Seabird behavior, ecology, and demography at Admiralty Bay, King George Island

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Our field team arrived at the Copacabana field station, in Admiralty Bay, King George Island, on 2 October 1994. Fast ice filled the inlets, but the center of the bay was open, with only some scattered brash ice present. The penguin breeding areas around the field station were covered with heavy snow, leaving no bare ground visible. Presumably, because of this and the presence of heavy pack ice in the area, the Adélie penguin (Pygoscelis adeliae) arrival was delayed and more protracted than in past seasons. Adélies did not begin egg laying until the last week in October, and the peak occurred between 7 and 10 November, about 1 week later than the norm. First incubation shifts were shorter than usual; the males and females took approximately 10- and 9-day shifts, respectively. We suggest that this was probably due to the close proximity of the pack ice, where, we hypothesize, the Adélies go at this time (**Trivelpiece**, Fraser, and **Trivelpiece** in preparation), since the pack ice habitat is the only reliable source of food this early in the season. Adélies breeding success was above average: over one chick fledged per pair. We believe the main reason for this success was that the cold, heavy-ice winter resulted in pack ice that was in close proximity to the breeding areas in the spring. The population as a whole, however, remains relatively stable, after dramatic decreases following the 1989 and 1990 winters. A recent analysis attributes this population decline to lower recruitment rates of young birds (**Trivelpiece** and **Trivelpiece** in preparation), which, in turn, is correlated to significantly lower krill (Euphausia superba) biomass estimates in our area (Siegel and Loeb in press).

Gentoo penguins (P. papua) were abundant when we arrived but were not associated with any nesting sites. This is typical of their behavior early in the season, when they return to the vicinity of their colonies at night after spending the days foraging out at sea. The gentoos began laying eggs in the second week of November and the peak occurred between the 16th and 19th, similar to past seasons. By that time, no pack ice remained in the immediate area, and the nesting sites were snow free, providing the gentoos with good conditions to begin breeding They had relatively high reproductive success: approximately 1.5 chicks fledged per pair, somewhat more than the past two seasons.

Chinstrap penguins (P. antarctica), as in the past, did not arrive until late October, so they were not greatly affected by the pack ice or heavy, snow. Their peak egg laying was in the third week of November, a time not significantly

different from that of past years. Their reproductive success of just over one chick fledged per pair was also similar to that of past years. The population as a whole, however, is still decreasing, presumably for the same reasons as for the Adélies population change mentioned above (**Trivelpiece** and **Trivelpiece** in preparation).

South polar skuas (Catharacta maccormicki) fledged less than one chick per pair; this represents a lower number than usual but an increase from last year. South polar skuas forage on krill and small pelagic fishes, primarily Electrona antarctica and Pleurogramma antarcticum; the abundance or lack of the latter seems to determine the reproductive success of these skuas for the season. Analysis of the south polar skua guano samples revealed mostly krill remains early in the season, with little or no fish. During the January and February chick-rearing period, however, fish, predominantly E. antarctica, dominated the diet samples. P. antarcticum remains were largely absent from the skua's diet in 1994-1995, similar to the 1993-1994 season.

Brown skuas (C. loonbergi) also fledged fewer than one chick per pair, which was similar to last year's results. Brown skuas, in contrast to south polar skuas, either hold penguin territories and forage there almost exclusively or feed at sea, as do the south polars. Brown skua pairs with penguin territories typically do better than the non-penguin-territory birds. This is probably because of the unpredictable abundance of prey in the marine environment. In addition, abundance of prey in the marine environment may indirectly affect brown skua breeding success, among the pairs with penguin territories, through intraspecific predation of their chicks by non-penguin-territory brown skuas that have failed in their breeding attempts because of lack of food.

Our 15-year southern giant petrel (Macronectes giganteus) chick-banding program has begun to show an increase in numbers of chicks fledged over the past 5 years. Before this, the numbers remained relatively stable. At this point, however, we have no direct evidence to explain this increase. It does correspond, however, to the decrease in penguin populations mentioned above, although the two may not be related at all. More investigations, such as the diets of giant petrels during chick rearing, are needed to understand fully the mechanisms at work here.

Kelp gulls (Larus Dominicanus) and American sheathbills (Chionis alba), in contrast, have continued a downward trend, with fewer breeding pairs at our site, although breeding success was within normal limits (i.e., more than one chick fledged per pair). With fewer breeders, fewer young ones are available for

recruitment into the local population, hence the decline in numbers. Gulls were not historically present in the Antarctic until fairly recently. Presumably, they followed sealing and whaling ships into the area and have increased in numbers over the years, particularly (in our area) near winter bases with accessible refuse areas. With the stricter regulations in effect regarding waste disposal in the Antarctic over the last decade, this resource is no longer available to the gulls, creating a particular hardship for juveniles and for all gulls during the winter. The stricter regulations may have led to the decrease in numbers witnessed at our site.

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