

The trouble with trawlers

Washington

PRACTICALLY everything in Antarctica dines on krill. Billions of the shrimp-like creatures are the big middle link of what is essentially a three-part food chain — algae, the krill, then nearly everything else, from whales to penguins. Even humans eat krill: fishing fleets from six countries netted some 400,000 tons of the two-inch crustaceans in the Antarctic oceans last year.

They could have taken even more. What kept those countries, and others, from sending bigger fleets and keeping them in Antarctica longer to net krill is simple economics — they find it hard to sell. Krill are expensive to harvest, turn an unappetizing algae-tinted green during the height of their feeding season and are barely big enough to lift with a fork. But that may change. Krill will not get bigger, but the human appetite for them may.

So far, man's impact has been minimal — krill overfishing, to the extent that it has even been observed (and even that is debated, see page 294), appears to have been mostly limited to small areas that soon recovered. If the market improves, however, there are at present no limits to the amount of krill that could be taken. And as the krill go, so do all the Antarctic animals that feed on them.

"What if the world suddenly decides it loves krill and wants them in their burgers?", asks Raymond Arnaudo, head of the US Department of State's division of polar affairs. "We could be looking at some real difficulties, not just for the krill, but for the predators."

Arnaudo, fortunately, is in a position to do something about it. He is the US delegate to the commission established to give effect to the Convention of the Conservation of Antarctic Marine Living Resources (CCAMLR), the nine-year-old fishing agreement signed by the members of the Antarctic Treaty. A precaution against any repetition of the excessive whaling and sealing that characterized much of the past century, CCAMLR was created to make sure

that krill, fish and marine mammals in the Antarctic are never again overfished.

But that, at least for krill, has turned out to be a surprisingly difficult assignment. CCAMLR is supposed to watch for unexpected changes in krill population, and then to regulate fishing if it seems to be starting to shift the balance of nature. Spotting population decline requires at least two sets of numbers: the baseline 'normal' population, and subsequent estimates. Regrettably, CCAMLR has neither.

The problem, explains Robert Hofman, scientific director of the US Marine Mammal Commission, is that counting krill is no small task. Krill tend to swarm by the millions in a small area, and to be entirely absent elsewhere. Researchers still have virtually no idea what drives this behaviour, or how to predict where it might happen next.

All the direct methods now used to count krill — nets, sonar and other hydroacoustic techniques — require that the observing vessel is almost on top of them. Miss the swarm by half a mile and one may find no krill at all. "It's frustrating. The distribution is very patchy," notes Hofman.

It would be prohibitively costly, if not impossible, to try to monitor each and every krill predator that might be affected by harvesting krill. Therefore treaty partners have begun to set up a network of 23 stations at which researchers will monitor populations of land-based predators such as penguins, fur and crabeater seals, albatross and petrels.

But indirect measurement have their own disadvantages. Uncertainty in the natural fluctuation of both the predators and the krill populations makes correlation difficult. Even for well-studied species such as penguins, researchers are only now beginning to understand the most basic factors (such as sea-ice coverage) that determine year-to-year population changes. Long-term research on the dynamics of the entire Antarctic food web, from krill up, may be required before indirect measurements can be trusted

to reveal krill populations. And although such an effort is under way, the programme at this point is, as one official puts it, "mostly conceptual".

Yet CCAMLR must make decisions now, before the fishery expands. "The question becomes how to deal with uncertainty", says Hofman. Uncertainty requires a healthy dose of precaution, he believes.

Other US officials agree. As a precaution the United States and several other CCAMLR treaty partners have proposed setting some limits on krill fishing. But Japan and the Soviet Union argue that there is no evidence of a problem and no limits are necessary. The two nations — whose trawlers take most of the yearly krill harvest — say that they have no plans to increase their catches.

The krill market could change, they acknowledge, and they make no promises for the future. But they point out that estimates of total krill population are in the 100-million-metric-ton range. Some 10 million metric tons of that could be harvested each year without endangering overall populations, according to one estimate. Current krill harvests have averaged only around 400,000 tons annually for the last several years. How could such drop-in-the-bucket fishing be a problem?

Worldwide, it probably will not be, Arnaudo says. But on a local scale, krill fishing can have more serious implications, especially for predators. No one knows how far penguins, for example, can travel for food in winter. If their range is relatively limited, over-fishing of even a small area could decimate the penguin colonies that feed there. There is currently nothing to stop fishing fleets from exhausting an area if they find it convenient to do so. And without better data on the risks of such fishing, it will be difficult to impose restrictions.

Nevertheless, at the next CCAMLR meeting, to be held in October 1992 in Hobart, Tasmania, the United States will make its strongest push yet for restrictions. Arnaudo says that the US delegation will attempt to encourage the Soviets and Japanese to agree to some limits before the meeting. Meanwhile, delegations from several countries will argue with their own governments for more money for monitoring. "The real problem is that it's a vast area to monitor with a minuscule budget", he says (the United States put a little over \$1 million into the programme last year). And until the research programme matures and the population monitoring improves, advocates of krill limits will continue to find stiff resistance to soft data.

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■ For an Australian view on the krill conservation issue, see page 306.

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