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SHORT NOTE

An update on the Southern Giant Petrels *Macronectes giganteus* breeding at Harmony Point, Nelson Island, Maritime Antarctic Peninsula

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Abstract
In several parts of Antarctica, the information on the size of seabird populations is outdated by decades. Considering the environmental changes taking place at the Antarctic Peninsula, up-to-date information is urgently required. In this study, the breeding population of southern giant petrel (*Macronectes giganteus*) at Harmony Point, Nelson Island, was counted and mapped during incubation. The total number of active nests was 481, distributed mostly in small dispersed groups (< 30 nests); one single colony presented > 100 nests. Nests were distributed throughout the whole area. Current colony distribution was similar to the ones reported previously. The current number of nests is similar to those reported since 2005, and also for early counts in the 1965 and 1989s. However, current numbers were almost half of those counted in the 1997. The apparent increases in the number of southern giant petrels by 1997 was attributed to prohibiting tourism visits to the area (giant petrels are sensitive to human disturbance), but causes of the following decrease are unknown. This highlights the need for updated information in order to understand which factors are responsible for trends in Antarctic seabird populations.

Keywords Breeding Pairs · Nest Distribution · Population · Seabird

Introduction

Currently there are 204 important bird areas (IBAs) in Antarctica (Harris et al. 2015). Long term population data with up-to-date counts are available only for some of those, for instance Admiralty Bay, King George Island (Petry et al. 2016) and Stinker Point, Elephant Island (Petry et al. 2018). Several studies summarized information on the population sizes of several species of seabirds at various scales (i.e. Lynch et al. 2008; Trivelpiece et al. 2011; Barbosa et al. 2012; Schrimpf et al. 2018). Nonetheless, for most Antarctic IBAs, information about population size of seabird species is outdated by decades (see Harris et al. 2015). This is concerning, as various studies reported population declines for several species in many parts of the Western Antarctic Peninsula and the Scotia Sea (Trivelpiece et al. 2011; Barbosa et al. 2012; Petry et al. 2016; Schrimpf et al. 2018).

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At the Antarctic Peninsula, Harmony Point (IBA ANT49 and Antarctic Specially Protected Area ASPA 133), Nelson Island, provides breeding grounds for 12 seabird species (Silva et al. 1998), representing an area in the South Shetlands with one of the highest number of breeding seabird species in the region (Harris et al. 2015). However, observations over the last two decades seem to indicate that populations of some species at Harmony Point have declined (see Harris et al. 2015). Southern giant petrels (*Macronectes giganteus*), or SGPs, in particular may have experienced a decline. In 1995/96, 746 pairs were counted (Silva et al. 1998), compared to 485 pairs in 2005 (ACAP 2010) and 395 pairs in 2009 (Harris et al. 2015). Silva et al. (1998) mentioned that the distribution of the colonies of flying seabirds coincided with previous mappings. The objective of this study was to present an update of the size of the breeding population of SGPs at Harmony Point and to provide detailed mapping of the nests in the area to compare with the previous distribution. Harmony Point has the second largest known population of SGPs in the South Shetlands (Harris et al. 2015), after Stinker Point with ~ 900 breeding pairs (Petry et al. 2018). The SGP is a species listed under the Agreement on the Conservation of Albatrosses and Petrels

(ACAP 2010). The global population of SGPs is estimated to range from ~ 95,000 and 108,000; the trend of the global population is unknown. According to Birdlife International (2019), under the best case scenario the global population increased an estimated 17%, or decreased by 7% in the worst case. Globally, several SGP populations appear to be decreasing (ACAP 2010). Therefore up-to-date population information is highly desired.

Material and methods

Harmony Point is located at the west of Nelson Island, South Shetland Islands (Fig. 1a, b). From 5 of December 2018 to 2 January 2019, during incubation, SGPs nests were counted by searching the whole ice-free area. Binoculars (10 × 50) were used to aid locate nestsites. All active nests had their geographical positions marked with a hand-held GPS (Garmin GPSMAP 64 s, ± 3 m precision). A nest was assumed to be active when the bird did not flee when approached. Based on personal experience, breeding SGPs tend to remain in the nest when approached. The number of nests with eggs whose occupants left during the mapping was very low (< 15). Birds that left the nest usually remained close to the colony and returned after a few minutes when the researcher moved a dozen meters away. As Southern Giant Petrels are sensitive to repeated human disturbance, each area was visited only once by a single researcher. GPS points were navigated to avoid recounting nests placed in relative isolation from the main breeding groups. Nests were grouped into colonies based on Silva et al. (1998) and a direct comparison of number of nests counted then and now was plotted on the map. Maps were drawn using ArcGis 10.4.

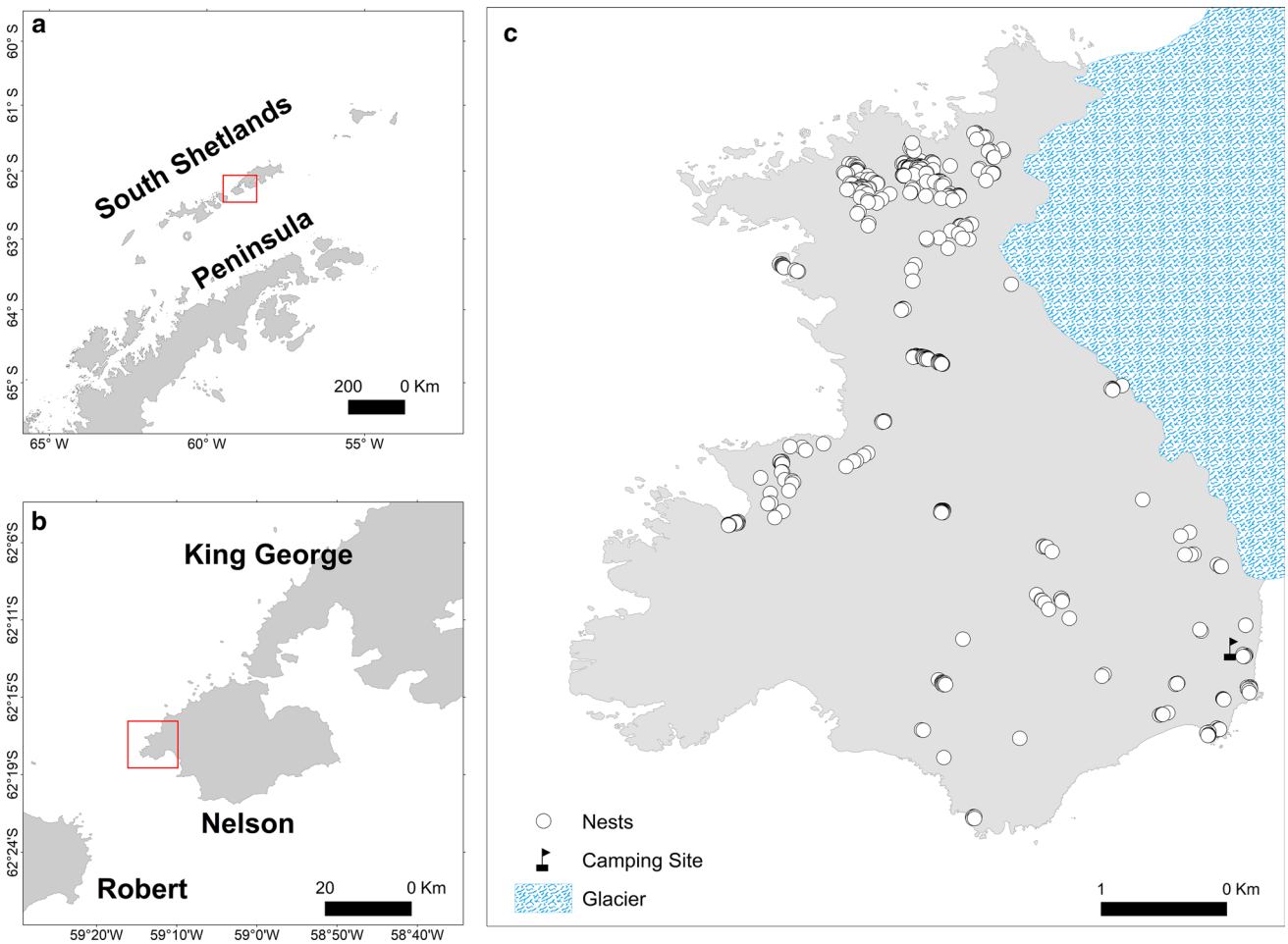

Fig. 1 Location of Nelson Island in the South Shetland Islands (**a**) and detail of Harmony Point (**b**); distribution of active nests (white points) of southern giant petrel (*Macronectes giganteus*) at Harmony Point (**c**)

Results

A total of 481 active nests was counted (Fig. 1c). The largest colony was located at the northern coast (Fig. 1c). Scattered small breeding groups (< 30 nests) and isolated nests were found in the higher inland area and at the southern shores (Fig. 1c). The distribution of the nests was similar to previous studies, with the exception of one colony recorded in previous studies that currently had no nests, and one new colony that was not recorded in previous studies (Fig. 2). The number of nests had decreased in practically the whole area, with exception of the large colony at the northern coast (Fig. 2).

Discussion

There are few areas at the Western Antarctic Peninsula where SGPs breed in large numbers, and Harmony Point, with > 450 nests, is one. The apparent increase in the SGP population at Harmony Point in 1997 (746, Silva et al. 1998), compared to 1965 (417; Araya and Aravena 1965) and 1989 (494; Favero et al. 1991) was attributed to the closure of the area to tourism activities due to the declaration of Harmony Point as an Antarctic Specially Protected Area ASPA in 1988 (Silva et al. 1998). However, since then the population seems to have declined to its pre-ASPA numbers and possibly is fluctuating around the 450 pairs (Harris et al. 2015 and references therein). Changes in SGP populations elsewhere were attributed to interactions with fisheries (Quintana et al. 2006; Krüger et al. 2017), to changes in food sources (Bruyn et al. 2007), intense human disturbance near

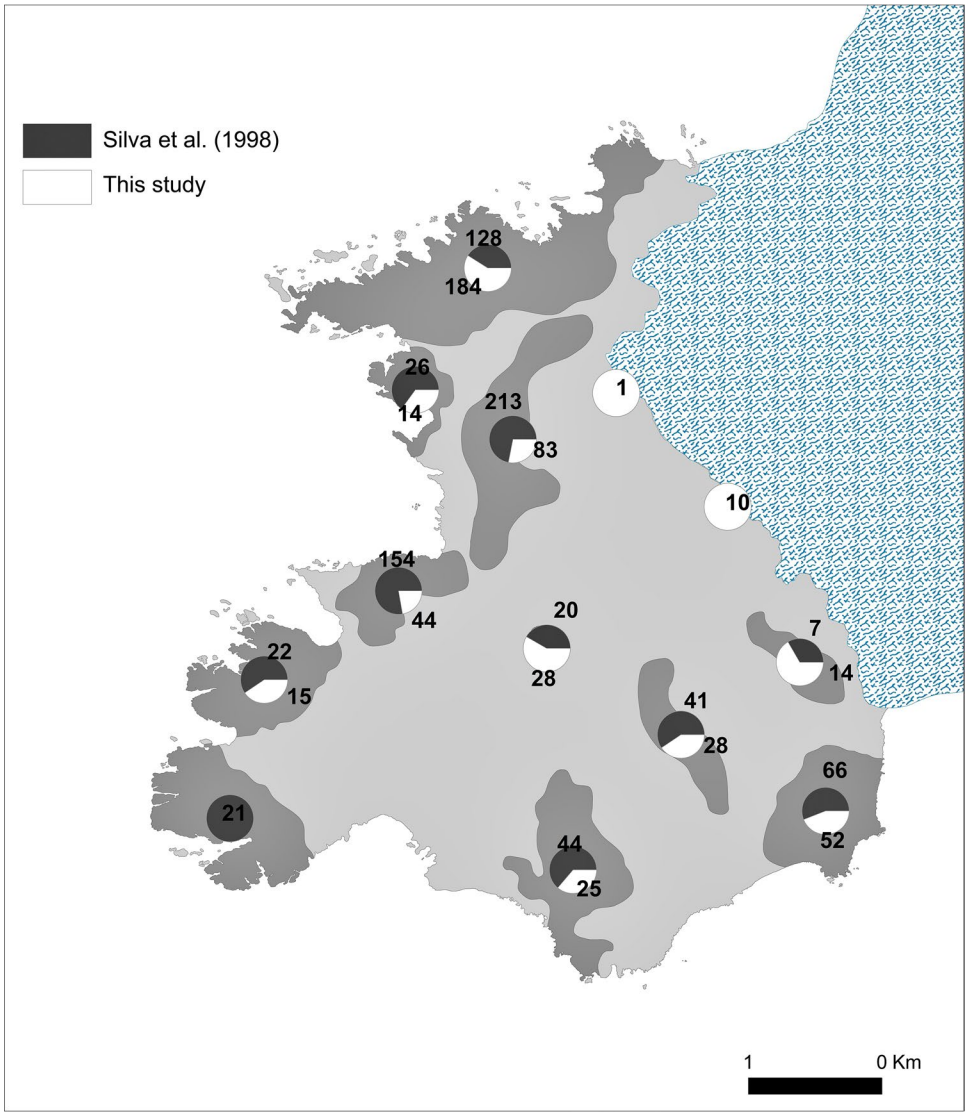

Fig. 2 Number of active nests of Southern Giant Petrels (*Macronectes giganteus*) for each colony at Harmony Point in 1995/96 (Silva et al. 1998, dark grey area on circular plots) compared to the counts made in 2018/19 (this study, white area on circular plots). Colonies distribution (grey polygons) was adapted from Silva et al. (1998)

colonies, and climate/weather influence (Krüger et al. 2012; Schulz et al. 2014; Petry et al. 2016). SGPs are very sensitive to constant human presence, and local decreases in colonies at places like King George Island (Sander et al. 2005; Petry et al. 2016) and Penguin Island (Harris et al. 2015) in South Shetland Islands, where human presence is intense due to the presence of research stations and tourism (Bender et al. 2016), seem to support that point of view. However, at Harmony Point, the causes of fluctuation are still to be evaluated properly. For instance, Chinstrap (*Pygoscelis antarcticus*) and Gentoo (*P. papua*) penguins, potential inland food sources for SGPs (penguin remains are found in > 90% of diet samples and can influence population dynamics Bruyn et al. 2007; Bezerra et al. 2015), are numerous at Harmony point (Patricia Silva et al. 1998). The lower SGP population count for Harmony Point was in 395 pairs in 2009. This is coincident with a strong El Niño (Lee et al. 2010), which could also have been responsible for the lower breeding success of SGPs at Elephant Island (Schulz et al. 2014; Petry et al. 2018).

Many factors may influence trends of SGPs populations in Antarctica, both at-sea or on land during the breeding period (climate change, tourism) or at-sea during the non-breeding period (fisheries) (Lynch et al. 2008; Dunn et al. 2015; Krüger et al. 2017). As top-predators (scavenging and also hunting actively on sea and on land), SGPs can be potential indicators of general ecosystem state (Sergio et al. 2008), and particularly of fishing activities (Krüger et al. 2017). How population drivers affect SGPs breeding in Antarctica during the non-breeding season and how changes affect the ecosystem is of concern and should be investigated. The population at Harmony Point can provide future data for investigating that.

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Compliance with ethical standards

Conflict of interest The author declare no conflicts of interests in this study.

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