CRUISE REPORT
FRS SCOTIA
23 May - 16 June 1969

PERSONNEL: D N MacLennan
D Cattanach
E S Strange
D Galbraith
W R Leys
R Kingsley

NARRATIVE

"Scotia" sailed from Aberdeen at 1715 hrs on 23 May and made for the Scalloway deeps. Experimental trawling was carried out there until 28 May, when the ship moved to continue the work in deeper water to the north of Shetland. On 30 May "Scotia" put in to Lerwick to take on water, and to change gear and staff.

On leaving Lerwick on 31 May, gear testing was continued off Fetlar until 8 June, when there was a further break for water and change of gear. "Scotia" left Lerwick on 10 June and returned to the deep water station north of Shetland and worked there until 12 June. She then moved southwards, and gear tests in more shallow water were carried out off Auskerry until 14 June. On completion of the programme of work, "Scotia" steamed for Aberdeen where she docked at 1345 hrs on 16 June.

GENERAL

This cruise was the second in a series aimed at the investigation and comparison between different types of otterboard. For this cruise four otterboard types were used;

A conventional flat boards
B 'V' boards
C cambered boards
D oval boards

Board types A and B were similar in size to the corresponding types used in the previous cruise of this series (ref 4SR68), while type C boards were reduced in size to better match "Scotia's" towing capacity. The "oval" boards (type D) were not truly oval in shape, but may be better described as rectangular with rounded corners. They did, however, have the main characteristic of "oval" boards, namely the presence of a slot cut in the board between the towing brackets. These boards had not previously been used on "Scotia".

Comprehensive measurements were made on the gear whenever possible, including wire tensions at the net, around the boards and at the ship; vertical opening and wing-end spread of the net; angles of the towing warp aft of the block and characteristics of the vibration of the warps in the towing condition. For all measurements but the last one, records were obtained on paper charts, but data obtained from accelerometers attached to the warps were recorded on magnetic tape because of the more complex analytical procedure which is required in this case.

RESULTS

The standard flat boards were used as a basis for comparison with the other board types, and their shooting performance was taken as the norm. In the

case of the 'V' boards, which had four warp attachment points available for experimentation, the gear shot and fished well with all four corresponding attack angles, but the greatest angle gave a significant reduction in board spread. Thus the most efficient angle of attack would be obtained using one of the middle pair of attachment points.

When the cambered board type was first used, the after board was observed to be riding toe up, but this was easily corrected by lengthening the upper backstrop. On the other hand, with the oval boards which were of a design supposedly as supplied for commercial use, considerable difficulty was experienced in getting the boards to work at all. Both boards were inclined to float, and were unstable during shooting. On taking a detailed look at the structure of the oval board this behaviour was diagnosed to arise for 3 reasons, namely (a) towing brackets too small, giving a low angle of attack, (b) backstrops assymetrically positioned with respect to the fore and aft centre line, and (c) centre of gravity too high, due to insufficient weight on the keel. Faults (a) and (b) were corrected at sea by replacing the towing brackets with a larger set taken from the standard flat boards and repositioning the backstrops. It was not, however, possible to correct fault (c) with the facilities available at the time. Nevertheless, the reconstructed boards were found to fish well although great care had still to be taken in shooting them.

There were no great differences in the readings of net mouth spread obtained with the various boards. The distance between otterboards, on the other hand, was quite variable, being greatest in the case of the cambered type. Other types exhibited occasional high readings of board spread, however, but it is suspected that this was due to the board coming off the bottom. As no instrument was available which could directly determine whether or not a board was floating, the true situation will have to be deduced from other data by further examination.

The areas worked were chosen to provide ground suitable for sustained use of comprehensive instrumentation, but the concentrations of fish in the areas were low. As a result catching rates were too small to allow meaningful statistical comparisons to be made of relative catching performance. Clearly this aspect of otterboard performance requires to be investigated independently of engineering studies, as was done on a cruise of FRV "Mara" last year (ref 10MP68).

Data on the vibration of the trawl warps were obtained for all board types at various warp lengths, by attaching accelerometers to the warps at distances up to 30 ft aft of the block. The vibration amplitude was surprisingly high, and on one occasion the record showed sustained bursts of 15G peak to peak acceleration, at a dominant frequency of 8 cycles per second. The true acceleration was probably higher, as the accelerometer was limiting at this high reading. There was no obvious correlation between the vibration characteristics and board type, ship's speed or warp length, but a more detailed analysis is now being made in an attempt to correlate less obvious features of the data. The amplitude of vibration was often greatest at the beginning of a haul, later settling down to a lower but still randomly varying value. On the other hand, the dominant frequency of the vibration, while varying slightly throughout a hual, did so to a much lesser extent than amplitude.

D N MACLENNAN
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