SIGHTINGS OF RINGED SOUTHERN GIANT PETRELS *MACRONECTES GIGANTEUS* IN EAST ANTARCTICA: A TALE OF MISSED OPPORTUNITY

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ABSTRACT

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Southern Giant Petrels *Macronectes giganteus* were leg-ringed as nestlings at two East Antarctic breeding locations, the Frazier Islands and Hawker Island, during the period 1959–1988. I searched these colonies in 2011, deducing ring numbers by using multiple digital photographs. The resightings suggest, but do not confirm, emigration between colonies separated by 1 500 km of coastline. The disparate nature of the ringing program within the Australian Antarctic Territory has led to a loss of important information that could now be used to model and predict how this long-lived species might respond to a number of population pressures, including environmental variability.

Key words: Antarctica, demographics, longevity, emigration, Southern Giant Petrel, *Macronectes giganteus*

INTRODUCTION

Globally, the use of plastic or metal leg-rings provides a means to individually identify free-ranging birds in field studies. However, without structured long-term observations of marked individuals, simply deploying leg-rings contributes little to our knowledge of the ecology and demographics of the study species. Unfortunately, mark-recapture studies can and do suffer from temporal discontinuities in ringing (e.g., Fig. 1) and resighting effort.

Over almost three decades (1959–1988), biologists working for the Australian Antarctic Program deployed >1 100 aluminium leg-rings on nestling Southern Giant Petrels (SGP; *Macronectes giganteus*) at two of their most southern breeding locations separated by about 1 500 km: the Frazier Islands and Hawker Island, East Antarctica (Wienecke *et al*. 2009). However, negative SGP population trajectories and human disturbance at their nesting colonies were thought to be related (Woehler *et al*. 2003). As a result, protective measures were introduced that not only prohibited ringing but restricted access for observations to the outside of colony boundaries at intervals of three to five years. Whether the measures had a positive effect on the status of SGPs within the region is inconclusive (Creuwels *et al*. 2005, Wienecke *et al*. 2009); however, the potential to resight ringed individuals at their breeding colonies was diminished. Consequently, resighting studies of SGPs ringed as nestlings within the Australian Antarctic Territory (AAT) report mainly on fledglings and juveniles seen at distant locations (e.g., van den Hoff 2011). Here, I present resighting data for ringed nestling SGPs seen as adults within breeding colonies on the Frazier Islands (hereafter FIs, 66°14′S, 110°11′E, Antarctic Specially Protected Area [ASPA] No. 160) and Hawker Island (hereafter HI, 68°38′S, 77°52′E, ASPA No. 167).

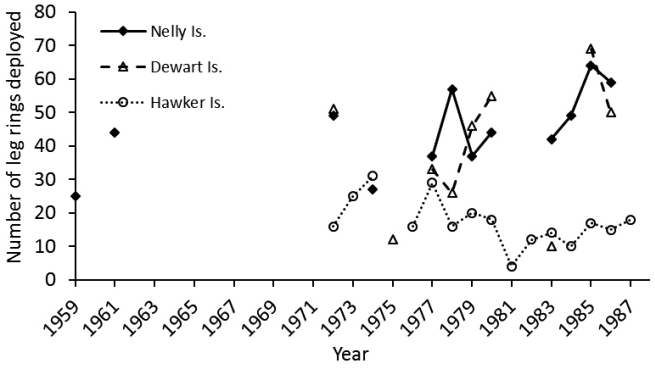

Fig. 1. Numbers of leg-rings deployed on nestling Southern Giant Petrels over time at three East Antarctic breeding locations. Breaks in the lines connecting points represent perturbations in deployment effort. Ringing ceased at the Frazier Islands (Nelly and Dewart Islands) in 1986 and at Hawker Island in 1987.

METHODS

I visited HI (5 March 2011) and the FIs (12 December 2011) during the breeding season, when chicks were close to fledging (HI) or when adults were still on nests (FIs). The Australian Government's Department of Sustainability, Water, Population and Communities issued permit number ATEP 10-11-3154 under the *Australian Antarctic Treaty (Environmental Protection) Act 1980* to allow me to undertake this research within the ASPAs.

In all, I saw six leg-rings on adult SGPs within the colonies surveyed: two at FIs and four at HI. I was unable to identify ring numbers using the naked eye or with the aid of binoculars at distances of about 20 m. Instead, I used a Nikon D70s digital camera fitted with a 300 mm fixed focal length lens to photograph the birds (Fig. 2A) and their leg rings (Figs. 2B, 2C). Unsurprisingly, no single image provided a complete view of the numbering sequence, and complete sequences were eventually compiled for six rings from all available images for each individual ring. In 40% of cases, the quality or quantity of photographs taken were insufficient to determine the ring identity with absolute confidence. Data collected during 2011

were supplemented with data housed with the Australian Bird and Bat Banding Scheme (ABBBS, https://www.environment.gov.au/science/bird-and-bat-banding).

RESULTS AND DISCUSSION

The 10 rings positively identified on adult SGPs to date (Table 1) amounted to <0.01% of the total number of rings deployed at colonies within the AAT. Of those identified, four birds identified in ABBBS records had been found dead, and I positively identified six live individuals in two days of effort. Even now, six years after this visit, a season of focused observations at the FIs and HI might more accurately determine the number of rings currently in circulation on living adult SGPs within the AAT and could confirm the identity of the individuals that I could not.

The oldest bird I saw alive was 34 years of age, and the average age for the six birds seen in 2011 was 27 (range 25–34) years. At South Georgia, Foote *et al*. (2011) sampled 47 adult SGPs whose ages were known from ringing data. Those birds ranged 12–40 years in age, but the oldest known bird reported was 47 years old (British Antarctic Survey data cited in Foote *et al*. 2011). Whether the life expectancy of SPGs ringed on the Antarctic continent differs from those ringed at lower latitudes remains to be seen, but the average age of birds within the two distinct geographic provinces (Salomon & Voisin 2009) did not differ greatly (Province I South Georgia, 20–26 years; Province II FIs, 29 years).

Giant Petrels show very high fidelity to their hatching grounds (Weimerskirch *et al*. 1985, Voisin 1988, Creuwels *et al*. 2005). Such behaviour reduces the potential for exchange of individuals among widely separated colonies and has contributed to the observed clear-cut geographic variation and population structure for SGPs (Salomon & Voisin 2010, Techow *et al*. 2010). The two live adult SGPs ringed as nestlings on the FIs and seen within the HI colony late in the breeding season were not attending chicks, but their presence on nests (Fig. 2B) and within the colony perimeter suggests that 1) emigration from the hatching colony can occur,

Fig. 2. Photographs of ringed Southern Giant Petrels at the Hawker Island colony, East Antarctica, 5 March 2011. A) Three ringed SGPs (circled) sitting within the colony perimeter. Notice nestlings are beginning to show feathers. B) Close-up of an adult petrel ringed as a nestling on the Frazier Islands and now sitting on a nest of pebbles at Hawker Island. Only three (956) of the possible five identifier digits are visible. The band batch number 131 is also obscured. C) Digital camera technology allowed numerous images to be captured quickly to obtain enough information to complete the numbering sequence for this bird. This was the best image taken for this ring (131-51956).

or 2) the birds were either breeding at their hatching colonies or were on a sabbatical year, and for reasons that remain obscure they visited a non-natal colony.

Perhaps the most important point of this study is to highlight some of its shortcomings. The disjunct nature of the ringing effort (Fig. 1) and lengthy breaks in resighting effort from 1987 onward have undoubtedly contributed to a loss of information on demographic parameters such as juvenile survival, age at first breeding, and breeding frequency for populations at their most southern extreme and foraging in oceans experiencing the impacts of climate change (Hoegh-Guldberg & Bruno 2010). When related to intrinsic and extrinsic population pressures such as fisheries mortality, climate-induced environmental change, and human disturbance at the breeding colonies, these important demographic parameters can elevate our understanding of the uncertainties surrounding SGP population trajectories (Wienecke *et al*. 2009, van den Hoff 2011). Although there are shortcomings in the data collected to date, I would recommend continued observations of ringed SGP at colonies in East Antarctica using digital cameras fitted with a telephoto lens of 300 mm at minimum. Such data would serve to 1) confirm emigration between breeding locations, 2) more fully determine adult lifespan, 3) record the frequency or occurrence of sabbatical years, and 4) establish pair bonding. We will need to be quick about this because the ringed birds are in their 30s now, and age is not on their side.

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TABLE 1
Summary of sightings for ringed Southern Giant Petrels observed at two East Antarctic breeding colonies

Leg-ring number applied	Location and date of ring		Age at resighting (years)	Possible emigration
	Deployment	Resight		
130-73210[a]	Hawker Island 28 March 1973	Hawker Island 2 March 1987	14	No
131-73067[a,b]	Hawker Island 29 January 1976	Hawker Island 20 February 1983	8	No
131-33458	Frazier Island 13 February 1977	Frazier Island 12 December 2011	34	No
131-34191[a,b]	Frazier Island 24 January 1978	Frazier Island 26 December 1998	20	No
131-34208[a,b]	Frazier Island 27 January 1978	Frazier Island 8 February 1994	16	No
131-51956	Frazier Island 3 March 1985	Hawker Island 5 March 2011	26	Yes
131-52011	Frazier Island 6 March 1985	Hawker Island 5 March 2011	26	Yes
131-47046	Hawker Island 12 February 1986	Hawker Island 5 March 2011	25	No
131-52203	Hawker Island 12 February 1986	Hawker Island 5 March 2011	25	No
131-52097	Frazier Island 14 February 1986	Frazier Island 12 December 2011	25	No

[a] Deceased.
[b] Ring applied at 1 year or older.

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