

THE TROPICBIRDS *PHAETON* SPP. OF THE ISLAS DESVENTURADAS ARCHIPELAGO, CHILE

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ABSTRACT

MARÍN, M. & GONZÁLEZ, R. 2022. The tropicbirds *Phaethon* spp. of the Islas Desventuradas archipelago, Chile. *Marine Ornithology* 50: 57–62.

We found nesting Red-billed and Red-tailed tropicbirds *Phaethon aethereus* and *P. rubricauda* in the Islas Desventuradas archipelago, Chile. We visited Isote González on 14–15 December 2020 and on 23 August 2021. During the December visit, we encountered a colony of Red-billed Tropicbirds totaling a minimum of 62 breeding pairs. The nests were in cavities on steep cliffs and slopes located mainly on the northern part of the island, and we were able to access 34, of which 11 had eggs, 11 had nestlings of different ages, and 12 were active but empty. During the August visit, we found four nests with adults attending but no eggs or nestlings, one nest with a chick close to fledging, and one adult attempting to take a nest site from a De Filippi's Petrel *Pterodroma defilippiana*. We visited San Ambrosio Island on 10–12 December 2019, and we found only the Red-tailed Tropicbird breeding, as evidenced by four active nests: two with eggs, one with a well-grown nestling, and one with a pair of adults but no nest contents. However, we observed several pairs in aerial display and estimated the Red-tailed Tropicbird population to be at least 10–12 breeding pairs, in addition to the five to six pairs at Isote González and about eight pairs at San Félix Island. Our findings represent a new Red-billed Tropicbird population and the largest breeding colony of the species for Chile. Furthermore, Isote González is one of the very few known places where sympatric breeding of Red-billed and Red-tailed tropicbirds occur. The White-tailed Tropicbird *Phaethon lepturus* is also known to nest at San Félix Island in the Desventuradas archipelago, but we did not visit that island. It appears that all three species of tropicbird nest in this archipelago.

Key words: archipelago, Islas Desventuradas, eastern South Pacific, Chile, *Phaethon*, tropicbirds

INTRODUCTION

Tropicbirds *Phaethon* spp. are a small genus of three species that for a long time were placed within the order Pelecaniformes. Currently, based on new genetic data, they are classified within their own order, the Phaethontiformes (e.g., Chesser *et al.* 2010, Dickinson & Remsen 2013). The species within this group are highly pelagic, occurring worldwide in tropical and subtropical seas. Most at-sea survey data for these species are concentrated in the central Pacific (e.g., Gould *et al.* 1974) or the Northern Hemisphere (e.g., Spear & Ainley 2005). Tropicbirds tend to nest on oceanic islands, predominantly placing their nests in cracks, ledges, or cavities on steep slopes or cliffs, though they sometimes nest in small, loose aggregations, depending on the availability of suitable nesting sites (del Hoyo *et al.* 1992, Nelson 2006). Regardless of such widespread distributions, it is rare that the two large species, Red-billed *P. aethereus* and Red-tailed *P. rubricauda* tropicbirds, breed at the same site (del Hoyo *et al.* 1992, Nelson 2006). On the other hand, the smaller White-tailed Tropicbird *P. lepturus* is often sympatric with one of the larger species.

Here we provide new distributional data, details of a new breeding colony for the Red-billed Tropicbird, and information on the breeding status of the Red-tailed Tropicbird at the Islas Desventuradas archipelago in the eastern South Pacific Ocean.

Review of tropicbird occurrence in the eastern South Pacific Ocean

Red-billed Tropicbird

The Red-billed Tropicbird is considered the least numerous of the three tropicbird species and it has the most restricted distribution (Nelson 2006). Along the Pacific coast of South America, Murphy (1936) considered the species to be a wanderer within the Humboldt Current south of the Gulf of Guayaquil, and he believed that Isla de la Plata, Ecuador, was the only breeding site in the eastern South Pacific. Ortiz-Crespo & Agnew (1992) reported 15 active nests and a maximum of 40 birds observed in a single count at Isla de la Plata, between 20 July and 01 September 1990 (see also Spear & Ainley 2005). One of us (MM) visited Isla de la Plata on 09 November 2018 and observed at least eight active nests in cliff cavities. Paeflsler (1913) recorded one adult bird further south at Callao, Peru, (12°S) on 19 June 1910 and another a bit further south near Isla San Gallán (14°S) on 21 May 1911. Koepcke (1964) discussed two reports from other sources for the Callao area and later, Mayr & Cottrell (1979) mentioned the species as breeding in San Lorenzo Island, near Callao. Contradicting that information, Schulenberg *et al.* (2007) considered the species to be a rare non-breeding visitor to Peru in waters far from shore. Nevertheless, Murphy (1936) reported some records from Chile ranging from Taltal (25°S) as far south as Valparaíso

(33°S). Goodall *et al.* (1951) and Johnson (1965) added new sight records between Valparaíso and Juan Fernández Archipelago (33°S), including some at Huasco (28°S) and its environs. Jehl (1973) added new sightings west of Coquimbo (30°S) and Copiapó (27°S), Chile. Blake (1977) listed the species as casual, at least to central Chile. Nonetheless, due to the scanty number of records for Chile, the evidence pointed toward the Red-billed Tropicbird being a straggler or visitor to the country, until Vilina *et al.* (1994) reported the species breeding at Isla de Chañaral (29°S). Records published by Bourne (2014), records in eBird, and our own unpublished findings ranging between December to May, might well indicate breeding in the Juan Fernández Archipelago. On five crossings between Valparaíso and Callao from either north to south or south to north along the Chilean coast (November 2007, March and November 2018, March and October 2019) and our cruises to the Islas Desventuradas and Juan Fernández archipelagos (February 2020), our encounters of this species at sea have all been to the east of the Islas Desventuradas and Juan Fernández archipelagos. More specifically, our sightings have been mainly between 25–33°S and 27–296 km off the coast, mostly on the west side of the Chilean trench.

There are also some records in unexpected areas, far from any other known breeding sites and the regular distributional range for the species. For example, Vilina & Gazitua (1999) reported one pair potentially breeding at Salas y Gómez Island (26°28'S, 105°21'W; 3210 km west of the Chilean mainland), and there is one specimen in the American Museum of Natural History (#422868) that was collected on 09 April 1934, 417 nautical miles (772 km) north-northeast of Salas y Gómez. Spear & Ainley (2005) predicted a high concentration of individuals southeast of Lima and in northern Chile, which would fit with our findings.

Red-tailed Tropicbird

The Red-tailed Tropicbird occurs in the tropical portions of the Indian Ocean, as well as in western and central portions of the South Pacific Ocean (Nelson 2006). Based on records for Chile, it is known mainly as occurring west of Islas Desventuradas, e.g., at Salas y Gómez (Harrison & Jehl 1988, Vilina & Gazitua 1999) and Rapa Nui (Easter Island; Marín & Caceres 2010, Flores *et al.* 2017). Recent reports also exist for the Desventuradas area (Spear & Ainley 2005, Aguirre *et al.* 2009, Terán & Vilches 2020).

The first mention of Red-tailed Tropicbird for the eastern South Pacific was by Chapin (1935), who wrote in his journal that he heard them several times during the night (“on a clear night with a bright moon”) on 17 February 1935, as Chapin approached San Ambrosio Island from the east, on his way to San Félix Island. Curiously, Murphy (1936) ignored Chapin’s comments in his book, possibly because Chapin did not secure a specimen and because the observation was on a highly improbable place, far from the known distribution at the time. Spear & Ainley (2005) mentioned a record at 28°S, ~176 km south-southeast of San Ambrosio Island, which is the southernmost record in the eastern South Pacific.

The species was mentioned as casual off Chile by E. Blake, based on a report made by G.E. Watson (Blake 1977); Blake’s statement was based on some specimen records deposited at the US National Museum (USNM). We located the original specimens reported by Blake at USNM, which were collected as part of the Pacific Ocean Biological Survey Program during the 1960s and 1970s. Some of the USNM specimens were also reported by Gould *et al.* (1974), who mentioned

that they represented a significant range extension to the southeast. The positions for all of the USNM specimens were 407–481 km off the Chilean coast and 518–588 km northeast of San Ambrosio Island, which is outside of Chile’s Exclusive Economic Zone.

Another interesting record is one at Bahía Flamenco, Chile, on 11 January 2012 at 26°33'S, 070°45'W (Barros & Schmitt 2012), a location that is to the east of where the species typically occurs. Nevertheless, Aguirre *et al.* (2009) subsequently mentioned that on 15 December 2001 at San Ambrosio Island, they found and examined two nests, both having well-grown nestlings, along with 12 other possible nests. Terán & Vilches (2020) visited San Ambrosio Island in September and found 10 nests (with unknown contents) and estimated 15–20 pairs. Also, worth mentioning: neither Millie (1963) nor Jehl (1973) noted tropicbirds for the Islas Desventuradas archipelago, which is unusual, but they most likely passed by the islands on the northwestern side where there is little presence of any tropicbird species. Jehl (1973) visited the archipelago during mid-winter; not finding them might indicate some seasonal movements. However, during our visit in late August, at least two birds were observed flying along the southern cliffs of Islote González.

White-tailed Tropicbird

The White-tailed Tropicbird is probably the most common species of tropicbird, having a pantropical distribution (Nelson 2006). Its distribution is mainly within the tropics of the western and central portions of the Pacific Ocean, with significant overlap with that of the Red-tailed Tropicbird. In Chile, this species is the rarest of all three species and is most often observed around Easter Island (e.g., Johnson *et al.* 1970, Marín & Caceres 2010). A sighting far to the south (perhaps the southernmost record for the species in the eastern South Pacific) was made on 04 May 1983, about 93 km south of Robinson Crusoe Island (*ca.* 34°30'S, 079°00'W, Clark 1986).

STUDY AREA AND METHODS

The Islas Desventuradas archipelago is composed of three larger islands—San Ambrosio Island, San Félix Island, and Islote González—plus a few rocky outcrops, the most remarkable of which is the Peterborough Cathedral. All three islands have a very scanty vegetation, as they lack fresh water. In the recent past, San Ambrosio Island had a flourishing flora but from about 1970 to 2020, introduced goats and rabbits (which no longer exist on the island) severely depleted the vegetation (see Marín *et al.* 2020, 2021). The center of the archipelago is approximately 927 km off the coast of northern Chile, at about the latitude of the port of Caldera. The easternmost island is San Ambrosio (26°19'S, 078°54'W) and the westernmost is San Félix (26°16'S, 080°07'W). We visited San Ambrosio Island once during 10–12 December 2019, and we visited Islote González twice (26°17'S, 080°06'W) during 14–15 December 2020 and on 23 August 2021. Positions, elevations, and distances were taken from the following marine charts: British Admiralty 4608 and Servicio Hidrográfico y Oceanográfico de la Armada (Chile) 510, 2410, and 2411.

San Ambrosio is the largest of the three main islands. Its coastline consists of precipitous cliffs surrounding an upper plateau that is 200–300 m above sea level (maximum 478 m). The island has an ellipsoidal shape running east to west for ~2.8 km; the maximum width is about 1 km, with an approximate surface of ~203 ha

(2.03 km²; for more details, see also Marín *et al.* 2020). Islote González is the smallest of the three main islands, ~0.85 km long and ~0.5 km wide with a narrower tip of ~0.25 km at its northernmost part. Its maximum altitude toward the southern end is 166 m above sea level. The northern tip is 100 m above sea level and has a narrow 200-m long plateau of ~0.76 ha, as estimated using Google Earth ©2021 (Fig. 1; for more details see Marín & González 2021). Most of the island is bounded by sheer cliffs, though the eastern side has a gentler slope of 40–60°. We were the first ornithologists to come ashore on the island; other ornithologists landed on the bigger islands of San Félix and San Ambrosio but not Islote González.

We traversed about 80% of San Ambrosio Island and 60% of Islote González, looking for nests. Steep terrain was scanned with 8× and 10× binoculars from various vantage points. We walked the entire section twice at different levels to search for nest cavities, and we found the highest density of nesting birds on the upper western slope at Islote González.

RESULTS AND DISCUSSION

Red-billed Tropicbird

On 14 December 2020, we observed many tropicbirds displaying high up along the cliff edges upon landing at Islote González. As

we climbed toward the top and the northern upper plateau from the eastern side, we were at about the same level with the displaying birds, most being Red-billed Tropicbirds with a few Red-tailed Tropicbirds. All were moving in singles or pairs, accompanied by loud calls, circling between the sea and the cliff. As we climbed alongside the cliff, we could see many birds entering and exiting cavities and caves in the lava cliffs. As soon as we reached the upper plateau, we noticed several birds on the western side, also doing aerial displays and going in and out of cavities. We observed large numbers of birds on the western slope; this was an area of high nest density for tropicbirds. The plateau was an area of high nest density for Sooty Terns *Onychoprion fuscatus* and a few dispersed Masked Boobies *Sula dactylatra*, but no tropicbirds (Fig. 1).

The western side of Islote González has a surface area of ~4000 m², on which we found 30 active nests, ranging from accessible to semi-accessible. The nests were in lava niches of different sizes and depths; some barely fit a single adult bird while others were 1–2 m in depth. The nests in the shallow cavities were a simple scrape directly on the sandy soil (i.e., no nesting material), where the single egg was deposited (Fig. 2). Some were thick, with concave bottoms and walls made of hard, dry guano, which indicated many years of use. The breakdown of the nests in this area was as follows: 10 nests with adults only, 10 with eggs, six with medium to large nestlings, and four with small nestlings. Of the 10 nests with adults, five were empty



Fig. 1. The upper plateau at the northern end of Islote González, Chile. On the left side is the slope where a high concentration of Red-billed Tropicbird *Phaethon aethereus* nests was located; on the right side is the cliff where both Red-billed and Red-tailed *P. rubricauda* tropicbirds nested. On the upper left side is Punta Bari, which is on the southeastern tip of San Félix Island, where both species were present and nesting. No tropicbirds nested on the large plateau, as the nesting area was used by Sooty Terns *Onychoprion fuscatus* and a few dispersed Masked Boobies *Sula dactylatra*.



Fig. 2. A Red-billed Tropicbird *Phaethon aethereus* at its nest with a recently hatched nestling (on the left side) at Islote González, 14 December 2020. All tropicbird nests are a simple scrape directly on the sandy soil. Old nests contain a thick layer of guano forming concave bottoms of 10+ cm in depth with their walls made fully of guano, indicating several years of use.

and five had unknown contents. At higher elevation, we found four other nests, one of which contained a recently hatched nestling and three of which contained eggs. By observing the cliff wall (Fig. 1) on the northeastern slope, we also observed 28 active nests, all with unknown contents. We estimated that there were at least 62 active nests, mostly located 80–150 m above sea level, except for one that we found in August that was about 30 m above sea level. We believe the number of nests was likely much higher, as we could not see the western, northern, or southern cliff faces from above or below.

We were able to observe the southeastern cliff face of San Félix Island (Fig. 1) in December, when about 15–20 birds were flying around the cliff face, and in August, when we observed no birds at the same location. On our second visit to Islote González on 23 August 2021, we were able to land only for 10 hours due to weather conditions. However, we found a new nest near the landing that had a nestling very close to fledging; thus, the egg was laid sometime in late April. On the upper parts, we found five adults that seemed to be prospecting for nesting cavities: three were inside cavities that contained no eggs, one was going in and out of an empty cavity, and one was harassing a De Filippi's Petrel *Pterodroma defilippiana* that was nesting inside an old tropicbird nest. Our impression was that this fifth tropicbird was trying to regain its old nest. In the surrounding areas, there were no more than five more birds, probably the mates of the ones in the cavities. However, the lack of tropicbirds in the area compared with our visit in December was striking, thus offering a clear sign of seasonal movements.

The Red-billed Tropicbird requires about four months from egg laying to chick fledging (Fleet 1974). Thus, if some nestlings were close to fledging during December at Islote González, egg laying must have started in September. Indeed, during our visit in late August at least four pairs were entering cavities and, judging by their behavior and displays, some were most likely close to laying eggs. Furthermore, the encounter in August of a ready-to-fledge nestling indicates that egg laying was in April, which gives further clues about the length of the breeding season. In some localities,



Fig. 3 A Red-tailed Tropicbird *Phaethon aethereus* on its nest at San Ambrosio Island, 11 December 2019. The nest is a simple scrape on the ground covered with dry plant matter that was blown in by the wind.

breeding is year-round (e.g., Galápagos (Snow 1965) and Ascension Island (Stonehouse 1962)), whereas it is seasonal elsewhere (e.g., Mexico (Hernández-Vásquez *et al.* 2018)). For Isla de Chañaral, Chile, Vilina *et al.* (1994) described the colony as having a breeding season from September to April, which is what we can infer for the Islas Desventuradas archipelago. The presence of this tropicbird in the eastern South Pacific seems to be more regular than previously thought.

Red-tailed Tropicbird

We visited San Ambrosio Island in December 2019, at which time we encountered only the Red-tailed Tropicbird nesting (Fig. 3). Adult individuals were seen in adjacent waters during 2019, 2020, and 2021. More than 12 birds were engaged in aerial displays along the island canyons on the eastern side. We were able to examine only four nests in three different canyons. Of these nests, two contained eggs, one had a large nestling, and one was empty though both adults were present. The nests consisted of ground scrapes; two had concave bottoms with edges that were 8–10 cm high and made of dry hard guano, one had sandy edges, and one was covered in plant matter that had been carried into the cavity by the wind (Fig. 3). All observed nests occurred 300–400 m above sea level and were 400–1000 m or more apart. Nevertheless, judging by the number of birds flying along only the canyons, we estimated the population to be a minimum of 10 breeding pairs. However, the species is likely to be more abundant than our estimate, as this population seems to be primarily cliff-nesters, making it hard to locate their nests on the large cliffs around the island periphery from above or below.

At Islote González during December 2020, we observed two particular nests that we could not reach, as they were about 80 m above sea level on the northeastern cliff walls, but we could see them directly at the same level from an adjacent parallel slope. The birds sitting inside the cavities were probably on eggs or small nestlings, as they did not move for many hours. Nevertheless, judging by the birds flying around, there were likely several more nests at difficult-to-observe places. Furthermore, we could see the southeastern end of San Félix Island at Punta Bari, where we observed another 10 birds flying around the cliffs entering and

exiting cavities (Fig. 1). These December observations contrast with our August 2021 visit, when only two birds were observed flying around the northern cliff face of Isote González and no birds were observed on the southern end of San Félix Island. This indicates changes in seasonal presence.

There seems to be a clear segregation of nesting sites between Red-billed and Red-tailed tropicbirds, as Red-billed Tropicbirds took mainly cavities at the higher parts of the island while the Red-tailed Tropicbirds were mainly on the cliff walls but closer to the sea. At sea, we encountered Red-tailed Tropicbirds only in the waters between San Félix and San Ambrosio islands, and we did not observe them to the south or east of the archipelago. Red-tailed Tropicbirds are probably the most abundant tropicbird in Chilean waters, having large populations at Rapa Nui and at Salas y Gómez. The previous estimates for San Ambrosio Island are 12 breeding pairs (Aguirre *et al.* 2009) and 15–20 breeding pairs (Terán & Vilches 2020). As the number of flying birds is related to the number of active nests (Vanderwerf 2021), we estimated 20–25 breeding pairs in the whole archipelago, judging by the number of birds that we observed and number of birds flying simultaneously. It seems that most are on San Ambrosio Island, with a few pairs breeding on San Félix Island and Isote González.

White-tailed Tropicbird

According to Aguirre *et al.* (2009), the personnel at the local naval station reported that White-tailed Tropicbird breeds at San Félix Island in December. Aguirre *et al.* (2009: p.44) also mentioned that they visited San Félix Island in June and March but not in December; they observed White-tailed Tropicbirds nesting on the south-facing cliffs, with no date provided but most likely in March. Additionally, they mentioned observing six to eight nest cavities to which adults were carrying food, presumably for their young, also likely in March. The White-tailed Tropicbird breeds year-round at Ascension Island in the Atlantic Ocean (Stonehouse 1962), but we have no data to indicate the timing at San Félix Island. During our visits to the archipelago in December 2019, December 2020, and August 2021, we did not observe the species at sea, at San Ambrosio Island, or at Isote González. However, looking north from Isote González toward the south-facing cliffs of San Félix Island, we observed many tropicbirds in December 2020. Those directly in front of us were a mix of Red-billed and Red-tailed tropicbirds. Individuals farther west were too distant for definitive identification, but based on the wing markings, some birds were very likely to have been White-tailed Tropicbirds (see also Aguirre *et al.* 2009). We note that during our visit in August 2021, no tropicbirds species were observed on the southern cliffs of San Félix Island.

CONCLUSIONS

Current literature indicates that Red-billed and Red-tailed tropicbirds do not breed in sympatry except on some islands on the central Indian Ocean (e.g., del Hoyo *et al.* 1992, Schreiber & Schreiber 1993, Nelson 2006). In addition, it is often mentioned that either the Red-billed or Red-tailed tropicbirds breed in sympatry with White-tailed Tropicbirds. It seems that the Islas Desventuradas archipelago is unique in having all three species present and breeding. The breeding season seems to be very protracted and egg laying occurs in well-defined months of the year (September through April), at least for the Red-billed and Red-tailed tropicbirds. Displaying birds, eggs, recently hatched nestlings, and ready-to-depart nestlings were

all present during December. Furthermore, we found one Red-billed Tropicbird nest with a well-grown nestling and four empty-but-active nests of the same species in late August. For Chile, the breeding season would likely have a peak during the austral summer or during the warm-ocean conditions from December to February. The colony of Red-billed Tropicbirds at Isote González was an unexpected finding and would be the largest colony in the eastern South Pacific.

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