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CRUISE REPORT  
F.R.V. "CLUPEA"  
May 2nd-19th 1966

Objective: to obtain measurements of the geometries and tensions in the wires at various towing speeds for the following gears:

1. "Clupea's" standard 54",  $\frac{1}{2}$  A.R. flat otterboards, with 7 fm spreading wires and 15 fm sweeps.
2. 60",  $\frac{1}{2}$  A.R. "V" form otterboards with 7 fm spreading wires and 15 fm sweeps.
3. 66",  $\frac{1}{2}$  A.R. curved otterboards, with 30 fm twin bridles.

A 22 $\frac{1}{2}$  ft nylon trawl was used with all these gears.

Narrative: The scientific staff joined "Clupea" at Buckie at mid-day on 2nd May. The rest of the day was spent loading and stowing gear, setting up recorders and instrument workshop in the vessel's fish laboratory, and running out electrical cables to deck instruments. Work at sea started the next day. The vessel returned to Buckie each evening.

This was the first time "Clupea" had been used for instrumented trawling, and the crew were not familiar with the experimental requirements and techniques for this kind of work. The curved and "V" form boards were not designed specifically for "Clupea". For these reasons, some time was required to modify and adapt normal deck operations to suit the new gears and instrumental requirements. Some necessary trial runs were made with the "V" type and curved boards, with only limited instruments mounted before carrying out "full scale" instrumented trawls.

Trawling was carried out in sea depth 18 fm to 30 fm off Buckie and from just inside station 7, making alternate north and south tows over the same course. For each tow, the ship's engine revs. were varied from 350 r.p.m. to 450 r.p.m. Ship's speed through the water was calculated by timing the passing of fixed points on the ship's side past floating indicators.

Instruments: 3 $\frac{1}{2}$  ton load cells were used to measure the tension in the wires fore and aft of the otterboards and at the wing ends. The performance of these load cells was, in general, satisfactory. There were very few recording failures.

A manometer was mounted at the centre of the groundrope with "heads" up to the centre and one wing end of the headline. On the fourth haul the gear came fast and the tubing to the wing end "head" was torn away from the recording unit and the unit became partially flooded. The instrument and tubing had to be brought back to Aberdeen to make temporary repairs and recalibration. This was done over night and no sea time was lost. On all other hauls, this instrument performed well.

A deck tension block was used to measure the tension in the warps just aft of the aft gallows. This instrument developed an intermittent fault which was found to be caused by "rough handling" breaking electrical continuity at the junction of the cable with the block. This was repaired at sea.

A warp spreadmeter was mounted across the warps aft of the towing block. This instrument also developed an intermittent fault. This was caused by faulty soldering in the instrument, and it had to be stripped and resoldered.

Two A.E.I. 4 inch recorders were used to record readings from the tension block and spreadmeter. A fault developed in one recorder which was repaired at the Laboratory over a week-end.

Results: In all, 25 instrumented hauls were made. Measurements of tensions in the warps, the wires fore and aft of the otterboards and at wing ends, headline heights and otterboard spread were obtained for each of the three gear conditions at various ship's speed.

The curved otterboards with twin backstrops and bridles produced considerably better spread than with the flat boards but were a little tricky to handle and shoot. The "V" form boards gave rather better spread than the flat boards, and were very easy to handle, especially in shooting.

Detailed analysis of the results should prove extremely valuable.

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13th December, 1966.