

Breeding of Red-billed Tropicbird (*Phaethon aethereus*) in Clarion Island, Mexico

Reproducción del rabijunco pico-rojo (*Phaethon aethereus*) en isla Clarión, México

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Abstract

The Red-billed Tropicbird is listed as a threatened species in Mexico. There is a notable lack of basic information about this species in the world. Between January-May 2015 and 2016 we confirmed its nesting on Clarion Island (there were reports and counts of couples flying around the island, but no evidence of nests). We estimate approximately 48 nesting couples on the island. The breeding season occurs between the months of December and May. When comparing our data with a report of couples flying in 1990 it seems that the population has remained relatively stable for the last 25 years.

Keywords: Breeding season, Seabirds, Revillagigedo, Nesting.

Resumen

El rabijunco de pico rojo se encuentra catalogado como una especie amenazada en México. Hay muy poca información de esta especie en el mundo. Entre enero-mayo de 2015 y 2016 confirmamos su anidación en la Isla Clarión (existían reportes y conteos de parejas volando alrededor de la isla, pero sin evidencia de nidos). Estimamos aproximadamente 48 parejas anidando en la isla. La temporada de reproducción ocurre entre los meses de diciembre y mayo. Al comparar nuestros datos con un reporte de parejas volando en 1990 parece que la población se ha mantenido relativamente estable en los últimos 25 años.

Palabras clave: Temporada reproductiva, Aves marinas, Revillagigedo, Anidación.

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Introduction

Islands hold a unique biodiversity and a superior rate of endemism compared to mainland; they also offer a sanctuary for seabird colonies (Tershy *et al.* 2015). However, due to their iso-

lation and difficult access, the knowledge of these ecosystems and their species is scarce.

The Red-billed Tropicbird (*Phaethon aethereus*) has a pantropical distribution (Nelson 2005). It is found in tropical and sub-tropical seas and is mostly pelagic. The species distribution includes the Atlantic, Indian and Pacific Ocean (Orta 1992). The breeding range along the Pacific Ocean extends from the Gulf of California to Chañaral Island in Chile; including Galapagos and the Revillagigedo Archipelago (Howell and Webb 1990, Vilina *et al.* 1994, Nelson 2005). This species is listed as "threatened" in México (SEMARNAT 2010), and despite the evidence of the declining world population (BirdLife International 2016), the Red-billed Tropicbird is classified as "least concern" by the IUCN.

There is a lack of information available on this species. Only a single study of reproductive ecology (Castillo-Guerrero *et al.*, 2011) and a few sightings and reproductive reports have been made in Mexico (Everett and Anderson 1991, Mellink

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and Riojas-López 2005, Guevara-Medina *et al.* 2008). Specifically, at Clarion Island, Howell and Webb (1990) reported 40-50 pairs of the Red-billed Tropicbird engaged in courtship flights, but no breeding records have been ever done (Wanless *et al.* 2009). Here, we confirm the breeding activity of the Red-billed Tropicbird in Clarion Island, plus an estimate of breeding pairs and some notes about its temporality of breeding. This elementary information can be used as a baseline to understand and prioritize important sites for conservation.

Methods

Clarion Island (18° 21' N, 114° 44' W) is the second largest (6.4 x 9.7 km) island of the Revillagigedo Archipelago, and apparently the oldest (early Pliocene, based on marine fossils) (Brattstrom 1990). It attains a height of 305 m and it's covered with

grass areas, low shrubs and small trees of 2.5 m top. Surrounded by cliffs up to 200 m high in the north, Clarion is Mexico's most distant island, lying 985 km west of the mainland.

This area is globally important for seabirds and is part of the UNESCO World Heritage List since 2016. Currently there are eight species recorded breeding on Clarion Island, four endemic land birds and four seabirds: Laysan Albatross (*Phoebastria immutabilis*), Townsend's Shearwater (*Puffinus auricularis*), Red-footed Booby (*Sula sula*), and Masked Booby (*Sula dactylatra*) (Wanless *et al.* 2009).

We visited the island several times between January 2015 and August 2016. The observations were made walking and climbing on the perimeter of the island. We search for nests (careful inspection of crevices and holes between rocks) in four accessible zones (Figure 1). During breeding, tropicbirds exhibit a conspicuous activity in the afternoons: flying with loud vocalizations around the breeding areas. We counted the

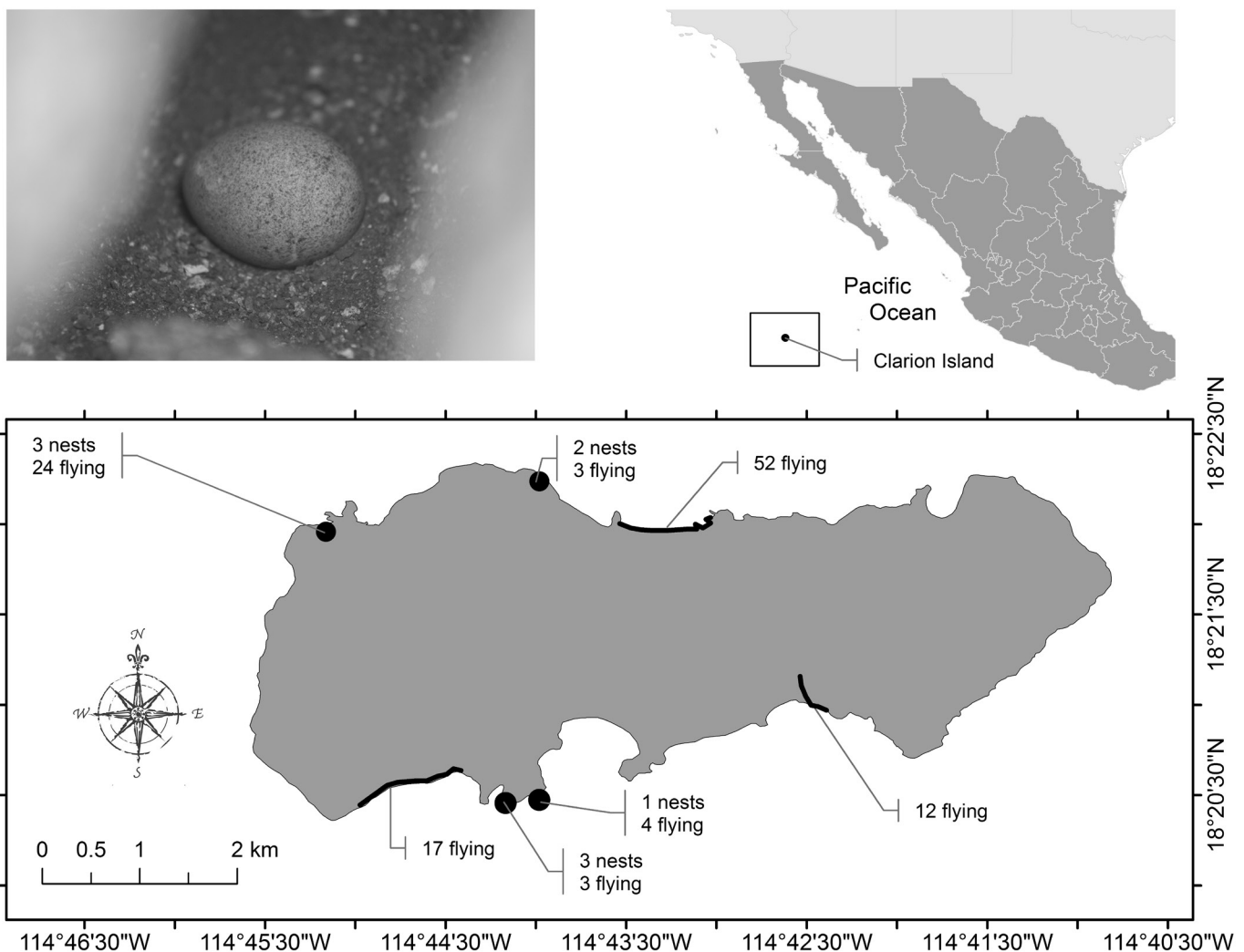


Figure 1. Number and location of nest and flying adults of Red-billed Tropicbird in Clarion Island, Mexico.

number of individuals flying in almost all the perimeter of the island (except the east side, Figure 1) and using an empirical relationship between active nest and flying birds (active nests = [Flying individuals/2.66] + 2.7, $r^2 = 0.91$, $r = 0.72$, and $P < 0.001$; Piña-Ortiz 2017), we estimated the possible number of breeding pairs.

Results

The first nest was observed on April 3, 2015 and contained a full-grown chick. Between January 18 and February 3, 2016, we recorded eight additional nests, six with one egg and two with a small chick. All the nests were found scattered at the cliffs around the island, inside rocky crevices (Figure 1). The distribution of nests seems to be heterogeneous, we found approximately one nest per 3650 m², but some inaccessible sections seem harbors higher densities. As example, we counted 115 flying individuals distributed unequally in different sections of the island (Figure 1). We estimated a total of 48 pairs. During January and February, we found predominantly eggs and a small chick, and full-grown chicks during April. During August-October no tropicbirds were observed.

Discussion

We confirm the breeding of Red-billed Tropicbird at Clarion Island. Although there was already literature that assumed the breeding of this species on the island, here we provide conclusive evidence and the baseline information of temporality and colony size.

Island invasive species had been suggested as the principal threat of tropicbird populations (Lee and Walsh-McGehee 2000). Our estimation resembles the observations made by Howell and Webb (1990; approximately 100 birds) before the eradication of pigs and sheep completed in 2002, pointing the lack of effects by these introduced species on the population of the Red-billed Tropicbird on Clarion. The number of pairs seems to be stable for the last 25 years.

The breeding season of Red-billed Tropicbird at Clarion resemble the temporality of other colonies in the Gulf of California (Castillo-Guerrero *et al.* 2011). Considering the incubation period, the season should be starting during November-December and extending to May. This implies a defined seasonal pattern. In the Gulf of California, the temporality and reproductive performance have been related to oceanographic conditions, particularly the presence and intensity of upwellings. Precisely, it

seems that Clarion is influenced by the California Current during the winter, which coincides with the reproductive temporality of the Red-billed Tropicbird. In Galapagos and Ascencion tropicbirds breed throughout the year, apparently due to no seasonal pattern in productivity (Stonehouse 1962, Harris 1969).

As a conclusion, we confirmed the reproduction, estimate a number of breeding pairs and describe the temporality of breeding season of this species in Clarion Island. We calculated a population of 48 pairs and observed a comparable temporality with the Gulf of California (from November to May), possibly associated with a pattern of high productivity.

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