# INTERACTIONS BETWEEN SKUAS *CATHARACTA* SP. AND GENTOO PENGUINS *PYGOSCELIS PAPUA* IN RELATION TO TOURIST ACTIVITIES AT CUVERVILLE ISLAND, ANTARCTIC PENINSULA

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**SUMMARY**

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The dramatic increase in tourism to the Antarctic has prompted speculation that the presence of tourists at a penguin colony could cause enough distraction to increase the vulnerability of the colony to predation. This study aimed to assess whether this hypothesis was correct for one heavily visited site supporting breeding Gentoo Penguins *Pygoscelis papua* in the Maritime Antarctic, that of Cuverville Island. A total of 164 hours of observation throughout one season was completed. One third of these were periods when tourists were present. Skua *Catharacta* sp. behaviour was catagorised and monitored throughout these periods. These observations revealed no evidence that the presence of parties of visitors within feeding territories influenced skua predatory behaviour.

## INTRODUCTION

Skuas *Catharacta* sp. are versatile and opportunistic feeders (Stonehouse 1956, Ekland 1961, Llano 1971, Müller-Schwarze & Müller-Schwarze 1977, Young 1994). Increases in skua predation on other bird species as a result of human interference have been documented (e.g. Kury & Gochfield 1975) as have incidents of skuas optimising from disturbance of prey (Stonehouse 1956). The dramatic increase in tourism to the Antarctic (Enzenbacher 1993) has prompted speculation that the presence of tourists at a penguin colony could cause enough distraction to increase the vulnerability of the colony to predation (Giese 1996, Soper 1996).

On Cuverville Island (64°41'S, 62°38'W) Antarctic Peninsula, a study was established to assess whether tourists visiting the Gentoo Penguin *Pygoscelis papua* colony contributed to opportunistic predation by the five pairs of skuas that held feeding territories there. Despite the large number of skuas breeding on Cuverville Island, only three pairs foraged regularly in the North-east Colony and two in the North-west Colony (Fig. 1). This is not unusual: similar percentages of the skua populations at Cape Crozier (Müller-Schwarze & Müller-Schwarze 1973) and Cape Royds (Young 1963) foraged within the local penguin colonies.

## METHODS

Two neighbouring feeding territories on Northeast Colony, each occupied by a pair of Subantarctic *C. antarctica* or hybrid Subantarctic/South Polar *C. maccormicki* skuas, were selected for monitoring from a vantage point during 1994/95 (Fig. 1). Each territory contained breeding groups of between 20 and 200 Gentoo Penguin nests, totalling about 2000 pairs, and each was subject to frequent tourist activity, averaging a visit of 70 tourists every three days. A team of observers took turns to watch and record skua activity for two-hour periods each day in consecutive cycles from 06h00 to 20h00 (within the time span that tourists landed at the island), restarting at 06h00 to 08h00 at the end of each cycle (a method based on Emslie *et al.* 1995). Additional observations were made during tourist ship visits, when tourists moved around the periphery of the penguin breeding groups. Observers sat on a hillside near the edge of Territory 1, *c.* 150 m from the territory owner's nest, using 8×40 binoculars for a clear view of the skua territories and nest sites.

No hide was used, and at no time were the skuas handled or fed, nor were their nests approached. They may have habituated to the presence of the observers; none of the birds showing curiosity over their presence. Both pairs displayed courtship feeding and fed chicks near the nest, behaviour that both B. Stonehouse and E. Young (pers. comm.) deemed indicative of non-disturbance.

Observations were made from 15 December 1994 to 15 February 1995, a period covering the breeding cycle of Gentoo Penguins at the locality from laying to crêching. Observations of skua and penguin interactions totalled 28 one-hour watches with tourist visitors present, and 68 two-hour watches when tourists were absent. Resident skuas were identified by eye. Behaviour was recorded according to categories based on Young (1970, 1994) and Emslie (1995): see Table 1. The presence of interloping skuas, Kelp Gulls *Larus dominicanus*, Southern Giant Petrels *Macronectes giganteus* and other predators was also noted. Rates of predatory activity in either feeding territory were calculated as the number of events (search flights, attempts, predations) per hour of observation.

## RESULTS AND DISCUSSION

In this study 91% of all predatory events within the penguin colony were due to the territory-owning skuas. The remaining

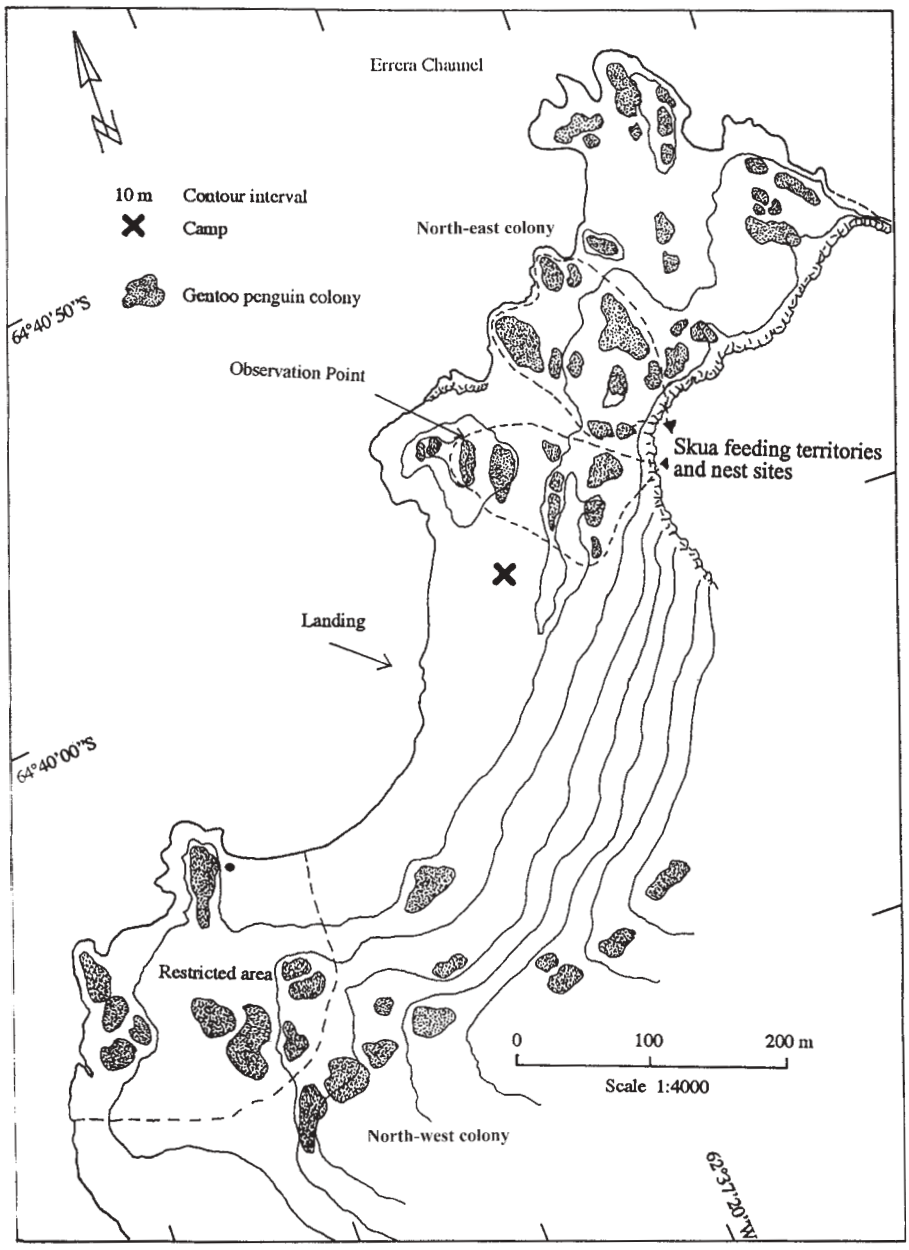


***Fig. 1.*** *North-western shore of Cuverville Island, including the north-west and north-east Gentoo Penguin colonies.*

**TABLE 1**

**Behaviour categories used to define skua foraging behaviour in the feeding territory**

| Behaviour category | Code | Definition of behaviour |
|---|---|---|
| Search air | SA | Slow, wheeling flight over the territory, often provoking no response from the penguins |
| Search ground | SG | Searching along edge of breeding groups, sometimes pausing. Occasionally provoking a defensive response from the penguins |
| Attempt air | AA | Unsuccessful predation from flight |
| Attempt ground | AG | Unsuccessful predation from a ground position |
| Predation air | PA | Successful predation from flight |
| Predation ground | PG | Successful predation from a ground position |
| Scavenge | S | Feeding on spilled krill, abandoned eggs or carrion without initial aggressive behaviour towards the prey |

**TABLE 2**

**Rates of skua foraging activity during periods with and without tourist visitors**

| Behaviour | Rates of activity with visitors present (and SD) | Rates of activity with visitors absent (and SD) |
|---|---|---|
| Ground search | 2.3±1.19 | 2.6±3.34 |
| Air search | 3.9±1.63 | 5.25±2.47 |
| Scavenge | 0.5±0.37 | 0.29±0.35 |
| Attempt predation from air | 0.08±0.08 | 0 |
| Attempt predation from ground | 0.28±0.35 | 0.25±0.35 |
| Predation from air | 0.12±0.11 | 0.17±0.38 |
| Predation from ground | 0.21±0.13 | 0.25±0.44 |

9% were due to Kelp Gulls (3%) and interloping skuas (6%). As found in previous studies (Müller-Schwarze & Müller Schwarze 1977, Young 1994, Emslie, 1995), a large proportion of predatory activities occurred at the periphery of penguin breeding groups, 92% when tourists were absent and 95% during their visits. Rates of the different predatory activities (Table 2) during visits and control periods were compared to assess whether rates of predator activity were higher when visitors were in the breeding territory. The results in Table 2 show that this was not the case. Skua behaviour patterns under the two conditions were further assessed using Kendall's rank correlation: a very strong relationship ($\tau = 0.93$, $P = 0.002$) indicates that overall behaviour patterns varied very little according to the presence of visitors.

The skuas used in this study occupy nests in one of the most frequently visited sites in Antarctica (an average of one visit, with 70 tourists every three days), hence if the penguins on Cuverville Island were sufficiently disturbed by visitors in a manner affording opportunity to skuas, it would be reasonable to expect the skuas to have learned to capitalise on this. Given that Nimon (1997) found that incubating Gentoo Penguins did not stand or flee, even when approached by 50 people to a distance of five metres, it seems safe to assume that, at least at this site, tourist activity does not enhance skua predation. Thus, although this was a site visited by many tourists for several seasons, and the feeding territories were in areas subjected to high rates of visitation, the resident skuas showed no evidence of having found the presence of human visitors either to their advantage or to their disadvantage.

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## REFERENCES

EKLAND, C.R. 1961. Distribution and life history studies of the South-Polar Skua. *Bird Banding* 32: 187–223.

EMSLIE, S., KARNOVSKY, N. & TRIVELPIECE, W. 1995. Avian predation at penguin colonies on King George Island, Antarctica. *Wilson Bull.* 107: 317–327.

ENZENBACHER, D.J. 1993. Tourists in Antarctica: numbers and trends. *Tourism Management* 14: 142–146.

GIESE, M. 1996. Effects of human activity on Adélie Penguin (*Pygoscelis adeliae)* breeding success. *Biol. Conserv.* 75: 157–64.

KURY, C.R. & GOCHFIELD, M. 1975. Human interference and gull predation in cormorant colonies. *Biol. Conserv.* 8: 23–34.

LLANO, G. 1971. Skuas. *Nature* 233: 627.

MÜLLER-SCHWARZE, C. & MÜLLER-SCHWARZE, D. 1977. Interactions between South Polar Skuas and Adélie Penguins. In: Llano, G.A. (Ed.). Adaptions within Antarctic ecosystems. Washington, D.C.: Smithsonian Institution. pp. 619–646.

NIMON, A.J. 1997. Gentoo Penguin responses to humans. PhD thesis. University of Cambridge.

SOPER, T. 1996. Antarctica: a guide to the wildlife. Chalfont St Peter, Buckinghamshire, England: Bradt Publications.

STONEHOUSE, B. 1956. The Brown Skua *Catharacta skua lonnbergi* (Mathews) of South Georgia. *Falkland Island Dependancy Survey.*

YOUNG, E.C. 1963. Feeding habits of the South Polar Skua *Catharacta maccormicki*. *Ibis* 105: 301–318.

YOUNG, E.C. 1970. The techniques of a skua-penguin study. In: Holdgate, M.W. (Ed.). Antarctic ecology. Vol. 1. London: Academic Press. pp. 568–584.

YOUNG, E.C. 1990. Long-term stability and human impact in Antarctic Skuas and Adélie Penguins. In: Kerry, K.R. & Hempel, G. (Eds). Antarctic ecosystems: ecological change and conservation. Berlin: Springer-Verlag. pp. 231–236.

YOUNG, E.[C.] 1994. Skua and penguin: predator and prey. Cambridge: Cambridge University Press.