Increase of Subantarctic fur seals at the Tristan da Cunha Islands

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Abstract

Subantarctic fur seal, *Arctocephalus tropicalis*, pups were counted on some of the beaches on all four Tristan da Cunha (TdC) islands, in January 2017, to determine the status of the population, in the face of climate change that is magnified in polar regions. Compared to counts done 40 years earlier on Gough, the breeding population increased markedly on some beaches, although negligibly on the largely open boulder beaches on the leeward northeastern sector of the island. Similarly, on the northern group of the TdC islands, the breeding population had increased markedly (including the very first pup counts at Inaccessible and Nightingale), despite fur seal females currently selecting only certain beaches for pupping (at Inaccessible and Tristan). At Tristan da Cunha, only one small breeding colony occurs which is remote from the human settlement, probably the result of anthropogenic disturbance.

Key words: Subantarctic fur seals, pup counts, Tristan da Cunha islands, population increase

Introduction

The Tristan da Cunha (TdC) islands are home to the majority of the world population of Subantarctic fur seals (*Arctocephalus tropicalis*), with more than 80% of the global population

breeding on Gough Island alone (Bester et al. 2006; Bester and Ryan 2007). The islands lie 2,700 km from South Africa and 3,700 km from the nearest coastline of South America. Saint Helena Island is the closest land, 2,400 km away to the north. The northern group of the TdC islands is composed of Tristan da Cunha, Inaccessible and Nightingale islands. Inaccessible and Nightingale lie approximately 30 km to the southwest and south of TdC respectively (Fig. 1). The southernmost and most isolated island, Gough, lies 380 km to the south-southeast.

The TdC islands' remote locations, and the paucity and timing of research vessels visiting the islands, precludes complete or regular censuses of Subantarctic fur seals there. Fortuitously, the National Geographic's Pristine Seas (NGPS) project, in collaboration with the Royal Society for the Protection of Birds (RSPB) and the Tristan da Cunha Government (including the Fisheries and Conservation Departments), embarked on a 21-day expedition to the TdC islands in January-February 2017. One of the scientific goals of the expedition was to conduct a quantitative survey of the fur seal population of the archipelago. Despite several fur seal population growth estimates at Gough Island (Bester 1980, 1990; Bester et al. 2006), no published pup estimates for Inaccessible and Nightingale islands exist. This study reports on the results of the fur seal pup census of January 2017 at all four of the TdC islands.

Methods

Study Area

The northern group (Tristan, Inaccessible and Nightingale) at 37°04' S, 12° 18' W is located north of the Subtropical Front while Gough Island (40°19' S, 9° 57' W) is located south of this front. Consequently, Gough Island's sea surface temperature is colder than the northern islands. The TdC islands are located roughly at the boundary between the Southern Ocean and the South Atlantic (Fig. 1).

Pup Counts

Towards the end of January, after the last fur seal pups are born and before they start playing in the shallow water (Bester 1980), particular stretches of coastline on all four islands (Fig. 2), depending on opportunity, were searched on foot, by clambering among the rocks and boulders to

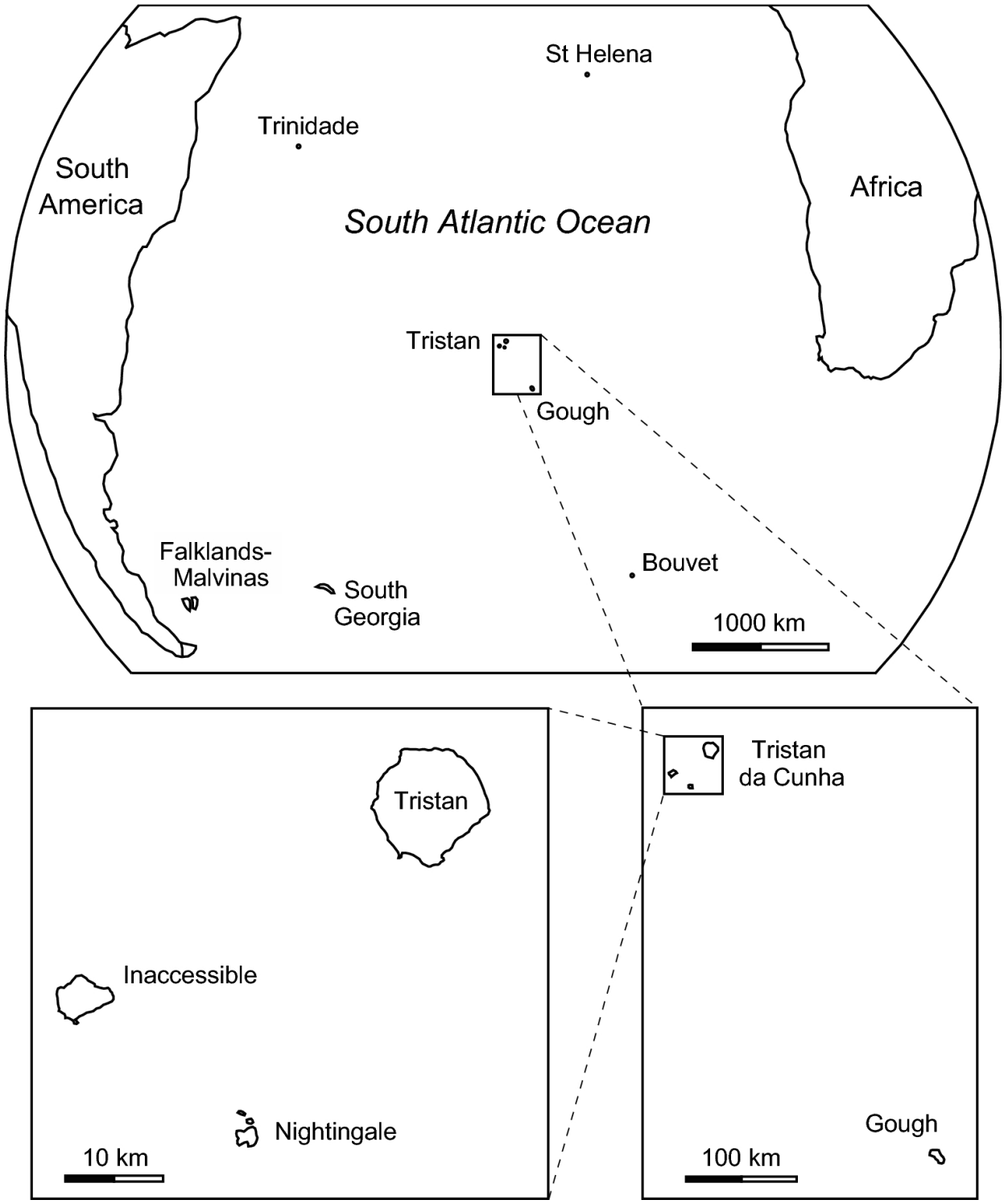

Fig. 1: Location of the Tristan da Cunha islands, including Gough Island, South Atlantic Ocean, where the Subantarctic fur seal pups were counted in January 2017.

find pups. Pups were counted because, unlike other age classes, all of the pup cohort is ashore at this time. Pup counts are also routinely used as a proxy for population numbers (e.g., Kerley 1983; Bester 1987). All live pups seen were counted, and the exact location(s) of each breeding or non-breeding colony (defined in Bester 1982) visited was recorded on a map of the islands. Given the limited time at our disposal on each occasion, the prevailing weather, wind strength, direction and sea state, and physiognomy of the beaches, not all beaches could be accessed from land (steep cliffs backing the beaches) or from the sea (poor landing conditions). Therefore, pup counts from close inshore from a Rigid Inflatable Boat (RIB) were done on occasion. Only live pups were recorded and time constraints, high density of pups at breeding colony beaches, and availability of assistance, precluded repeat counts to calculate errors of the pup number estimates for each beach. Naturally, an unknown number of pups escaped being counted (hidden under rocks or in large concentrations), which would require undercount corrections (e.g., Condy 1978; Bester 1980). An estimate of the number of dead pups (which, together with the undercount corrected number of live pups, would provide estimated number of births) additionally requires application of (published) mortality rates, over the first six weeks of life, for the species (Bester 1987). Uncorrected pup counts in the present study are compared primarily with those recorded previously (Bester 1980; Bester 1990a; Bester et al. 2006) to infer breeding population trend, using pup numbers as a proxy of breeding population size, for the particular beaches only.

Results

Gough: Compared to end-January 1978 (Table 1) when the fur seals pups were counted previously (Bester 1980), uncorrected pup numbers at the Tumbledown Beach area (n = 24 *versus* 591), Buttress Rock to Dell Rocks (n = <10 *versus* 724) and the north-east coast beaches north of Deep Glen (n = 0 *versus* 5199) have increased markedly. Other small (Seal Beach, n = 1 *versus* 2) and large open beaches (Reef Point to Deep Glen, n = 0 *versus* 16; Capsize Sands, n = 0 *versus* 8) showed virtually no increases over 40 years (Table 1). These largely open boulder beaches on the leeward northeastern sector of the island (Fig. 2A), which are of similar physiognomy to those beaches with large concentrations of fur seal pups (e.g., from Deep Glen towards Northeast Point counted in the present survey), have not developed into breeding colony beaches in the intervening four decades.

Table 1: Comparison of Subantarctic fur seal (*Arctocephalus tropicalis*) uncorrected pup counts on east coast beaches, listed from southernmost to northernmost, of Gough Island between January 1978 and January 2017

Beach	**1978***	**2017**
Tumbledown to Cave Beach	24	591**
Seal Beach	1	2
Buttress Rock to Dell Rocks	<10	724
Capsize Sands	0	8
Reef Point to Deep Glen	0	16
North of Deep Glen	0	5199

* Values taken from Bester (1980)

** Cave Beach not counted

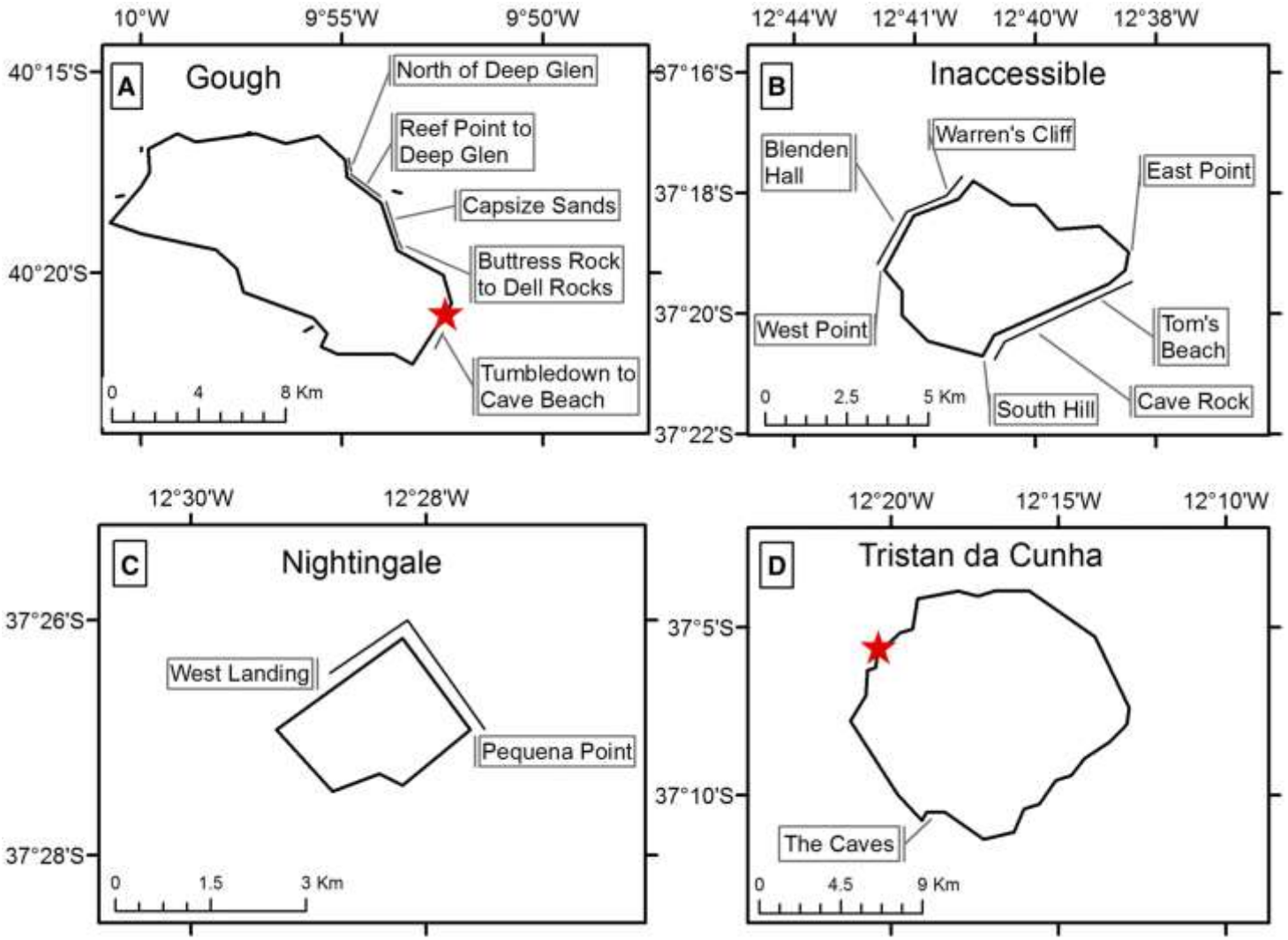

Fig. 2: Stylized maps of Gough (A), Inaccessible (B), Nightingale (C) and Tristan da Cunha (D) islands, South Atlantic Ocean, showing the locations of beaches mentioned in the text, where Subantarctic fur seal pups were counted in January 2017. Stars indicate the meteorological station (Gough) and human settlement (Tristan da Cunha) that are occupied year- round.

Inaccessible: No baseline counts at the remaining Tristan da Cunha islands are available for the 1970s. At Inaccessible there is a preference for selecting certain beaches for pupping (Blenden Hall to Warren's Cliff, n = 446 pups; Blenden Hall to West Point, n = 1). On the south-eastern aspect of Inaccessible only some (n = 35) pups were clustered at East Point, and then again on the approach to Cave Rock (n = 166). The entire section in between these points, such as Tom's Beach, was devoid of pups. South-east of Cave Rock there was a concentration of pups (n = 345) towards South Hill (Fig. 2B). The total pup population of Inaccessible comes to at least 993 individuals.

Nightingale: Except for the area directly in front of the 'Huts', the un-named eastern beaches from West Landing (n = 17 pups) towards Pequena Point, all had pups ashore (estimated from RIB close inshore). These counts (n = 1126) are augmented by those counts at informally named "Bester's Beach" (n = 1509), which was located further along the eastern section, short of reaching Pequena Point, and counted directly on foot (Fig. 2C). The total pup population of Nightingale comes to at least 2652 individuals.

Tristan da Cunha: Pups (n = 75) occur only at The Caves (Fig 2D).

Discussion

Total island counts of fur seals were not done in any year on the TdC islands (Bester 1984; Bester and Ryan 2007) and no previous estimates of pups present at any of the beaches on Nightingale existed. The only counts at Inaccessible Island (04 – 20 November 1999) produced a total of about 503 adult males, adult females and juveniles but no pups (PG Ryan *pers comm*), as pups are only born between the last week in November and the first week in January (Bester 1987).

In the present study, pups were counted directly only on some accessible beaches to either compare counts amongst years (previously counted), or to set a baseline value (not previously counted). The estimation of fur seal pup numbers ashore at the TdC islands in January 2017 is therefore nowhere near the true situation, as we only counted a fraction of the beaches available to fur seals. Furthermore, adjustments to 'boat-based' counts as opposed to 'beach-based counts' are likely to

be considerable, and undercount corrections to augment the 'beach-based' estimates (variously between 14,2% and 34.3% - Kerley 1983; Wilkinson and Bester 1990; Hofmeyr et al. 1997; Bester et al. 2003) must also be factored in (neither of which is done here).

Despite the counts not being corrected, there is no doubt that the overall population of fur seals in the TdC islands have increased over the past 40 years. The factors responsible for the demographic peculiarities in Gough's fur seal population (open boulder beaches on the leeward northeastern sector of the island not developing into breeding colony beaches) are unknown. Breeding fur seals are perhaps reluctant to colonize open boulder beaches on the lee of the island, likely due to thermoregulatory constraints (Bester 1982a, b) and fur seal females' fidelity to a particular breeding beach (e.g., Lunn & Boyd 1991). The large concentration of pups on the northeastern section of the coastline likely represents an overflow of breeders from established fur seal colony beaches (Bester 1982a) on the north coast. This would then be similar to what had appeared to happen on the southeast coast (Bester 1990; Bester et al. 2006) with an influx of breeders from the adjacent south coast. Similarly at Marion Island, during the first ~40 years after recolonization by Subantarctic fur seals, breeding colony beaches were first established on the western side of the island. Only after these beaches presumably reached a saturation point, were the beaches on the lee of Marion Island (north-east and east coasts) established (Hofmeyr et al. 1997, 2006; Wege et al. 2016).

On Inaccessible, the narrowness of some beaches in the southeastern sector may preclude development of breeding colony beaches, while protected beaches (from wave action and backed by perpendicular cliffs) in the same sector have been colonized. At Nightingale, fur seal have colonized all the beaches in the more protected eastern sector. At Tristan, only one small breeding colony of Subantarctic fur seals has developed (mentioned in Bester et al. 2014), pups numbering 70 in January 2017, some six weeks after the median birthdate (presumably similar to the 10-11 December at Gough – Bester 1987), therefore past the conclusion of the pupping season. Anthropogenic disturbance perhaps prevent breeding colony development elsewhere on Tristan, the inhabited island (see Wace and Holdgate 1976).

Whereas the fur seal population at Gough Island has possibly recovered to pre-exploitation levels (Bester et al. 2006) and numbers some 300,000 animals with an estimated 60,000 pups born which is about 80% of the world population (Bester and Ryan 2007), the fur seals were extinct at the northern islands of TdC in the early 20th century. Gough Island probably is the main source area for the current re-colonization of the proximate islands of TdC to the north after the severe population decreases due to commercial sealing in the early 1800s (Bester 1987; Cooper & Headland 1991), which decimated the fur seal populations at the TdC islands (Wace and Holdgate 1976; Bester 1987, Bester and Ryan 2007).

Further assessment of the population size and trend of the Subantarctic fur seals at the TdC islands is needed as a contribution to the TdC Blue Belt Program (http://www.tristandc.com/wildlife/bluebelt.php) which is aimed at establishing a regime for protecting the waters across its entire maritime zone by 2020.

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Compliance with Ethical Standards

The University of Pretoria Animal Ethics Committee (Project Number EC077-15) cleared the procedures of this project, executed under an Environmental Research Permit, including the Wildlife and Protected Areas Research Permit, of the Tristan da Cunha Government.

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