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FRV CLUPEA

Cruise 4/80

REPORT

5-23 May 1980

Objectives

1 To measure and record using dye and instruments water flows through two bottom trawls and one pelagic trawl.

2 To identify and measure turbulence areas close to the netting where fish have been seen to react.

Narrative

1st week The ship sailed to the Dornoch Firth on Monday 5 May at 1540 hours and diving operations started on Tuesday 6th. Due to poor water clarity the dye work was not practical. Using the divers towed underwater vehicle the North Sea 600 hp high-lift trawl was measured and the components of the gear filmed using an underwater television camera.

A new hand held thermistor speed log failed to produce the results required due to calibration shifts and this part of the programme had to be abandoned.

The ship sailed to Burghead Bay on Tuesday night in the hope that water clarity would improve but the weather deteriorated and the ship had to shelter at Invergordon during the whole of Wednesday. The ship returned to Burghead Bay on Thursday morning where diving on the gear continued for the rest of the day with the ship docking at Buckie at 1845 hours. The measurements were not completed but the high-lift trawl had to be returned to Aberdeen for another exercise. A 30 ft Aberdeen trawl was rigged with the same doors and spreading wire lengths.

2nd week The ship sailed on Monday 12 May at 1120 hours for Burghead Bay in a strong offshore south easterly wind. Diving commenced in the afternoon and work continued in this area for the rest of the week with the ship docking at Buckie on Friday 16 May at 0200 hours.

During this week the gear was measured for spread and heights and for the declination of the top panels of the net. Dye was also dropped in the path of the net and cine filming attempted even though the water clarity was poor.

Sets of flow meter measurements were made on the top netting close to the inside and outside on all the panels using a hand held digital flow meter.

Due to lack of staff only one diving team could be worked so use was made of the remote vehicle with some interesting observation on flows through the netting and on the behaviour of flat fish near the sweep wires and wing ends.

3rd Week For this last week the Small Gadoid Pelagic Trawl with Suberkrub doors was fitted and the ship sailed on Monday 19 at 1445 hours. The gear was shot but several problems developed with one of the doors coming to the surface, the netsonde not operating correctly and then the net coming foul made it impossible to dive before dark.

Diving continued uninterrupted for the next three days and a complete set of measurements were obtained.

The ship docked at Buckie on Thursday 22 May at 1820 hours.

Results

Towing at 3 to 3½ knots the High Lift North Sea Trawl gave a headline height of 15 feet, wing end height of 7 feet and wing end spread of 46 feet. The declination of the top panels of netting were 2° at the front of the net and 5° just before the codend. The belly sloped up at 10° just before the codend. The slopes in both the top netting and belly were gentle with no sudden dips. No strain points were observed anywhere in the net.

Sandeels were seen to escape only on the top panel of the extension piece. The rubber legs were off the bottom and only touched on occasion at all towing speeds.

Observing fish reaction to the busom at 3 different speeds it was noticed that the Lancasters were jamming, pulling the fishing line tight into the back of the bobbins and as the speed decreased the netting rolled right over the bobbins. The netting returned to its original position close to the back of the bobbins when the speed was increased. The gear appeared correct when recovered on board.

The 30' Aberdeen Trawl towing at 3 knots gave a headline height of 9 feet, wing end height of 6 feet, wing end spread of 29 feet but the warp lengths marks were found to lie approximately 3 feet out and when this was corrected the headline height was 7 feet, wing end height 6 feet and the spread 39 feet, door spread 26 fathoms.

The trawl doors appear to be too big for this net causing the gear to over spread. Whilst towing at 3 knots the doors would tip inwards and run on the angle irons and give a bridle angle of around 19°.

The declination of the top panels of netting were 2° throughout and 0° at the codend. The lower panel in front of the codend rose at 5°. The netting was not tight as in the North Sea Trawl and tended to be easily distorted. When the ship changed its towing direction slightly the net would change shape causing pockets in the wings where flat fish collected and to be released again when the ship changed direction.

Dye was dropped in the path of this net. Except where it touched the netting, it passed out through the codend.

Dye was also released in a fine jet on top of the square approximately 2 cms off the meshes but no disturbance of the flow was observed in the water flow 2 cms from the netting panel.

A fine nylon line, 50 cm long, was streamed close to the netting from the Remote Vehicle where the angles on side panels were greatest to the direction of tow and where small fish had been seen escaping. The impression given was that water flowed freely through the meshes with no build up and little turbulence.

Sandeels were seen to break out all along the top of the net with an increase just before the flapper at the front of the codend. Herring and sprat were also caught in the meshes all along the top of the net.

The Small Gadoid Pelagic Trawl with the standard rig had a good shape with no strain points but the port door had a tendency to lift during every haul. When examined it was found to lean in between 45° and 60° and to lean backwards by about 30°. A possible explanation could be that the pennants behind the doors are of different lengths; 2 m top and 2.5 m lower.

Towing at 3 knots the spread at the wing ends was 34 feet with a height of 21 feet. The centre of the mouth opening was 30 feet, the next panel opening 24 feet, then 18 feet, then 12 feet. The following panels, including the codend, could not be measured with the sonar unit, in the ROV II but the netting appeared to have a gentle taper. Declination of the top panels from the headline to codend were 10°, 12°, 11°, 10°, 5°, 5°. The codend was moving up and down and gave a measurement between 0° and 3°.

Sandeels were only seen meshed in one panel, the second last one just before the codend. Note this is at a change in the colour of the netting from white to dark green.

Flow meter measurements were made along the top panels. They showed no significance difference inside and outside the net. However there was a slight slowing down of the water flow towards the codend area close to the outside of the netting.

The pelagic trawl was shot on a spot of fish seen on the echo sounder close to the bottom. The catch of 2 boxes of fish consisted of sprat with a small proportion of whiting. Samples were kept and the one year old whiting measured.

Good close ups on the television of the lower and top wing ends were recorded showing the smooth curve and shape.

Seen in draft G Geddes

John Main

20 June 1980