

# Continuing studies of the population biology and foraging behavior of Adélie, gentoo, and chinstrap penguins

DOUGLAS F. WALLACE, MICHELLE McCLURE,  
SUSAN G. TRIVELPIECE, and WAYNE Z. TRIVELPIECE

*Department of Oceanography  
Old Dominion University  
Norfolk, Virginia 23529*

We arrived in Admiralty Bay, King George Island, on 8 October 1990 and departed on 23 February 1991. The bay and the surrounding waters were free of ice upon our arrival and had been all winter except for two brief freezes in May and late August (Arctowski Station personnel personal communication). We focused on two continuing investigations during the season; a demographic study on Adélie, chinstrap, and gentoo penguin populations and the diving and foraging behaviors of the Adélie and gentoo.

The demographic study entailed following a random sample of 200 breeders of each species, plus all known-age birds, through the reproductive season. This effort began upon our arrival in October and ended with the fledging of chicks in January and February. Ten years of this study have demonstrated an inverse relationship between the overwinter survival of Adélies and chinstraps (Trivelpiece et al. 1990a); for mild/light pack-ice winters such as the 1990 winter, Adélies have shown low over-winter survival and chinstraps the opposite. Yet, for the second consecutive year, both Adélie and chinstrap populations have had large, concurrent declines, indicating poor overwinter survival for both species. The emphatic reversal of such a long-term pattern suggests that other factors, such as changes in pack-ice conditions, may play an important role in antarctic ecosystem dynamics. As members of the new Antarctic Marine Long-Term Ecological Research study, we hope to address issues such as this.

Adélies and chinstraps continued to do poorly throughout

the breeding cycle, and reproductive success was very low, with less than 0.5 chicks fledged per pair for both species. For Adélies, this is the worst fledging rate recorded in 10 years at this site.

Although gentoos fared better than their congeners, it was still a mediocre season. The population declined for the third consecutive year, although not as drastically as the other two species. Like Adélies, this season had the lowest reproductive success ever recorded at this site for gentoos. The fledging rate was well below the previous nadir of 0.9 chicks fledged per pair in 1981–1982.

The telemetry study focused on breeding Adélies and gentoos with two chicks. The procedures for transmitter and time-depth recorder application and data collection were similar to those used in the previous season (see Trivelpiece et al. 1990b). We monitored foraging trip durations, recorded dive profiles, and collected stomach samples of the study birds; concurrently, stomach samples of previously unhandled birds were taken as controls. Analysis of the dive patterns and stomach contents continue to yield information about the birds' foraging activities and the development of time budgets for trips to sea.

We had a surprise visit from an immature emperor penguin in November, the first recorded for this site. The usual few macaroni penguins made their appearances, as well.

We thank the crew of the R/V *Polar Duke* and the U.S. Antarctic Program for logistical support and members of the XIV and XV Polish Antarctic Expeditions for their hospitality and assistance. This research was supported by National Science Foundation grant DPP 88-15878.

## References

- Arctowski Station personnel. 1990. Personal communication. •  
Trivelpiece, W.Z., S.G. Trivelpiece, G.R. Geupel, J. Kjølmyr, and N.J. Volkman. 1990a. Adélie and chinstrap penguins: Their potential as monitors of the southern ocean marine ecosystem. In K.R. Kerry and G. Hempel (Eds.), *Antarctic ecosystems. Ecological change and conservation*. Berlin: Springer-Verlag.  
Trivelpiece, W.Z., C. Fritz, K.L. Montgomery, S.G. Trivelpiece, and D.F. Wallace. 1990b. Demography and foraging behavior of pygoscelis penguins. *Antarctic Journal of the U.S.* 25(5), 220.