DECLINE IN NUMBERS OF ANTARCTIC SKUAS BREEDING AT POTTER PENINSULA, KING GEORGE ISLAND, ANTARCTICA

MARICEL GRAÑA GRILLI

Instituto Antártico Argentino, Balcarce 290, C1064AAF, Ciudad Autónoma de Buenos Aires, Argentina (ggmaricel@gmail.com)

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The Brown Skua (*Stercorarius antarcticus lonnbergi*) and the South Polar Skua (*S. maccormicki*) breed in Antarctica and, in the case of Brown Skua, on sub-Antarctic islands (Ritz *et al.* 2008). During the austral summer breeding season, they feed both on land and at sea. Their broad diet includes penguins and other seabirds (mainly eggs and chicks), fish, krill and carrion (Reinhardt *et al.* 2000). Where nesting is sympatric, the Brown Skua monopolizes terrestrial food sources (especially penguin colonies), forcing the South Polar Skua to rely mostly on marine resources (Pietz 1987, Hahn *et al.* 2008, Malzof & Quintana 2008, Montalti *et al.* 2009, Graña Grilli & Montalti 2012).

Both skua species are listed as "Least Concern" by BirdLife International (2014), and thus little attention is being paid to the state of their populations. However, at Potter Peninsula, King George Island, off the west coast of the Antarctic Peninsula, their numbers appear to be changing. For this site, I contrast the historical information available from the literature on breeding numbers and performance of both species with data on breeding attempts and success recorded during three recent breeding seasons (2011/12 to 2013/14). Hereafter, I use the initial year of the austral spring–summer season to denote the breeding season.

In 1988, two pairs of South Polar Skuas and 20 of Brown Skuas bred at Potter Peninsula (Aguirre 1995), although this was likely an underestimate because important areas of the Peninsula where skuas breed were not covered. Using more complete coverage, higher numbers of both species were found between 1993 and 2003 in the total area of Potter Peninsula (Hahn *et al.* 1998, Hahn & Peter 2003, Hahn *et al.* 2007; Table 1). Furthermore, during that period breeding success was lower than 0.5 in only two of seven years for Brown Skuas and two of five years for South Polar Skuas (Hahn *et al.* 2007; Table 1).

Numbers of breeding pairs during the three most recent austral summers (2011–2013) were much reduced (Table 1). In 2011, I was not present at the start of the breeding season, and thus no total count of pairs was made, but only two Brown Skua pairs fledged chicks. In 2012, 11 Brown Skua pairs nested and three fledged chicks (one each, one of which was found dead at the onset of the 2013 season). Two breeding pairs lost their chicks and the other six lost their eggs. Two of the lost chicks were found dead without injuries or any evident cause of death. Of the pairs that fledged one chick, one of them lost one egg and another lost one chick. During 2013, 14 Brown Skua pairs nested and three chicks were fledged. Eight pairs lost their eggs; one of them left the nest after a storm and the eggs of the others disappeared. Two pairs lost one egg each and subsequently one chick each, at 42 days and 59 days of age. Another pair lost both 15-day-old chicks. Another pair lost one chick of about 24 days and fledged one chick. Only one pair succeeded in fledging two chicks. During 2011–2013, no South Polar Skuas bred, although some pairs defended territories and were observed copulating.

No severe weather events preceded Brown Skua chick loss in most cases, but predation by other skuas was likely involved. Cannibalism exists in both skua species (Reinhardt *et al.* 2000, Malzof & Quintana 2008) and is considered to be an important cause of breeding failure (Young 1963, Hamer *et al.* 1991, Pietz 1987). The degree to which chick loss in this Brown Skua population can be attributed to intraspecific predation, inter-specific predation by South Polar Skuas, or other causes awaits more detailed observation.

On the basis of the little information currently available, the causes of the decreasing numbers and breeding success of skuas at Potter Peninsula remain open to speculation. Skua trends in

TABLE 1
Number of breeding pairs and breeding success of Brown Skuas and South Polar Skuas from historical and current data

Year	Brown Skua		South Polar Skua		Source
	Breeding pairs	Breeding success	Breeding pairs	Breeding success	
1988[a]	20		2		Aguirre (1995)
1993	35		40		Hahn *et al.* (1998)
1994	29		41		Hahn *et al.* (1998)
1997	26		44		Hahn *et al.* (1998)
1998–2000	26–32				Hahn & Peter (2003)
1993–2003 (mean ± SD)		0.61 ± 0.28	50 (average)	0.58 ± 0.54	Hahn *et al.* (2007)
2012	11	0.27	0	0	This work
2013	14	0.21	0	0	This work

[a]Only a portion of breeding area surveyed.

the larger region would be most informative, but that remains for future work. Numbers of Adélie (*Pygoscelis adeliae*) and Chinstrap (*P. antarctica*) Penguins have been decreasing in the northern Antarctic Peninsula, and locally penguin numbers declined 37% during 1995–2006 (Carlini *et al.* 2010). However, there is a lack of agreement among researchers as to the causes (Trivelpiece *et al*. 2011, Lynch *et al*. 2012, Sailley *et al*. 2013). Although Young (1994) showed fairly well that South Polar Skuas and penguins, although they nest together, are affected somewhat independently by factors that facilitate breeding, the skua decline may be related to the penguin decline, either directly (penguins are a food source for Brown Skuas) or indirectly (if both are affected by weather and alteration of marine resources). Unlike penguins, skuas depart for low latitudes during the winter, and it is possible that factors on the wintering grounds are involved in the trends (Harrison *et al.* 2010).

The populations of Brown and South Polar Skuas are said to be stable in the absence of evidence for any declines (BirdLife International 2014). Despite the short temporal and regional scope of this work, however, the breeding populations of these birds in Potter Peninsula indicate a need for longer-term attention and increased research to understand the reasons for the apparent decrease in numbers and breeding success.

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REFERENCES

AGUIRRE, C.A. 1995. Distribution and abundance of birds at Potter Peninsula, 25 de Mayo (King George) Island, South Shetland Islands, Antarctica. *Marine Ornithology* 23: 23–31.

BIRDLIFE INTERNATIONAL. 2014. IUCN Red List for birds. [Available online at: http://www.birdlife.org; accessed 14 May 2014].

CARLINI, A., CORIA, N.R., SANTOS, M.M., NEGRETE, J., JUARES, M.A. & DANERI, G.A. 2009. Responses of *Pygoscelis adeliae* and *P. papua* populations to environmental changes at Isla 25 de Mayo (King George Island). *Polar Biology* 32: 1427–1433.

GRAÑA GRILLI, M. & MONTALTI, D. 2012. Trophic interactions between brown and south polar skuas at Deception Island, Antarctica. *Polar Biology* 35: 299–304.

HAHN, S., PETER, H.-U., QUILLFELDT, P. & REINHARDT, K. 1998. The birds of the Potter Peninsula, King George Island, South Shetland Islands, Antarctica, 1965–1998. *Marine Ornithology* 26: 1–6.

HAHN, S. & PETER, H.-U. 2003. Feeding territoriality and the reproductive consequences in brown skuas *Catharacta antarctica lonnbergi*. *Polar Biology* 26: 552–559.

HAHN, S., REINHARDT, K., RITZ, M.S., JANICKE, T., MONTALTI, D. & PETER, H.-U. 2007. Oceanographic and climatic factors differentially affect reproduction performance of Antarctic skuas. *Marine Ecology Progress Series* 334: 287–297.

HAHN, S., RITZ, M.S. & REINHARDT, K. 2008. Marine foraging and annual fish consumption of a south polar skua population in the maritime Antarctic. *Polar Biology* 31: 959–969.

HAMER, K.C., FURNESS, R.W. & CALDOW, R.W.G. 1991. The effects of changes in food availability on the breeding ecology of Great Skuas *Catharacta skua* in Shetland. *Journal of Zoology London* 223: 175–188.

HARRISON, X.A., BLOUNT, J.D., INGER, R., NORRIS, D.R. & BEARHOP, S. 2011. Carry-over effects as drivers of fitness differences in animals. *Journal of Animal Ecology* 80: 4–18.

LYNCH, H.J., NAVEEN, R., TRATHAN P.N. & FAGAN, W.F. 2012. Spatially integrated assessment reveals widespread changes in penguin populations on the Antarctic Peninsula. *Ecology* 93: 1367–1377.

MALZOF, S.L. & QUINTANA, R.D. 2008. Diet of the south polar skua *Catharacta maccormicki* and the brown skua *C. antarctica lonnbergi* at Cierva Point, Antarctic Peninsula. *Polar Biology* 31: 827–835.

MONTALTI, D., CASAUX, R., CORIA, N.R., SOAVE, G. & GRAÑA GRILLI, M. 2009. The importance of fish in the diet of the south polar skua *Stercorarius maccormicki* at the South Shetland Islands, Antarctica. *Emu* 109: 305–309.

PIETZ, P.J. 1987. Feeding and nesting ecology of sympatric south polar and brown skuas. *Auk* 104: 117–127.

REINHARDT, K., HAHN, S., PETER, H.-U. & WEMHOFF, H. 2000. A review of the diets of Southern Hemisphere skuas. *Marine Ornithology* 28: 7–19.

RITZ, M.S., MILLAR, C., MILLER, G.D., PHILLIPS, R.A., RYAN, P., STERNKOPF, V., LIEBERS-HELBIG, D. & PETER, H.-U. 2008. Phylogeography of the southern skua complex-rapid colonization of the southern hemisphere during a glacial period and reticulate evolution. *Molecular Phylogenetics and Evolution* 49: 292–303.

SAILLEY, S.F., DUCKLOW, H.W., MOELLER, H.V., FRASER, W.R., SCHOFIELD, O.M., STEINBERG, D.K., GARZIO, L.M. & DONEY, S.C. 2013. Carbon fluxes and pelagic ecosystem dynamics near two western Antarctic Peninsula Adélie penguin colonies: an inverse model approach. *Marine Ecology Progress Series* 492: 253–272.

TRIVELPIECE, W.Z., HINKE, J.T., MILLER, A.K., REISS, C., TRIVELPIECE, S.G. & WATTERS, G.M. 2011. Variability in krill biomass links harvesting and climate warming to penguin population changes in Antarctica. *Proceedings of the National Academy of Science* 108: 7625–7628.

YOUNG, E.C. 1963. The breeding behaviour of the south polar skua *Catharacta maccormicki*. *Ibis* 105: 203–233.

YOUNG, E.C. 1994. Skua and Penguin: predator and prey. London, UK: Cambridge University Press.