

Tracking fish with ultrasound

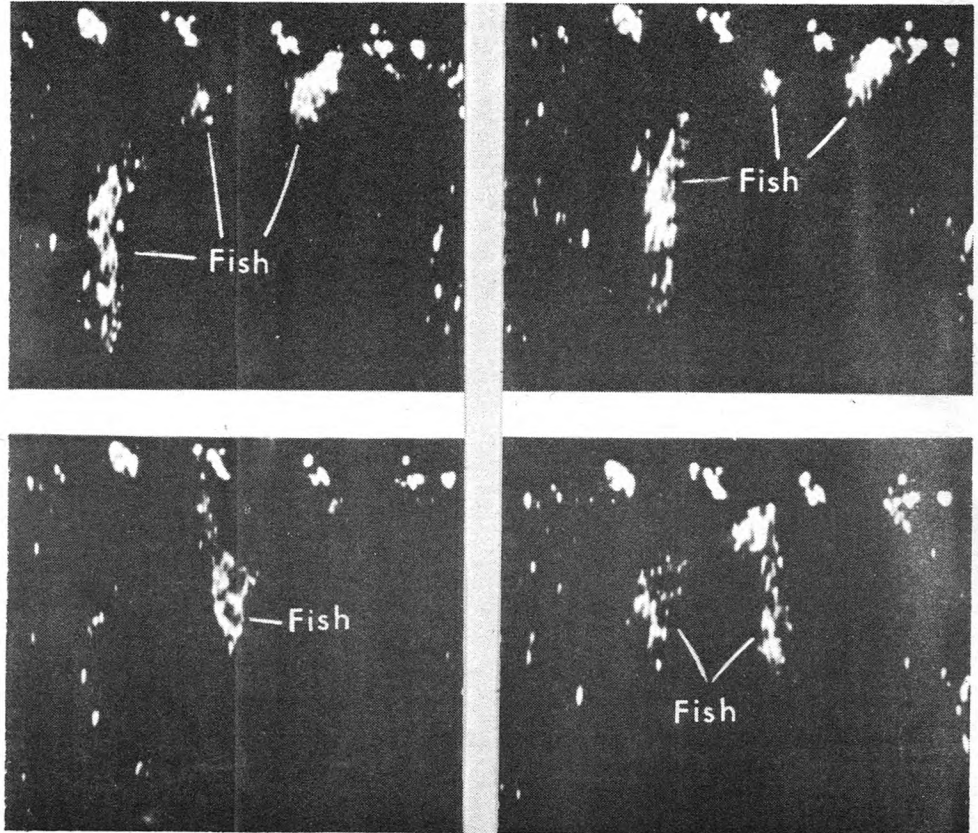
an announcement was made re- about the National Research ment Corporation's sponsoring mercial development and pro of a high-resolution sonar for fish-finding. The system, incorporates within-pulse elec- tector scanning, is to be manu- by Coastal Radio Limited on as of an experimental prototype ed at the University of Bir-

man under the direction of Pro- D. G. Tucker and Dr V. G. in the department of electronic tical engineering, developed prototype fish-finding sonar. This ment has long been working on aspects of signal processing for al systems in sonar and radar, equipment now to be produced ially is a practical embodi- some of this research.

use of echo sounders in fisheries is very well known, but the re- of the area of search to the immediately under the fishing is a severe one. Beams with a horizontal axis have been used to find fish ahead of or around and have been successful with to the catching of fish in mid- For the much more important of fish within a fathom or so sea bottom, however, these are quite useless. In these rances the fish have to be de- against a background of random from the sea bottom itself; only beam is made extremely narrow fractions of a degree—can ble detection of fish be assured. the velocity of sound in water about 1500 metres a second, the ng of a sector with a narrow is prohibitively slow, since the must remain in each position long for a pulse to travel out to the eam range and back again. Elec- tector scanning overcomes these sies since it permits a whole ector to be searched with the n of the narrow receiving aring a single-pulse transmis-

inciple is that the whole sector "ified" by a pulse transmitted a wide-beam transducer. Then y narrow receiving beam is by electronic means, very ver the sector within the time for the pulse to travel its own hrough the water.

art of system which has been eful for fish behaviour studies hich the acoustic frequency c/s, the scanned sector is 30 and the angular resolution is e degree. The maximum range ection of a fish 15 cm in length to 100 metres. Although trials



These four photographs, taken at short intervals, show clearly the movements and break-up of a small fish shoal. The marks along the top edge represent fixed piers supporting the intake grille; the scattered marks at the right-hand side are due to the shingle on the river-bottom. Each picture represents a kind of plan view, since the horizontal axis represents distance from the transducer (whole width representing 20 metres) and the vertical axis represents bearing angle (the whole height representing 30 degrees). Resolution is about 7 cm in range by about 0.5 degree in bearing.

have not yet been made to confirm it, it seems probable that a range of 300 metres can be obtained for 100-cm cod, by using an angular resolution of 0.05 to 0.1 degree, supported by reasonable power and not too extravagant a transducer.

The new sonar system is intended initially for use in marine research, and particularly for studies of fish behaviour. This application has been sponsored by the Marine Laboratory of the Department of Agriculture and Fisheries for Scotland at Aberdeen. Here, R. E. Craig and several of his fellow biologists have found that the prototype equipment, which enables individual fish to be resolved at ranges up to about 100 metres without physical movement of the transducers, has opened up new possibilities in research. It is hoped, however, that before long equipment of this type will be found valuable in fish-finding and catching, and it is expected that trials of this application will be held soon.

The kinds of application of which experience has so far been obtained include, first, the study of fish movements at the opening of a net, and the reaction of the fish to the presence of the net itself. Another is the study of fish movements at the intake of the cooling water system of a power station. The accompanying photographs of fish movements near the intake at Kincardine power station show how well the equipment displays this information.

A third application is the display of steep irregularities on the sea-bottom in a more effective, rapid and reliable way than is normally achieved with echo sounders. And there are many more.

It may well prove that for many applications an equipment with lower frequency and lower resolution, but with much greater range, would prove attractive. Certainly for oceanographic and hydrographic purposes frequencies down to about 7 kc/s are envisaged.