FROM KERGUELEN TO BRAZIL: INSIGHTS INTO THE MOVEMENT AND HEALTH OF A THREATENED SEABIRD, THE WHITE-CHINNED PETREL *PROCELLARIA AEQUINOCTIALIS*

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ABSTRACT

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This study presents the case of a White-chinned Petrel *Procellaria aequinoctialis* that was tagged as a fledgling in April 2023 in the Kerguelen Islands, southern Indian Ocean, and subsequently rescued on the southeast coast of Brazil in July 2024. Upon recovery, the petrel displayed symptoms of exhaustion, malnutrition, and anemia, highlighting the substantial energy demands associated with its extensive journey of over 10,000 km. Rehabilitation efforts were successful, resulting in the bird's release after a month of intensive care, which involved nutritional support and monitoring of its health parameters. This case highlights the importance of long-term coastal and marine monitoring programs, which provide valuable data about the health challenges of seabirds, their long-distance movements, and the impacts of human activities on their populations.

Key words: international collaboration, long-distance movement, *Procellaria aequinoctialis*, post-fledging behavior, seabird rehabilitation

INTRODUCTION

The high incidence of White-chinned Petrel *Procellaria aequinoctialis* as bycatch in pelagic and demersal fisheries in the southern hemisphere is of major concern (Phillips et al., 2024; Weimerskirch et al., 1999). This species breeds at most islands ringing the sub-Antarctic (Carboneras et al., 2024) and disperses widely, including north into the Humboldt Current and Benguela Current (Carboneras et al., 2024; Lambert, 2001; Spear et al., 2005), in addition to the western South Atlantic (Bugoni et al., 2008; Gómez-Laich & Favero, 2007; Phillips et al., 2006).

White-chinned Petrels exhibit delayed maturity (first breeding at *ca.* 7 years; Dasnon et al., 2022), making them vulnerable to adult mortality, and are classified as Vulnerable by the International Union for Conservation of Nature, due to previous rapid declines across several populations (BirdLife International, 2018). The species feeds on cephalopods, small fish, and crustaceans (Catard et al., 2000) and it is known to follow fishing vessels to scavenge on offal and discards, an activity that exposes it to extensive bycatch in longline and trawling fisheries (Bugoni et al., 2008; Delord et al., 2005; Gómez-Laich & Favero, 2007; Phillips et al., 2024; Weimerskirch et al., 1999).

As a result of being so wide-ranging, ringing and tracking initiatives are important to understanding the species' ecology and migration routes (Péron et al., 2010; Phillips et al., 2006). Here, we report on the movement of a fledgling White-chinned Petrel originating in the southern Indian Ocean (Kerguelen Islands) to the western coast of the South Atlantic Ocean.

CASE REPORT

On 31 July 2024, an adult-plumaged White-chinned Petrel was found ashore at Praia Grande, Arraial do Cabo (22.9585°S, 042.0579°W), Rio de Janeiro state, Brazil. The bird had a tarsal metal ring (DZ29400) that had been applied 485 days earlier, on 03 April 2023, when it was a fledgling at Kerguelen Islands (49°S, 069°E), French Southern Territories (Fig. 1), as part of a long-term monitoring study supported by the French Polar Institute Paul-Émile Victor (IPEV Project 109 ORNITHOECO "Seabirds and Marine Mammals as Sentinels of Global Change in the Southern Ocean") and by the Réserve Naturelle Nationale des Terres Australes Françaises.

Upon discovery, the bird was promptly transported to the Instituto Albatroz rehabilitation center. Upon arrival, it weighed 874 g (*cf.* average body mass of healthy adult White-chinned Petrels is 1,213 ± 134 g; Jouventin et al., 1985). Physical examination revealed the bird was in poor nutritional condition, had an intense louse infestation, and exhibited exhaustion, lethargy, pale mucosae, hypothermia, and dehydration. Lice were collected in 70% ethanol, slide-mounted (Palma, 1978), and identified as *Austromenopon popellus* Piaget, 1890, *Naubates fuliginosus* Taschenberg, 1882, and *Trabeculus hexakon* Waterston, 1914. A blood sample, collected from the jugular vein (Campbell & Ellis, 2007), revealed anemia (packed

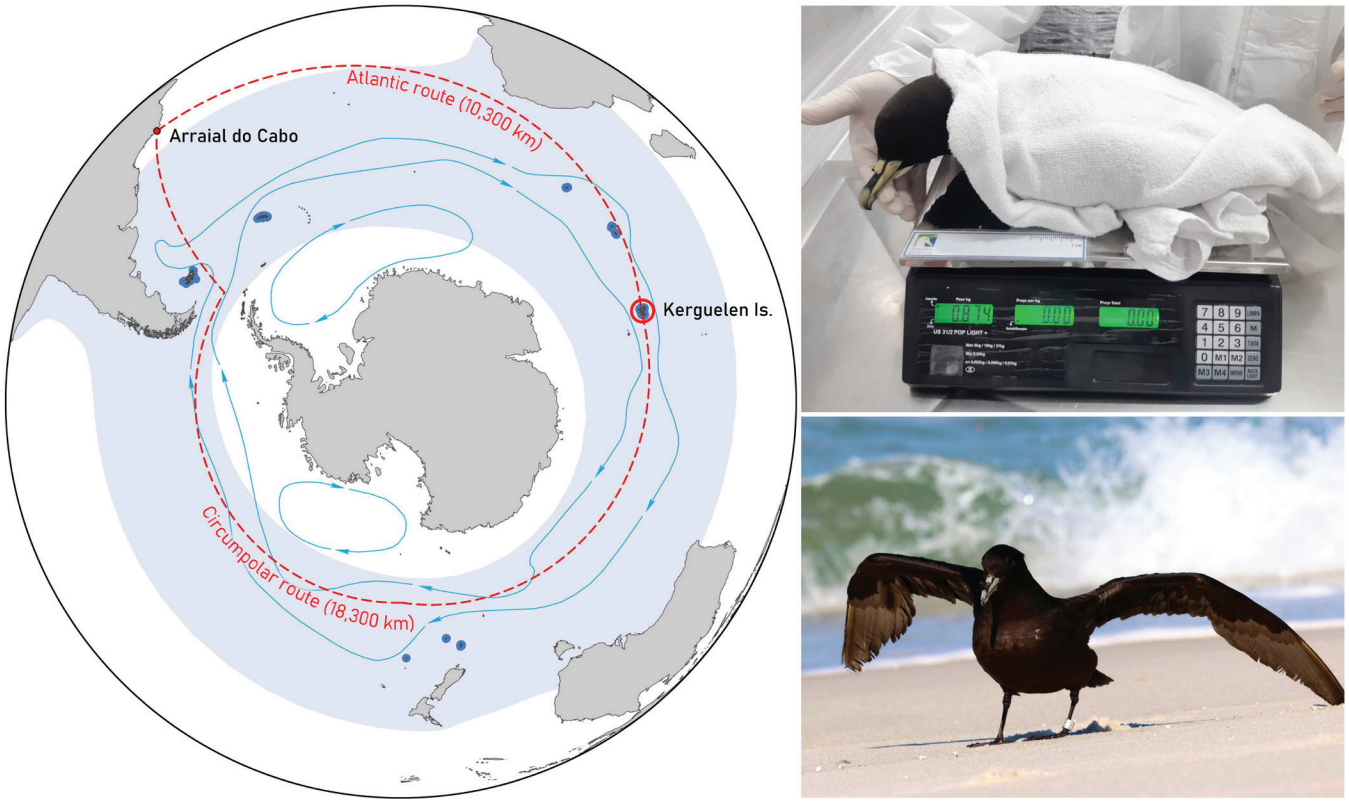

Fig. 1. Potential routes (red dashed lines) used by a White-chinned Petrel *Procellaria aequinoctialis* tagged as a chick at the Kerguelen Islands, Indian Ocean, and found 485 days later in Arraial do Cabo (red dot), Southeast Brazil. Shaded blue areas represent the species' breeding (royal blue) and non-breeding distributions (light blue) (BirdLife International, 2018). Blue arrows represent the dominant Southern Ocean currents (Rintoul et al., 2001). Top right: Initial intake and weighing of the bird at the rehabilitation center in Brazil. Bottom right: Successful release after 30 days under care.

cell volume = 24%), hypoproteinemia (plasma total solids = 24 g/L), and mild leukocytosis (white blood cell count = 14,300 cells/µL). Oropharyngeal and cloacal swabs were screened for influenza A virus and, by polymerase chain reaction screening, for *Mycoplasma* spp. Results were negative for influenza A virus and positive for *Mycoplasma* spp. (further details to be presented in a future study).

Rehabilitation followed well-established protocols for procellariform birds (Hurtado et al., 2020), initially including administration of hydration fluids supplemented with essential nutrients and fish gruel. As its health improved, the bird began eating on its own, consuming a diet of sardines, squid, and shrimp. During the rehabilitation, the bird was housed in an outdoor enclosure equipped with a saltwater tank. Weighing and hematological analyses were performed weekly to monitor the bird's response to treatment. After 30 days, the bird—weighing 1,000 g and with hematological analyses indicating a satisfactory recovery (packed cell volume = 43%, plasma total solids = 39 g/L, white blood cell count = 12,600 cells/µL)—was released on 30 August 2024 at Praia da Pernambuca (22.9390°S, 042.2835°W), Araruama, Rio de Janeiro state, Brazil.

DISCUSSION

A number of procellariid species travel long distances between breeding and wintering waters (Phillips et al., 2006; Pinaud & Weimerskirch, 2007). This is true of White-chinned Petrels breeding at South Georgia, Prince Edward, Crozet, and Kerguelen Islands (Berrow et al., 2000; Catard et al., 2000; Péron et al., 2010; Phillips et al., 2006; Rollinson et al., 2018; Weimerskirch et al., 1999). There are two potential routes that a White-chinned Petrel could take traveling from the Kerguelen Islands to the western South Atlantic (Fig. 1). The most direct route would be toward the west, a journey of at least 10,300 km. Westward routes have been reported in White-chinned Petrels traveling to Argentine waters from South Georgia or to South African waters from Prince Edward, Crozet, and Kerguelen Islands (Berrow et al., 2000; Péron et al., 2010; Phillips et al., 2006; Rollinson et al., 2018; Weimerskirch et al., 1999). Alternatively, an eastward circumpolar route is also possible, although considerably longer (18,300 km). Eastward circumpolar navigation is common in albatrosses (Croxall et al., 2005) but has not yet been documented in the White-chinned Petrel. Indeed, records are scarce of individuals from the Indian Ocean being sighted in the South Pacific Ocean (Miskelly, 2009). Furthermore, genomic studies suggest that White-chinned Petrel population connectivity is limited between the Indian and South Pacific Oceans but is significant between the Indian and South Atlantic Oceans (Rexer-Huber et al., 2019). In this context, the westward Atlantic route appears to be the most plausible route for the bird in this study to have travelled from the Kerguelen Islands to Brazil. Of note, procellariiform birds seem to prefer flying with crosswinds or quartering winds (Spear & Ainley, 1997), often favoring trajectories oblique to the prevailing winds (Adams & Flora, 2010; Péron et al., 2010; Weimerskirch et al., 1999). Hence, the westerly winds that are dominant in the sub-Antarctic region would not necessarily have benefited an eastward route (or hindered a westward route).

Even though White-chinned Petrels, with their long wings, can employ dynamic soaring to conserve energy while flying (Pennycuick, 1982), a bird weighing ~1 kg and traveling more than 10,000 km would inevitably require a significant energy expenditure. Seabirds undertaking such prolonged journeys rely heavily on their endogenous energy reserves (Bauchinger et al., 2005), which can cause them to deplete their nutrient and energy stores (Arizmendi-Mejía et al., 2013). When it was found in Brazil, the bird in our study was in poor nutritional condition, hypothermic, dehydrated, anemic, and hypoproteinemic, suggesting that the long journey had considerably worn out its energetic and physiological resources.

It is worth noting that highly pathogenic avian influenza (HPAI) was implicated in the mass mortality of seals, gulls, and skuas at Kerguelen Islands in November and December 2024 (Clessin et al., 2025) and had been detected in two White-chinned Petrels found ashore in Brazil in November 2023 (Rivetti et al., 2024). Although the bird in question was negative for HPAI, this case illustrates how the dispersal of seabirds could provide opportunities for long-distance, longitudinal dispersal of pathogens such as HPAI in the Southern Ocean.

In conclusion, the successful rehabilitation and release of this petrel highlights the importance of long-term coastal and marine monitoring programs, producing valuable data about the health challenges of seabirds, their long-distance movements, and the impacts of human activities on their populations. Continued international cooperation and support for such programs are essential for enhancing our understanding of migratory seabirds and ensuring their continued protection.

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ETHICS STATEMENT

Ethical approval was not required for this study in accordance with local legislation and institutional requirements. All information used in this study was collected as part of the Campos and Espírito Santo Basins Beach Monitoring Project (PMP-BC/ES), under license No. 861/2017 - 3rd Renewal - 1st Amendment (22023451).

DECLARATION OF INTERESTS

The authors declare that there are no conflicts of interest relevant to the content of this article.

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