



Population fluctuation of *Pygoscelis papua* and *Pygoscelis antarctica*, Elephant Island, South Shetlands, Antarctica



Roberta da Cruz Piuco, Jaqueline Brummelhaus, Maria Virginia Petry, Martin Sander

Universidade do Vale do Rio dos Sinos - UNISINOS
ropiuco@gmail.com; vpetry@unisinis.br

INTRODUCTION

- Penguins comprise 90% of the total Antarctic avian biomass.
- The Gentoo penguin is circumpolar in breeding and the least abundant with 314.000-520.000 breeding pairs.
- Chinstrap penguin populations, ≈7.4 million breeding pairs, are found on breeding mainly in sub-Antarctic Islands and along the Antarctic Peninsula .
- The number of breeding pairs has showed fluctuations along the years.

AIM

Compare the breeding population size over the last 40 years of Gentoo and Chinstrap penguins on Stinker Point, Elephant Island, and we calculate the population growth rates during this period.



Gentoo penguin
(*Pygoscelis papua*)



Chinstrap penguin
(*Pygoscelis antarctica*)

MATERIAL AND METHODS

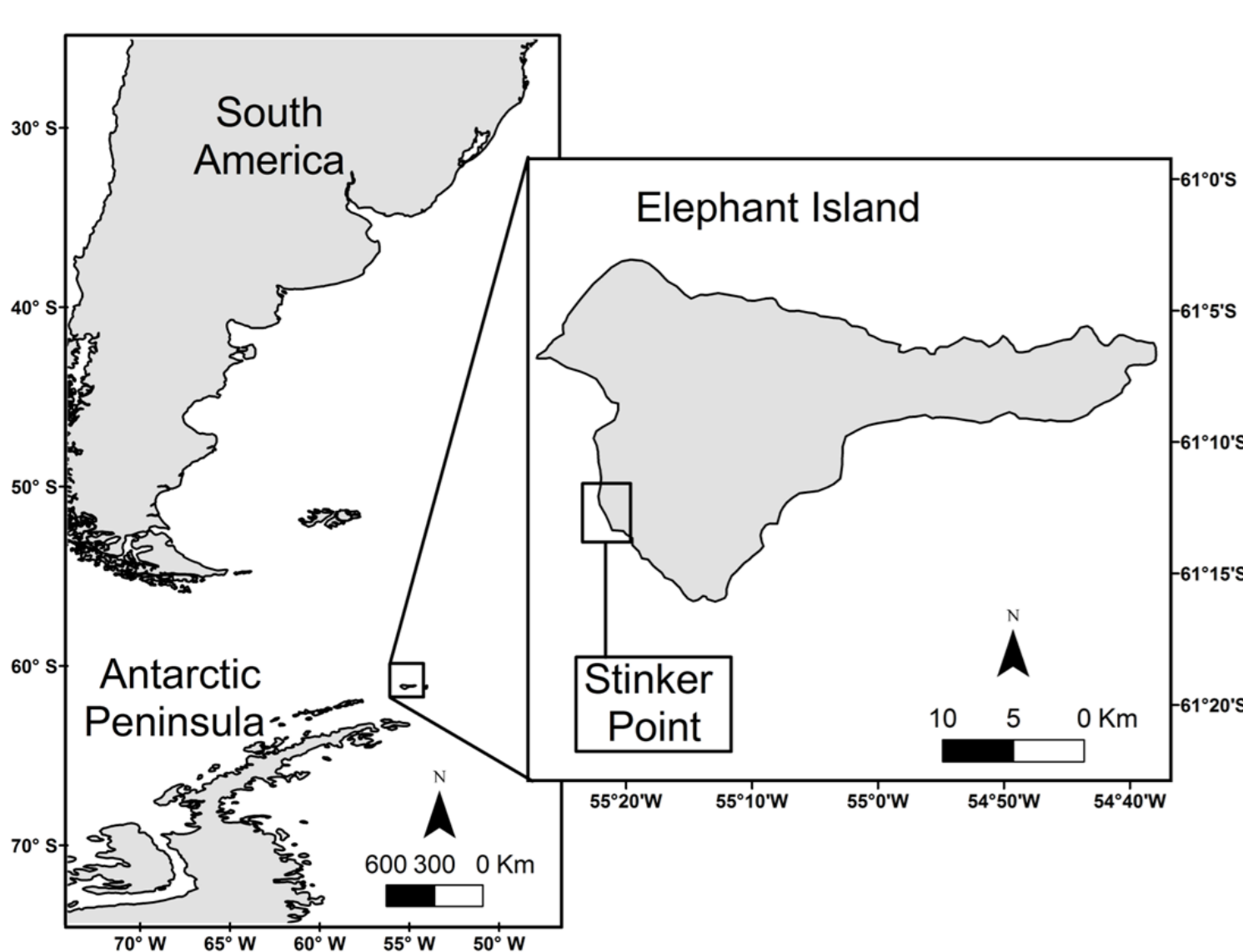


Figure 1: Study area.

- Three observers.
- Direct counting of nests, to estimate the numbers of breeding pairs.
- Averaging all total counts according to standard Ecosystem Monitoring Program Methods, CCAMLR.
- Average annual growth rate was calculated using the Yáñez Index, i :

$$i = [(BP_{pr} / BP_{ps})^{1/n} - 1] \times 100$$

- BP_{pr} stands for the number of breeding pairs at present, BP_{ps} stands for the number of breeding pairs in former surveys and n stands for the years that passed by.

- Data collected in 2009, 2010 and 2011.

- Data from past studies Furse e Bruce (1972) e Petry (1994).

RESULTS

Table 1. Average annual growth rate (i) of Gentoo penguin population at Stinker Point, Elephant Island 1970 - 2011.

Period	Breeding pairs	i (%)
1970-1987	1000-1879	3.8
1987-1988	1879-2192	16.7
1988-1991	2192-1929	-4.2
1991-2009	1929-915	-4.1
2009-2010	915-905	-1.1
2010-2011	905-1652	82.5

Table 2. Average annual growth rate (i) of Chinstrap penguin population at Stinker Point, Elephant Island 1970 - 2011.

Period	Breeding pairs	i (%)
1970-1985	12455-13000	0.28
1985-1986	13000-12200	-6.15
1986-1987	12200-11969	-1.89
1987-1988	11969-13383	11.81
1988-1990	13383-12218	-4.45
1990-2009	12218-3974	6
2009-2010	3974-5250	32.1
2010-2011	5250-5279	0.55

DISCUSSION

- Changes in population size are indicative of environment quality in which a population depends on variable food resources and are also important to understand and to predict the effects of environmental change.

- For long-lived birds such as penguins, a 2 to 3% annual change in population size can be quite significant.

- Local climate events such as excessive accumulation of snow and snowstorms limit the nesting sites of penguins, as observed in our study in December 2009, when many breeding pairs of both species lost their eggs and abandoned their nests.

- Our results show that population fluctuation for the Elephant Island Gentoo penguins varies less than for its Chinstrap penguins.

- The survival of juveniles, their recruitment and return rates to colonies may be affected by adverse winter conditions.

CONCLUSION

- The continued monitoring and demographics studies are needed for both penguin species to determine with confidence whether the observed population decline is a long-term trend or represents transient local environmental fluctuations.

- Whether changes in conservation efforts will be required to maintain future global and regional populations of these species.

REFERENCES

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- Petry, M.V. (1994). Distribuição espacial e aspectos populacionais da avifauna de Sitnker Point – Ilha Elefante – Shetland do Sul – Antártica. MSc. thesis, Universidade do Vale do Rio dos Sinos, São Leopoldo, Brasil.