

Penguins losing the struggle?

King George Island

WAYNE Trivelpiece boarded the Antarctic icebreaker *Polar Duke* last month with bad news. For the first time in 13 years, the biologist, who studies penguins on a desolate island beach off the Antarctic Peninsula, had recorded a fall in the local population — some 20 per cent of the 18,000 penguin breeding pairs that normally return to the rookery had failed to do so.

Worse still, the missing included large numbers of both Adélies and chinstraps, the two main species in the region. New research by biologist William Fraser, Trivelpiece's colleague at the Old Dominion University Polar Oceans Research Group, has shown that natural fluctuations in sea-ice coverage are often the major factor in penguin survival and breeding success. But because the winter feeding strategies of the Adélie and the chinstrap are so different, declines in one species have always been offset by increases in the other. To lose 20 per cent of both species in the same year, Trivelpiece says, is unusual. To have this occur for the last three consecutive years is unprecedented, and may suggest a shortage of krill, the shrimp-like crustacean that comprises most of a penguin diet.

Normally, returning penguin populations can be correlated to the weather conditions of the previous winter. In a cold winter, there is more sea ice, which favours the survival of the Adélie penguin, a species that winters under the pack ice. During a mild winter, on the other hand, the chinstrap penguin has the advantage. It feeds in open water, and the absence of sea ice means better hunting close to home.

The years 1986 and 1987 had harsh winters; from 1988 to 1990, the winters were mild. Ordinarily that would have meant depressed chinstrap populations for the first two years, then a change of fortunes as the Adélies suffered over the next three winters.

Instead, Trivelpiece has seen a 10–20 per cent decline in both species for all of the past three years.

Until this year, Trivelpiece was willing to explain away the anomalous chinstrap declines as a statistical aberration. Now, he says, after another mild winter, "we knew it wasn't just a fluke".

Although Trivelpiece says that krill shortages are just one possible explanation for the decline, he notes that the change in the population patterns corresponds closely with an increase in krill harvests. From 1982 to 1985, fishing fleets took between 130,000 and 200,000 tons of krill from the Southern Oceans each year. But in 1986, they doubled their take to nearly 400,000 tons. Two years and two harsh winters later, penguin populations began to decline.

If, indeed, a krill shortage turns out to be the problem, one obvious suspect is fishing. Japanese and Soviet trawlers fish mostly from the region where Trivelpiece believes



Adélies — 10 per cent population drop three years running.

his penguins feed. An international body created by the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) is supposed to watch for overfishing, but counting krill is a difficult and inexact science (see page 296). Krill tend to move in huge swarms, which may easily be missed in random sampling of the Southern Oceans.

Biologists such as Trivelpiece and Fraser believe that penguins and other predators are better at finding krill than we are. So why not let the predators do the counting for us? If the predators cannot find krill, they starve. Track predator populations, the biologists propose, and you will have an accurate measure of krill populations. That is what Trivelpiece, his co-investigator and wife Susan, and other colleagues do each summer on their bleak beach on King George Island. And if penguin populations are any guide,

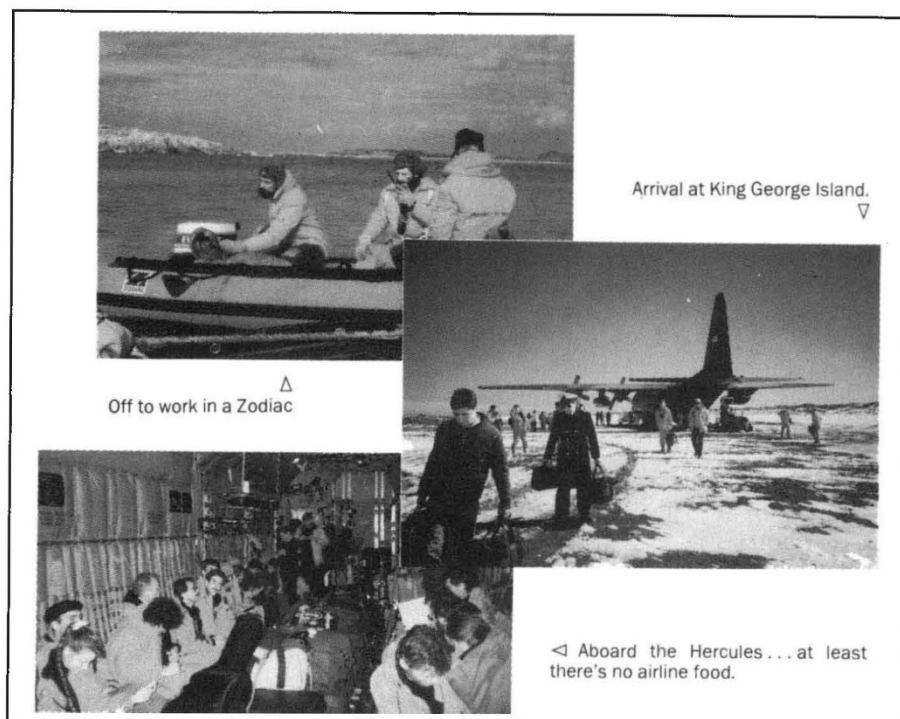
the krill are becoming hard to find.

But if overfishing is to blame, and 400,000 tons of harvested krill a year is too much, why did it take several years for the effects to show? The answer may lie with the krill themselves. New data suggest that the two-inch crustacean may live and breed far longer than anyone had previously suspected. If the average krill lifespan were just a year or two, overfishing would quickly show its mark. But researchers now believe that krill may naturally live 6 to 8 years. It is not a new population of krill that the fishing fleets thin each year, but mostly the same population as the year before. Yearly fishing totals now seem less important than the cumulative krill harvest over the decade — some 3 million tons and counting.

What that means for krill fishing — and for krill — is still open to debate. CCAMLR has not finished compiling krill population figures for this year, but previous years' counts (taken mostly with sonar surveys and nets) showed no obvious decline. Those counts, however, are based on poor statistics and spotting sampling. Fishing nations have argued that the data are too unreliable to be used as the basis for krill restrictions — an argument that seems sure to be renewed in the light of the findings.

While no one is likely to restrict fishing on the basis of penguin populations alone, the worrying population trend at the beach cannot be ignored, researchers argue. Further studies on krill life cycles and improved sonar surveying techniques may help to refine the counting techniques. But if portions of the Antarctic waters are indeed losing their krill, CCAMLR — not to mention the penguins, whales and other predators that depend on the krill — may not be able to wait.

C.A.



Arrival at King George Island.

Off to work in a Zodiac

◁ Aboard the Hercules... at least there's no airline food.