Dr. H. Wood

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Confidential: Not to be quoted without reference to the Laboratory.

CRUISE REPORT

F.R.S. "SCOTIA"

3rd-14th March, 1955

AIMS

The objectives of the cruise were as follows:-

1. To study the distribution of herring in the area to the north of Shetland and in the north-eastern North Sea.

2. To make trials with different rigs of pelagic trawl.

GENERAL

The commencement of the cruise was delayed six days for repairs and "Scotia" did not set sail from Aberdeen until 3rd March. A direct passage was made to the Shetlands, and then, after a further hold up of two days because of gale force winds, an echosounder survey was made from the north of Shetland to the Norwegian Deeps and southwards to Coral Bank. Small concentrations of plume traces were obtained in the region north of the Shetlands (shown in the chart), in which area a fleet of about thirty Russian vessels were operating. So far as could be judged, these vessels were working drift-nets, but it was not possible to observe the success of their fishing or the type of herring in the area. One pelagic trawl haul was made in the vicinity of the Russian fleet, but no fish were caught. "Scotia's" echosounder survey in this area did not indicate the presence of large herring concentrations in the vicinity and it appeared from the large spread of the Russian vessels that the shoals were probably very spotty.

No large herring concentrations were recorded in the area between the north of Shetland and the Norwegian Deeps but a major herring concentration was located to the north of Coral Bank on 10th March. Pelagic trawl tests were made in this vicinity from 10th to 13th March when "Scotia" had to return to Aberdeen.

TRAWL EXPERIMENTS

The gears used in attempts to catch herring pelagically were as follows:-

(i) The "Icelandic Trawl" rigged with headline bridles attached to the towing warp ahead of the trawl boards. Some modifications to the usual rig had been made to make the gear easier to handle.

(ii) The same trawl rigged with 10 fm. legs from the trawl door.
(iii) The "Swedish" type herring trawl with 10 fm. legs from the trawl door.
(iv) The same with the net upside down.

All hauls were made in darkness on dense shoals of herring which ranged in depth between 10 and 30 fm. from the surface. Measurements of towing speed, depth of net, gape of the net, towing loads and warp spread were made at intervals during the experiments.

Spread by "Scotia's" trawl doors, these light nets would not stand up to towing at above $3\frac{1}{2}$-$3\frac{3}{4}$ knots. Rig 1 seemed to put extra stress

on the net resulting in splits. For this reason and also because it takes an excessively long time to shoot gear with sweeps on it, let alone the "Icelandic" rig, from "Scotia", rig 1 was abandoned when the heavy concentrations of fish were reached. Gears ii, iii and iv, in spite of the long legs in use, all proved to have an inadequate gape for pelagic trawling.

The largest catch obtained was 318 herring (one $\frac{1}{4}$ cran basket) using rig iv at the above speed for a 1 hour tow. Attempts to increase the gape by the use of patent elevators dependent on kiting only succeeded in tearing the net.

The indications are that a somewhat higher towing speed is desirable and quicker methods of handling a pelagic trawl with an adequate gape such as the "Icelandic" rig are necessary.

FISH

The fish population sampled during the experiments was composed almost entirely of herring, but small numbers of mackerel and solitary saithe were also taken in some hauls. The herring population was composed of fish ranging in length from 20-34 cm. The per mille length composition of the total catch was as follows.

Length (cm)	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
No. per mille	3	14	81	207	173	131	77	63	51	86	89	23	1		1

The population was composed almost entirely of autumn spawners ranging in age between 2-12 years, and the major group between 20-25 cm. was of immature two-year-olds. They had a high fat content with otoliths showing characters similar to those commonly found amongst herring in the Scottish east coast summer fishery. The older groups were recovering spents of low fat content and they again possessed characters similar to the customary north-western North Sea stock. The single 34 cm. herring was a spring spawner of "Norwegian" origin.

ECHOSOUNDERS

The "kingfisher" echosounder was used at intervals during the cruise to study the distribution of echoes near the sea-bed. Excellent traces, thought to be of fish near to the sea-bed were obtained on the CRT, which were not distinguishable from the bottom trace on the paper recording. However, lack of time prevented an investigation being made of the type and quantities of fish giving rise to the near-bottom echoes.

The MS24 survey echosounder was used continuously whenever the kingfisher was not in use, and comparisons were made between the quality of the records obtained with the pierced hull and limpet oscillators. Excellent recordings were made with both oscillators, but the pierced hull oscillator gave rather less "interference" than the limpet oscillator at about two-thirds maximum gain when both were used in more than a moderate sea. The recordings with the limpet oscillator, on the other hand, gave evidence of less oscillator "cross-noise" than with the pierced hull oscillator. It is considered that the pierced hull oscillator will provide very adequate records for all types of routine survey work which the ship may be required to do.

B. B. PARRISH.
W. DICKSON.
31st March, 1955.

CIRCULATION

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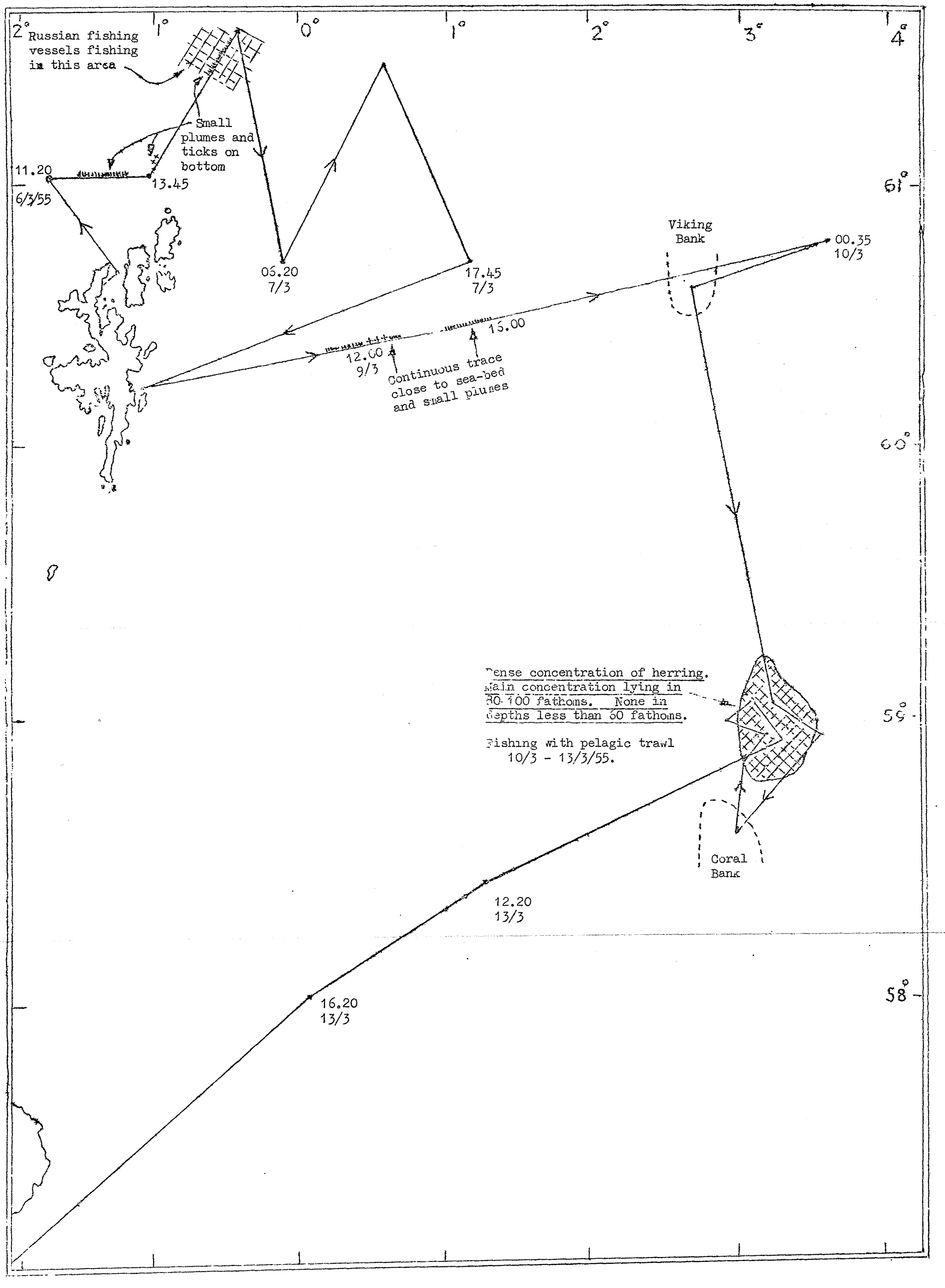
2°
1°
0°
1°
2°
3°
4°
61°
60°
59°
58°
Russian fishing vessels fishing in this area
Small plumes and ticks on bottom
11.20
6/3/55
13.45
06.20
7/3
17.45
7/3
Viking Bank
00.35
10/3
15.00
12.00
9/3
Continuous trace close to sea-bed and small plumes
Dense concentration of herring.
Main concentration lying in 80-100 fathoms. None in depths less than 60 fathoms.
Fishing with pelagic trawl
10/3 - 13/3/55.
Coral Bank
12.20
13/3
16.20
13/3