

LETTER FROM SYDNEY



Boosting the tuna catch

**Infrared readings taken
from aircraft are aiding
Australia's fishermen**

by William A. Scholes

Tuna are especially sensitive to surface water temperatures, and fishermen around the world have for many years made extensive use of this fact.

Australian fishermen, in their search for southern bluefin tuna, learned that the rippling schools of tuna that provided much of the catch were found only in waters of 62 to 68 degrees F. Below this range the fish were usually dispersed and feeding. Above 68 degrees they formed schools, but did not bite well. Above 70 degrees bluefin were rarely seen.

They also learned that within the range of 62 to 68 degrees bluefin were more likely to be found where there were sharp discontinuities in surface temperature. At these fronts temperatures might change as much as 3 degrees F. in a matter of yards. The fronts were often visible to the eye as boundaries between two adjacent areas of water of different colors. So the fishermen try to find waters in the 62- to 68-degree temperature range and look for fronts within these areas. Up until recently they had only the thermograph, standard equipment in Australian tuna boats, to supplement their eyesight.

Now maps of sea-surface temperatures taken with an airborne sensor are helping the Australian tuna fishermen increase their catches. The maps were prepared with data gathered by an aircraft equipped with an infrared radiation thermometer. The record catch of more than 4,000 short tons of tuna taken off the New South Wales coast during the 1968 season is attributed in great part to this new tool.

Maps of surface temperatures on fishing grounds are invaluable to the fisherman, but until the first commercial versions of the infrared radiometer came along, the only way they could be produced was by surface vessel observations—a slow and costly process.

The radiometer makes use of the principle that within a certain range of wavelengths the amount of infrared radiation emitted by an object is proportional to its surface temperature.

The operation can be conducted at any distance so long as the target object fills the field of view. The instrument's response time is a fraction of a second, so it is ideal for measuring sea-surface temperatures from the air. The advent of the tool made the quick preparation of temperature maps a practical proposition.

In 1965 an infrared radiation ther-

mometer was fitted to an aircraft making a survey for bluefin tuna in Tasmanian and Victorian waters. Many troubles were experienced, but they were gradually overcome. Even so, by the end of the survey in May 1966, it was clear that for the instrument to be used effectively for this specialized work, modification would be necessary. This was done in the latter half of 1966, and the same aircraft with the instrument reinstalled was sent to Queensland on a yellowfin tuna survey. Here the instrument worked satisfactorily and surface isotherm maps of the area were prepared.

Two other series of flights were carried out over the New South Wales tuna fishing grounds. Based on the results, two surface isotherm maps were prepared and given to fishermen who used the information to direct their searching operations.

Fishermen later requested preparation of a further map. The task was carried out by the Commonwealth Scientific and Industrial Research Organization's (CSIRO) Division of Fisheries and Oceanography in conjunction with a processing company and a fishermen's cooperative.

This map showed that there was one area with conditions particularly favorable for bluefin tuna; catches were subsequently made in the area.

The idea is spreading to other fisheries, but slowly. About the only other area being mapped by air is along the Atlantic coast of the United States, where maps of sea-surface temperature are prepared and distributed monthly from data gathered by aircraft infrared radiation thermometers.

It is impossible to make objective estimates of the benefits the fishermen derived from the isotherm maps, says J. S. Hynd, a senior research assistant with the Division of Fisheries and Oceanography. But he says it is extremely likely that without the use of the maps off the New South Wales coast the fishermen would have missed a good area of tuna.

Two leading fishermen, asked to give their subjective estimates of the increased tonnage directly attributable to the maps, were enthusiastic.

One says he estimates the increased tonnage to be between 10 and 15 percent. In addition the boats had been saved about 20 percent of their normal steaming time. The other estimates the increased tonnage to be 30 percent.

The catch during the season was more than 4,000 tons.