CRUISE REPORT

F.R.S. "SCOTIA"

18th-23rd March, 1956.

STAFF: Mr. R. E. Craig
Mr. W. Dickson
Mr. S. D. E. Devlin
Dr. J. C. Swallow (National Institute of Oceanography)

The object of the cruise was to test the potentialities of a towed echo-sounder oscillator developed by Dr. Swallow. It was intended to use this oscillator in pelagic trawling operations on the Coral Bank-Viking Bank region where concentrations of herring were to be expected at this season. During the period allotted to the work strong to gale force S.E. winds prevailed over the North Sea, and it was impossible to carry out the work as planned.

Accordingly "Scotia" proceeded to the inner Moray Firth where sea conditions would allow some work to be done. As the winter fishing for halflin herring in the Inverness and Cromarty Firths was drawing to a close it was hoped that some concentrations of these fish might be found moving out into open water where "Scotia" could operate with the trawl. This hope was not, however, realised, and observations of trawl and fish had to be carried out as separate operations.

Technical Detail:

The equipment was an elliptical housing about 14" in diameter, with stabilising fins, containing a ring type oscillator operating in direct contact with the sea. A conical steel reflector backed by expanded Araldite resin was used behind this. A heavy ~~polythene~~ cable was used with this unit to take the towing strain at speeds up to about 5 knots. The cable carried twin conductors, separately screened, but having the screens in direct contact with one another.

The equipment was used at first as a single deep ring oscillator for both transmission and reception. Protection to the amplifier from the transmission pulse was afforded by placing a pair of small neon lamps across the secondary of the input transformer. This was found to be insufficient, as the input transformer itself burnt out after a short period of use. As a first modification the oscillator was divided into two, one half transmitting and the other receiving. One end of each oscillator was connected to the two conductors, and the double screen was used as a common lead to the other ends of the windings. By this method only a small part of the transmission voltage, that on the screen, was applied to the receiver. However, a second input transformer burnt out and had to be replaced temporarily by one from the Kingfisher cathode ray tube unit.

It was regretfully decided to cut the cable in two and keep the transmitting and receiving circuits entirely separate, as in conventional ship installations. The two parts of the cable were lashed together with trawl twine, and the available scope was reduced to 80 fathoms. In this form the equipment operated in a satisfactory and reliable way.

Observations on fish:

Good herring traces were found in twenty fathoms of water in the entrance to the Cromarty Firth. "Scotia" steamed over these using one laboratory sounder in its normal form and the other connected to the oscillator which was towed 20 fathoms astern. The level of the upper edge of the traces was about ten fathoms and the ship's speed four knots. The shipboard and towed oscillators were separated by about 30 fathoms.

From the practical identity of appearance of the traces on the two machines, it was apparent that the fish were not scattered or dispersed, but

were in fact not evidently influenced by the passage of the ship over them. It will be of interest in the future to repeat this experiment with a relatively noisy diesel vessel such as "Clupea".

Observations on the trawl:

The pelagic trawl was shot with 40 fathoms of warp aft and towed in water of 20 to 30 fathoms depth. Sweeps 20 fathoms in length were used.

The oscillator was then let away from the plankton winch aft, and allowed to take up its position over the trawl. Clear traces of a portion of the trawl were obtained, probably the head and footropes. Used in this way the equipment was convenient to handle.

Conclusions:

1. As a means of increasing the information obtainable from a single vessel, such an oscillator is invaluable. Thus there is every prospect of learning something of the behaviour of shoals in front of a pelagic net.

   Also in the conduct, for instance, of light experiments from an anchored vessel, such equipment would have a real value, and it gives at least a chance of observing movement of shoals up or down a channel.

2. There is no point, however, in using such an oscillator simply as a means of obtaining details of the net. Such work is best done by towing another vessel as observer, in the usual way. To be sure about details of the net, the power to sheer across the gear from side to side is required.

3. While in a more developed form a deep oscillator might be useful for the detection of fish near the bottom, this is not felt to be a practical proposition in the immediate future.

4. The oscillator towed at a depth of six or seven fathoms is practically free of water noise and aeration troubles, and a more powerful unit might be expected to be superior to the ship's oscillator in bad weather conditions.

5. In the present form of the equipment its output power is insufficient for general work on fish and modification is required. It is probable that this modification should take the form of including the transmission unit in the towed body.

General:

It has been a pleasure to collaborate with Dr. Swallow, whose unremitting labour in the early part of the cruise overcame the various technical difficulties in time for useful work to be done. It is felt that the exchange of ideas has been of value to everyone concerned and that the cruise has been well worth while.

It is pleasant to be able to add that Dr. Swallow was impressed by the competent and efficient way in which his cable and equipment were handled by "Scotia's" crew.

The oscillator and cable have been retained here for use as required by our staff. Decisions about future developments, and what contribution may best be made by each of the establishments concerned will be made at a later date.

R. E. CRAIG.

28th March, 1956.

CIRCULATION

Mr. M. Graham
Dr. J. N. Carruthers
Mr. Leonard
Captain MacCallum
Captain Finlayson
Dr. Lucas
Dr. Wood
Dr. Tait
Dr. Fraser
Dr. Rae
Mr. Parrish
Mr. Saville
Mr. Steele
Mr. Craig
Mr. Dickson
Mr. Devlin
Dr. Deacon
Dr. Swallow
Mr. Gordon (2)
Library (2)
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Spare 4