



While the total southern bluefin tuna catch has increased in number since 1960, its weight has fallen substantially.

delicacy — especially in the 'sashimi', or raw fish, market. Hence, despite the fact that the fish in these waters are scattered rather than concentrated in schools, catching them can be a highly profitable enterprise.

The catch begins

Serious exploitation of the species began in the early 1950s, by Japanese long-line fishing fleets. Australian fishermen joined the hunt, mainly using the live-bait and pole method, nearly 10 years later. New Zealand fishermen have recently also begun taking the southern bluefin.

Because of its economic importance, Australian and Japanese fisheries scientists have put a lot of effort into studying this fish, with the result that it has become the best understood of all tuna species. Tags have been inserted in some 70 000 specimens, and information about individuals from which tags have been recovered has provided data not only on migration patterns, but also on growth and mortality rates. Catch-sampling has provided information on the age distribution of the fish.

The information gathered enables the scientists to estimate the size of the spawning stock and the number of young fish entering the fishable population each year. They use these estimates to calculate what catch rates can be sustained indefinitely.

A major problem in reaching firm conclusions about the state of the southern bluefin population, however, is that the effects of a year's catch on the numbers of young fish leaving the spawning grounds cannot be measured with any accuracy until perhaps 9 years after the catch. For example, the Australian catch this financial year will not affect the spawning stock until 1983/84, and 7 more years will pass before recruitment to the fishable stock from that year's spawning can be esti-

mated. If there is a dramatic population decline, of course, it will show up earlier — possibly in the fishing results for 1985/86.

Calculations by Dr Garth Murphy and Dr Jacek Majkowski, of the CSIRO Division of Fisheries Research, show a steady reduction in the spawning stock from 1967 to 1974. The researchers cannot be certain yet what has happened since then, but they point out that the continuing decline in total catch weight in the face of increasing fishing effort and fairly stable catches in terms of numbers of fish taken is symptomatic of a stock being continually reduced in size (see the graph).

Their calculations indicate that, before fishing began, the spawning stock of southern bluefin tuna was around 650 000 tonnes, and by 1974 had been at least cut in half. However, this is not as drastic as it might sound because, in general, fish stocks are remarkably resilient. Most stocks, when first reduced by fishing, produce more young than they did before, and a substantially reduced spawning stock can maintain a thriving fishery.

Nevertheless, fisheries scientists generally regard half the initial stock as the lower limit for reliable production of the young ones needed to sustain a fishery. The signs are that that limit has been passed.

Setting a limit

In 1979, the last year for which complete figures are available, the total southern bluefin catch was about 35 000 tonnes. Recent calculations by Dr Majkowski and his colleagues suggest that, to prevent stocks declining further, the annual catch should be reduced to about 28 000 tonnes.

This one was caught off the South Australian coast.



Calculations indicate that the spawning stock is being reduced.

But that is a lot easier said than done. Imposing catch-weight quotas is the obvious solution. However, as Western Australia, South Australia, and New South Wales are all major participants in the fishery, individual quotas would have to be determined and accepted for each State. Account would also have to be taken of the Japanese and New Zealand involvement. Dr Murphy suggests that establishing an international committee empowered to introduce and enforce limits on catches may be the only way to impose quotas successfully.

At present, there are no restrictions on southern bluefin tuna catches. For the 5 years up to 1981 a freeze was imposed on the number of live-bait and pole boats operating from Australia. However, illustrating how difficult it is to control catches of a valuable fish, this freeze proved ineffective, mainly because operators were transferring their licences to larger boats capable of catching more fish.

Robert Lehane

More about the topic

State of the southern bluefin tuna population: fully exploited. G. I. Murphy and J. Majkowski. *Australian Fisheries*, 1981, 40(11), 20-9.

The decline of the southern bluefin tuna population. J. Somers and G. Murphy. *Australian Natural History*, 1982, 25 (in press).

Australia's fishing zone — vast and largely unknown. *Ecos* No. 24, 1980, 24-31.