NEW ESTIMATE OF THE NUMBER OF BREEDING PAIRS OF GREAT-WINGED PETREL *PTERODROMA MACROPTERA* ON TRISTAN ISLAND, SOUTH ATLANTIC

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SUMMARY

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The current estimate of the number of breeding pairs of Great-winged Petrels *Pterodroma macroptera* on Tristan Island is 1 000 or less. In the last few hours of daylight on 11 April 2018 we observed large numbers of Great-winged Petrels off the southeast coast of Tristan Island and estimated from this a breeding population of 3 000–4 000 pairs. This article details the initial observation and the method used to derive the estimate of the number of breeding pairs.

Key words: Great-winged Petrel, Tristan Island seabirds, estimating seabird populations

INTRODUCTION

Great-winged Petrels *Pterodrom macroptera* breed in the South Atlantic Ocean on Gough Island and in the Tristan da Cunha group; in the South Indian Ocean on the Prince Edward Islands, the Crozet Islands, the Kerguelen Islands, and Amsterdam Island; and on islands off the southeast coast of Australia (Flood & Fisher 2013). Adults return to their breeding colonies from mid-March, the pre-laying exodus occurs mid-May to late-May/mid-June, and the young fledge in November (Ryan 2007). The global population of Great-winged Petrels is not known because most breeding sites have not been accurately surveyed. A crude estimate puts the number of breeding pairs at 150 000 (Dilley *et al.* 2018). The most recent surveys of the breeding population in the South Atlantic, conducted in the 1970s, estimates that there are 1 000 breeding pairs on Tristan Island (probably fewer now), and less than 100 breeding pairs on Gough Island (Ryan 2007, Dilley *et al*. 2018).

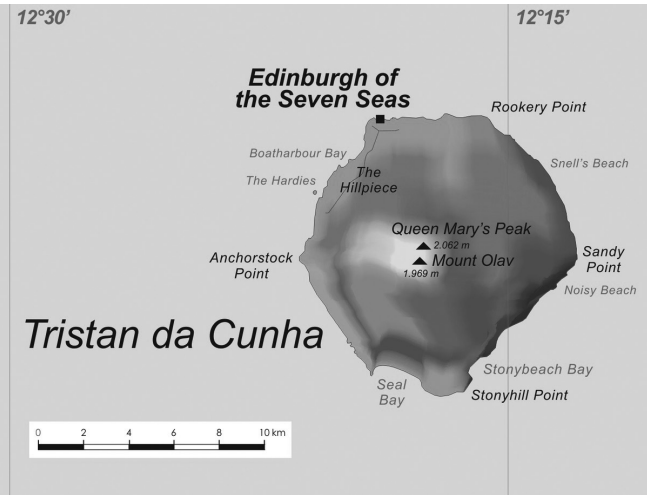

Fig. 1. Tristan Island, showing the locations mentioned in the text. This map was modified by Telim tor from its original form (Map of Tristan da Cunha Group, Southern Atlantic Ocean).

In recent years, researchers have departed from Tristan Island by March, and thus have not studied Great-winged Petrels during their pre-breeding season. Observations on Tristan Island have been of active burrows with large chicks, primarily on the west and northwest slopes where burrow density is low (Fig. 1). Breeding success is low in the few monitored burrows on the settlement plain at Burntwood (located on the northwest side of Tristan Island), most likely because of mouse and rat predation (B. Dilley *in litt.* 2015–2018, Dilley *et al*. 2018). Little research has been carried out on the southeast and northeast sides of Tristan Island in recent years (P. Ryan *in litt*. 2018).

OBSERVATIONS

On 11 April 2018, we were aboard MV Plancius cruising very slowly between Sandy Point and Stonyhill Point, southeast Tristan Island (Fig. 1), keeping in the lee of the island *c*. 1 km offshore. The wind was southwest and sustained at 25–30 knots (46–56 km/h), cloud cover was 65%–80%, there was no precipitation, air temperature was 18°C, and sea temperature was 20°C. The moon was 21% and waning, sunset was at 18h17, and civil twilight was from 18h17 to 18h39.

A small number of Great-winged Petrels moved around with no apparent purpose in the lee of the island within *c*. 2 km of shore throughout the afternoon. Early evening, at approximately 17h10, we noted many Great-winged Petrels gathering *c*. 3 km offshore outside of the island lee and along the entire ocean horizon. Numbers steadily grew, with thousands of birds visible by 17h34. By about 18h00, a significant number of birds had moved into the lee of the island, flying mainly low to the water, courting and calling, and rafting. Loose rafts of 50–250 birds were seen on both

sides of the ship beginning at 18h10. Large numbers of birds were observed between the ship and shore by 18h27. Many birds were present around the ship toward the end of civil twilight at 18h35. Such behaviour is characteristic of petrels returning to the colony.

During the evening, we observed a mixture of several species of birds, including Atlantic Yellow-nosed Albatross *Thalassarche chlororhynchos* (*c*. 30 birds), Great-winged Petrel (number estimate below), Soft-plumaged Petrel *Pterodroma mollis* (a maximum of 5% of the total number of Great-winged Petrels), Atlantic Petrel *Pterodroma incerta* (*c*. 20 birds), prion *Pachyptila* sp. (four birds), and 'white-bellied' storm-petrel *Fregetta* sp. (*c*. 15 birds).

EQUIPMENT

A Canon Legria HF G30 HD camcorder with 20x optical zoom was used to estimate the number of Great-winged Petrels. This model has a focal length of 3.67–73.4 mm, 35 mm equivalent focal length 26.8–576 mm, with field of view at 576 mm of 3.58° horizontal and 2.39° vertical (manufacturer's specifications).

METHODS AND RESULTS

Tristan Island Population

Video of a section of the ocean horizon was taken from a location of 37.0925°S, 12.1500°W at 17h34 while there was a maximum concentration of birds in the windy zone *c*. 3 km from shore. Video was taken at 20x magnification for 30 sec. The number of birds in the section was estimated from single frames at 5-sec intervals and 10 random frames. Three people made independent estimates. Counts of birds visible in the frames consistently fell within the range 50–100 birds, with most counts in the range of 75–85 birds. Birds below the horizon against the dark sea were difficult to pick out or were out of view (which was discovered by following an individual or group of birds, frame by frame). Groups of birds flying together would arc up and then dip below the horizon in synchronized flight, accounting for the wide range in the number of birds counted.

The field of view of the camcorder at 20x magnification was 3.58° horizontal, and the visible ocean horizon was *c*. 200°–220° horizontal, so the field of view of the video was about 1/55–1/62 of the ocean horizon. Calculation of the number of degrees making up the ocean horizon was not strongly sensitive to variation in the distance of the ship from shore (i.e., 1 km +/- 500 m). The number of birds across the ocean horizon, determined to be in the range of 4 125 to 5 270 birds, was calculated by multiplying the mid-estimate range of birds in the video clip (75–85 birds) by 55 and 62, respectively.

These estimates are likely to be conservative. It is very likely that birds in the field of view of the video clips were obscured, even in the freeze frames with the highest counts of birds. Birds would have been present farther out to sea beyond detection of our optical equipment. Not all birds would have returned to the colony that night, despite good conditions for return, with a 21% waning moon and 65%–80% cloud cover. Also, at our request and for comparison, several companions estimated the total number of birds using binoculars. Their estimates fell within the range 10 000–15 000 birds, which is considerably higher than our counts using the video-based approach.

The following evening, we cruised from Edinburgh of the Seven Seas down the west side of Tristan Island. An estimated 500–1 000 Great-winged Petrels were observed by nightfall. The estimate was made using binoculars rather than by video because the smaller number of birds was relatively easy to count. It is likely that these birds nest on the west and northwest slopes of Tristan Island and are different from the birds that we recorded on the other side of the island.

The population counts reported above indicate that the existing estimate of 1 000 breeding pairs or less is a significant underestimate of the Great-winged Petrel population on Tristan Island. However, calculating a new estimate from our results is not straightforward because there are several unknown variables, such as the ratio of pre-breeders to adults, the percentage of the breeding population that returned to colony on any given night, and the percentage of birds in the field of view that were picked up by the camcorder (i.e., some birds would have been farther out to sea beyond detection of our optical equipment). We estimate the number of breeding adults in the colony to be 6 700 if we take the approximate mid-point of 4 700 individuals across the ocean horizon (from the range 4 125 to 5 270 birds), and set all three variables at 70%. This yields an estimate of 3 350 breeding pairs. Our calculations are transparent and the reader can adjust the settings of the variables. We recommend an upward revision to 3 000–4 000 breeding pairs.

Gough Island Population

The current estimate of Great-winged Petrels on Gough Island is less than 100 breeding pairs, although there might still be pockets of burrows in the Glens on the eastern slopes where these birds have historically been more abundant (Dilley *et al.* 2018 submitted; Swales 1965). We sailed into Gough Island from the southwest against a brisk northerly wind during the late afternoon of 9 April 2018, arriving at approximately 17h00. There were many thousands of tubenoses representing most species known to breed on Gough Island, but no more than 10 Great-winged Petrels were logged. Furthermore, very small numbers were observed during our arrivals from the southwest on 25 March 2006 and 8 April 2010 (RLF pers. obs.). Observations from all three years (2006, 2010, and 2018) are consistent with a very small breeding population on Gough Island.

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