

THE BLACK NODDY *ANOUS MINUTUS*: A NEW BREEDING SPECIES FOR CHILE

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ABSTRACT

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A small breeding population of Black Noddy *Anous minutus* was encountered on San Ambrosio Island in the Desventuradas Archipelago in the southeast Pacific off Chile. On 11 December 2019, we found eight Black Noddy nests among 50–60 nests of Brown Noddies *A. stolidus*. Black Noddy nests were placed on the ground with little to no nesting material in the interior of the island, which is an unusual nest type and placement for this species. All nests were at different stages, from recently hatched to recently fledged nestlings. Black Noddies usually nest in trees or bushes, but the vegetation on San Ambrosio had been largely extirpated, raising the possibility that this small population may have been larger prior to habitat loss. This is the first published documented record of Black Noddies in Chile and is the southeasternmost breeding population of this species in the Pacific.

Key words: Black Noddy, *Anous minutus*, breeding, San Ambrosio Island, eastern South Pacific, Chile

The Black Noddy *Anous minutus* is a widely distributed pantropical colonial species that nests in the subtropical and tropical zones of the Atlantic and Pacific oceans (Murphy 1936, Gochfeld & Burger 1996). In most of the breeding stations throughout its range, the Black Noddy nests mainly in bushes or trees, building a bulky nest (Murphy 1936, Gochfeld & Burger 1996). In the few places where it nests on the ledges of sea cliffs—such as the main Islands of Hawai‘i (Gochfeld & Burger 1996), Ascension Island, the mid-Atlantic (Ashmole 1962), Malpelo Island, Colombia (Lopez-Victoria & Estela 2006), Hatu-iti Island, and French Polynesia (Chanpeau *et al.* 2011)—this behaviour is apparently related to a lack of suitable bushes or trees for nesting or the avoidance of terrestrial predators (e.g., crabs and reptiles).

As part of a regional bird survey, we visited San Ambrosio Island (26°21'S, 79°47'W) during 10–12 December 2019; San Ambrosio, along with San Félix and González islands, are part of the Islas Desventuradas Archipelago. San Ambrosio is located about 898 km from land at about the latitude of the port of Chañaral in mainland northern Chile. It is a volcanic island that is ellipsoidal in shape, ~2.8 km in length, and has a maximum width ~1 km; its coastline consists of sheer cliffs with an upper plateau at 200–300 m and a maximum height of 478 m (for more details, see Marin *et al.* 2020). During the three days that we visited San Ambrosio, we walked across ~80% of the island and scanned the remainder from high points; we also inspected ~60%–70% of the coastline by small boat. The island is rarely visited by ornithologists because the island itself and its upper plateau are difficult to access. However, the most relevant published ornithological observations of the island include observations made by J.L. Chapin in February 1935 that were published in Murphy (1936); observations made in October 1962 and published in Millie (1963); observations made in June 1970 and

published Jehl (1973); and observations made in June and December 2001, and in March 2003, both published in Aguirre *et al.* (2009). Prior to the current study, Aguirre *et al.* (2009) and their party are the only ornithological observers to have made it to the upper plateau.

Previously, the only record of the Black Noddy in Chile was a sight record of two individuals at Salas y Gomez Island (26°28'S, 105°22'W) on 03 March, in 1985 or 1986 (Harrison & Jehl 1988). The record provided little description of the birds and mentioned a photograph that was never published. Salas y Gomez is approximately 2534 km west-southwest of San Ambrosio. On 11 December 2019, we encountered a colony of about 50–60 breeding pairs of Brown Noddy *A. stolidus*. This was the largest Brown Noddy colony on the island at the time of our visit. Additionally, there were three smaller colonies of 10, seven, and four breeding pairs. The large colony was at the center of the island in the upper part of a gully that had a slope of approximately 45° and was on the periphery of a Sooty Tern *Onychoprion fuscatus* colony of about 150 breeding pairs, along with several dispersed nests of Masked Boobies *Sula dactylatra*. The nesting phenology of the noddy colony was asynchronous and ranged from recently hatched to recently fledged nestlings. While observing the Brown Noddy colony, we noticed nestlings with a different downy coloration, including distinct groups of older nestlings, some having a very pale white forehead and others having a very dark forehead (see Fig. 1). Because we expected to find only one species of noddy in the southeastern Pacific, and none of us had experience with the nestlings of either species, we thought, at first, that these were individual variations among the nestlings. We noticed eight nests with nestlings having this variant plumage among the 50–60 Brown Noddy nests. The nestlings of Black versus Brown noddies can be distinguished by the color of the neossoptile and

the coloration of the forehead: Black Noddies have white feathers whereas Brown Noddies have uniform sooty brown feathers (see Fig. 1). Notably, we only observed Brown Noddy (but not Black Noddy) adults around the nests and in the colony, although it is possible that we overlooked adult Black Noddies among the flying adult Brown Noddies. At San Ambrosio, Black Noddy nests were

built, somewhat sparsely, with dry grass, dry plant parts, and bird feathers. On the other hand, while some of the Brown Noddy nests in the small colonies were constructed from dry grasses and feathers to form a shallow platform, most nests were on bare ground with the single egg in a small depression among broken rocks and pebbles (Fig. 1A, B).



Fig. 1. Comparative growth at different developmental stages, from hatching to fledgling, of Brown *Anous stolidus* and Black *A. minutus* noddies on San Ambrosio Island. From hatching, the nestlings can be distinguished by the color of the neossoptile. (A) A recently hatched Black Noddy nestling with dark sooty brown coloration and a pale forehead, and (B) a recently hatched Brown Noddy nestling having grayish tone over the entire body. (C) An intermediate stage Black Noddy and (D) Brown Noddy. (E) The fledglings of Black Noddy with a prominent white forehead and (F) Brown Noddy that completely lacks the conspicuous pale forehead except for a slim white line through the forehead and supercilium. Also note differences in nest structure between the two species, with some nesting materials on the Black Noddy nest (A) and almost no nesting materials at the Brown Noddy nest (B). All photos were taken on 11 December 2019 at San Ambrosio by M. Marín, except (F) which was taken by S. Trucco.

The diversity of nest types among noddies is probably the result of a lack of nesting materials. Worldwide, Black Noddy nests have been reported mainly on vegetation and occasionally on sea cliffs (Gochfeld & Burger 1996). The nests on San Ambrosio were located inland, at about the middle of the island, contrary to where noddies would be expected. Mixed colonies of both noddy species have been reported elsewhere, also with ground nesting, but with nests constructed on sea cliffs (e.g., Lopez-Victoria & Estela 2006). The non-cliff nesting and breeding at the center of the island seems unusual for the species. The only noddy species nesting on the sea cliffs and on sea caves at San Ambrosio was the Grey Noddy *A. albivitta*.

Black Noddy nesting usually occurs in locations where the species is relatively numerous, but the population on San Ambrosio is exceedingly small. We believe that the birds that we observed on San Ambrosio are the remnants of a once much larger population. San Ambrosio, in the recent past, had abundant vegetation (Sparre 1949). Most vegetation was seasonal and about 50–80 cm tall, with some woody plants reaching 5 m in height (Hoffmann & Marticorena 1987). The vegetation was devastated by the introduction of rabbits in 1971 and goats in 1976, and we observed only its remnants. Recently, both goats and rabbits were eradicated by natural and man-made causes (see Marín *et al.* 2020). Given the preference of the Black Noddy to nest in trees or bushes, or alternatively but more rarely on sea cliffs, we speculate that the destruction of the native vegetation could have reduced a formerly large Black Noddy population at San Ambrosio. We do not know whether the depletion of vegetation also affected other species, but it is likely that it did. However, because the bulk of published data for the Islas Desventuradas are concentrated on species presence and/or breeding data, but not on overall abundance or population data, we cannot evaluate these effects. There are at least two known cases of Black Noddy population extinction by vegetation destruction. The first occurred on Malden Island in the Central Pacific, Republic of Kiribati (Gochfeld & Burger 1996), and the second occurred on Trindade Island in the South Atlantic, Brazil (Murphy 1936).

In the more equatorial areas of the tropical ocean, there are several reports of Black and Brown noddies participating in aseasonal nesting and having more than one brood per year (Murphy 1936, Gochfeld & Burger 1996). However, the subtropical populations of noddies in the south Atlantic region nest more seasonally, arriving to their nesting grounds in September, laying eggs in November, and departing for the austral winter months towards warmer waters (Murphy 1936). Based on the breeding phenology we observed, and on relatively strong seasonal oceanographic patterns at the Islas Desventuradas, both species of noddies on San Ambrosio most likely have a similar regime as those in the South Atlantic region. Indeed, there is a seasonal shift in sea surface temperature (SST) in waters around the Islas Desventuradas Archipelago, with cooler subantarctic surface waters prevailing during the austral winter (Bahamondes 1987). By the end of the summer, in March, SST reaches its peak 20–21 °C and starts to decline steadily in April, reaching its lowest point of 15–16 °C in August/September (data from Servicio Hidrográfico y Oceanográfico de la Armada, Chile).

The timing of the presence of tropical tern species at Islas Desventuradas coincides with these seasonal temperature changes. With cold water around the islands during the austral

winter, most individuals are likely to vacate the premises to unknown areas by April/May. Very few individuals of Brown Noddy were observed in mid-late March by Aguirre *et al.* (2009). During winter visits to this island group by Jehl (1973) in 1970 and by Aguirre *et al.* (2009) in 2001, Sooty Terns, Grey Noddy, and Brown Noddy were absent. However, one specimen of Grey Noddy was collected on San Ambrosio on 21 July 1879 (Sharpe, 1881). There is no indication whether other individuals were present or if this was a single straggler. Presumably, the seasonal timing of Black Noddy in Chilean waters would be similar to these other tropical tern species.

The San Ambrosio population of Black Noddy is far from any other known breeding population. The next closest breeding population to the west is on the Tuamotu Archipelago (French Polynesia; Dupont 1976), with the closest island 6071 km away (unless Black Noddy formerly nested on Easter Island, 2935 km to the west, or Salas y Gomez, 2534 km to the west, but there is no present data to support this idea); to the north is Malpelo Island (Colombia; Alvarez 2000), which is 3380 km away from San Ambrosio. Because of its isolation, it will be of interest to determine if the San Ambrosio population is genetically closer to the *A. minutus minutus* population from Polynesia or the *A. minutus diamesus* population from the east central Pacific, breeding at Malpelo, Cocos, and Clipperton Islands.

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