in the western Pacific, made in H. M. S. 'Constance,' 1883–5. *Ibis* (5)5: 201–215.
Marín, M. & Cáceres, P. 2010. Sobre las aves de Isla de Pascua. *Bol. Mus. Nac. Hist. Nat., Chile* 59: 75–95.
Marín, M. & González, R. 2021. A new breeding colony of Blue-footed Booby *Sula nebouxii* at Islote González, Archipelago Islas Desventuradas, Chile. *Mar. Orn*. 49: 189–192.
Marín, M., González, R. & Trucco, S. 2020. Population status of the Kermadec Petrel (*Pterodroma neglecta juana*) at San Ambrosio Island, Chile. *Mar. Orn*. 48: 209–214.
Mathews, G. M. 1914. On the species and subspecies of the genus *Fregata*. *Austral Avian Rec*. 2: 117–121.
Métraux, A. 1940. Ethnology of Easter Island. *Bernice P. Bishop Mus. Bull*. 160.
Metz, V. G. & Schreiber, E. A. 2002. Great Frigatebird (*Fregata minor*). *In* Poole, A. & Gill, F. (eds.) *The birds of North America*, no. 681. The Birds of North America, Inc., Philadelphia, PA.
Millie, W. R. 1963. Brief notes on the birds of San Ambrosio and San Felix islands, Chile. *Ibis* 105: 563–566.
Millie, W. R. & Johnson, A. W. 1970. Aves de la Isla de Pascua. *Not. Men. Mus. Hist. Nat., Chile* 164: 6–10.
Millie, W. R., Johnson, A. W. & Moffett, G. 1969. Seabirds of Easter Island. *Bol. Orn*. 1(1): 1–3.
Montero, R. T. 1993. Noticias de la Isla de Pascua. *Bol. Inf. UNORCH* 16: 4.
Murphy, R. C. 1936. *Oceanic birds of South America*, 2 vols. Amer. Mus. Nat. Hist., New York.
Narvarte, B. & Cristino C. 1982. Un Chile microscópico. *Revista del Domingo* (23 May 1982): 8–9.
Nelson, B. J. 1976. Breeding biology of frigatebirds – a comparative review. *Living Bird* 14: 113–155.
Nelson, B. J. 2005. *Pelicans, cormorants, and their relatives*. Oxford Univ. Press.
Orta, J. 1992. Family Fregatidae (frigatebirds). Pp. 362–374 *in* del Hoyo, J., Elliott, A. & Sargatal, J. (eds.) *Handbook of the birds of the world*, vol. 1. Lynx Edicions, Barcelona.
Philippi, R. A. 1873. Jeografía.—La Isla de Pascua i sus habitantes. *An. Univ. Chile* 43: 365–434.
Plaza, P., Serratosa, J., Gusmao, J. B., Duffy, D. C., Arce, P. & Luna-Jorquera, G. 2020. Temporal changes in seabird assemblage structure and trait diversity in the Rapa Nui (Easter Island) multiple-use marine protected area. *Aquat. Conserv. Mar. Freshwater Ecosyst*. 31: 378–388.
Rothschild, W. 1915. On the genus *Fregata*. *Novit. Zool*. 22: 145–146.
Schlatter, R. P. 1984. The status and conservation of seabirds in Chile. Pp. 261–269 *in* Croxall, J. P., Evans, P. G. H. & Schreiber, R. W. (eds.) *Status and conservation of the world's seabirds*. International Council for Bird Preservation, Cambridge, UK.
Vilina, Y. & Gazitua, F. 1999. The birds of Sala y Gómez Island, Chile. *Waterbirds* 22: 459–462.
Weimerskirch, H., Borsa, P., Cruz, S., de Grissac, S., Gardes, L., Lallemand, J., Le Corre, M. & Prudor, A. 2017. Diversity of migration strategies among great frigatebird populations. *J. Avian Biol*. 48: 103–113.

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