

R1/6

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FRV *Clupea*

Cruise 1492C

REPORT

Personnel

| | |
|---------------|-----|
| J Main | SSO |
| R D Galbraith | HSO |
| G I Sangster | HSO |
| P J Barkel | PTO |
| N S Collie | PTO |

Objectives

To evaluate a grid system where the grid could be quickly removed before the trawl passes onto the net drum.

To investigate the size selection of species passing through a grid system.

To film fish reactions to the grid system, using both the RCTV and diving techniques. Water flow to be recorded in the vicinity of the grid system using both flow meters and dye pack.

Narrative

Mr Barkel joined the *Clupea* at Fraserburgh on 2 September and prepared the RCTV for operation. The remainder of the scientific staff joined the vessel on 3 September.

Clupea sailed at 1330 for the Moray Firth in a strong northwesterly wind for an area where diving could take place. Unfortunately, by the time we reached the proposed site off Nairn the wind was too strong and the vessel anchored under the land off Cromarty Firth. With continuing 7-8 force northwesterly winds on 4 September the vessel moved to the Dornoch Firth and trawled in shallow water under the land where diving observations were made on the net and modified grid system.

Small fish were seen to escape through the extension after passing through the grid and this was remedied by adding some additional small mesh material in this area so directing the fish into the cod-end. A Scanmar unit confirmed that the frame holding the grid system was held in a horizontal trim ensuring that the escape hole was as intended. The *Clupea* anchored in the Dornoch Firth for the night. The next day diving was conducted using both video and still cameras. Dye trials were satisfactorily filmed passing through the grid system showing that the flow meters were positioned correctly.

With a poor weather forecast for the Orkney area, operations were moved to grounds off Lossiemouth but there was found to be insufficient fish for successful observations. The vessel entered Buckie at 2030 on 5 September for the night, sailing again 0730 on 6 September but with a force 9 gale blowing, the vessel was forced to return to port. *Clupea* sailed again on 7 September but bad weather again forced the vessel to shelter in the Dornoch Firth. One haul was conducted in this area but the net came foul after only 30 minutes and was badly damaged. This was repaired before proceeding to the Orkneys where the vessel anchored in Inganess Bay at 2230 for the night. On 9 September the vessel proceeded to Copinsay grounds but 30-40 knot winds made

this impossible so a passage was made for North Sound where fishing took place. The vessel tied up at Pierowall for the night.

Clupea was confined to port for the next three days due to severe gales. On Sunday 13 September the vessel sailed for Copinsay where two hauls were made before tying up at Kirkwall for the half landing.

On 15 September 0730 *Clupea* sailed for Copinsay but again bad weather only allowed one 30 minute tow before having to run for shelter in Holm Sound.

A full day's trawling was conducted off Copinsay on 16 September. On 17 September the wind was strong SE with a big swell so work was conducted in North Sound where a horizontal grid and a cod-end with 6 mm twine of 100 mm mesh was filmed using the RCTV. Only very small haddock and whiting were observed giving limited information. The vessel anchored off Westray Island for the night.

On 18 September fishing was conducted at a number of positions off Noup Head but there were no fish on the grounds at all, this may have been due to the very clear water encountered in the whole of this area. The net came fast on the second haul necessitating repairs which were carried out at anchor off Sandy Island where the vessel remained for the night.

With slightly improved weather conditions work commenced on the east side of Orkney off Start Point and continued to the south of Copinsay.

On Sunday 20 September *Clupea* lost engine power due to the main engine oil pump breaking down. Inganess Bay provided shelter whilst the backup system was put into service. Work continued the next day before a passage was made for Fraserburgh where *Clupea* arrived at 1830 that night.

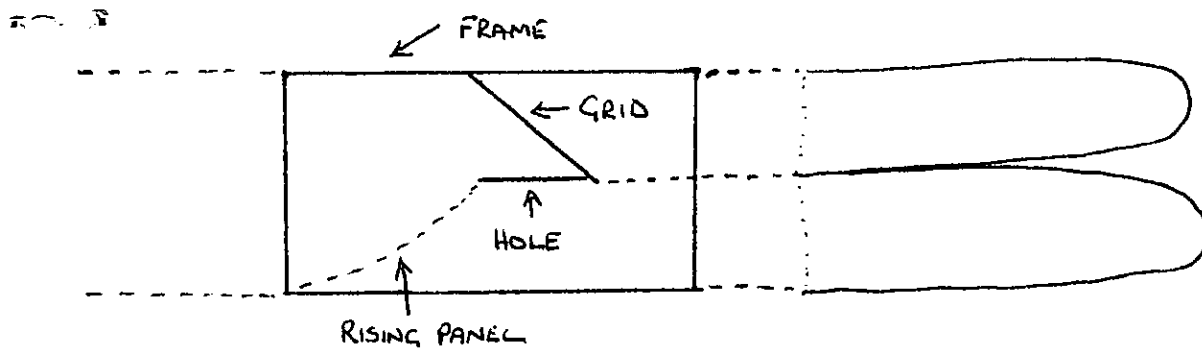
The scientific equipment and trawl gear was off loaded and returned to the Laboratory on 22 September.

Results

To ensure that the "grid system" was rigged and set on a horizontal plane it was fitted inside a light tubular frame. It was also essential that the frame could be easily inserted or removed from the trawl. This was achieved by fitting a nylon zip on the top side of the extension above the frame. The grid was set at an angle of 45° to the horizontal with a bar spacing of 40 mm. The rear of the frame was positioned 180 cm in front of the two black small meshed cod-ends. A Scanmar unit confirmed that the hole at top of the rising panel in front of the grid was held in a horizontal plane. The rising panel directing the fish up to the grid was set at 65° to the horizontal.

On occasions flow meters were fitted at various positions around the grid to give an indication of the water speeds. Towing at 2.75 knots water flow readings of around 1.5 knots was recorded in front of the grid. Dye was also introduced by divers at positions around the grid system within the frame but did not show any significant deviations in the flow. The dye flow was observed passing up the rising slope in front of the grid. The grid system was found to work as intended.

Two cod-ends were fitted to retain all the fish passing through the system, one small meshed cod-end retained the fish passing through grid whilst the other retained those that passed down through the hole in front of the grid. See diagram below:-



An average of 79% of all haddock and 91% of all whiting passed through the grid. With no cod-end behind the grid these juvenile fish would have escaped from the trawl. They consisted mainly of two age groups (12-19 cm) and (20-29 cm) with only a small number of haddock and whiting over 29 cms. All whiting caught and measured could pass between the grid bars without touching. Only haddock over 33 cms touched the bars and these could also pass through the bars if they wished. No substantial quantity of large fish was present on any of the grounds fished during the cruise.

Of the 37 cod (26-37 cm) caught only seven passed through the grid. Cod of 30 cm just touched the bars but again could pass through if wished.

Although progress was hindered by the bad weather, the grid system proved successful when the hole in front of the grid was held in a horizontal plane. The Scanmar unit indicated that the frame was never more than 8° from the horizontal. This technique is a practical, mechanical method of reducing both unwanted haddock and whiting from the catch in any water conditions in daylight or dark and with little or no damage to the fish.

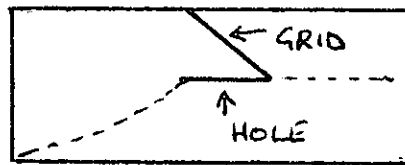
J Main

12 November 1992

Table 1

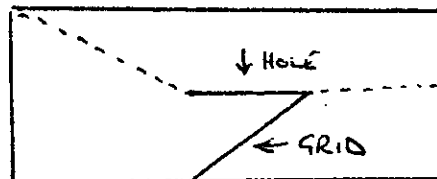
Catch retained in both cod-ends

Grid fitted in the top at angle 45° with 40 mm spacing between bars



| Haul | Haddock | | | | Whiting | | | |
|-------------|-------------|----|----------------|----|-------------|----|----------------|----|
| | Top cod-end | | Bottom cod-end | | Top cod-end | | Bottom cod-end | |
| | Nos | % | Nos | % | Nos | % | Nos | % |
| 166 | 194 | 84 | 37 | 16 | 1730 | 89 | 214 | 11 |
| 167 | 12671 | 84 | 2449 | 5 | 1710 | 99 | 5 | 2 |
| 168 | 279 | 71 | 115 | 29 | 1317 | 88 | 183 | 12 |
| 171 | 3397 | 81 | 881 | 19 | 1768 | 86 | 289 | 14 |
| 172 | 1004 | 60 | 676 | 40 | 2431 | 93 | 188 | 7 |
| 173 | 672 | 73 | 248 | 27 | 14637 | 98 | 373 | 2 |
| 175 | 2105 | 73 | 781 | 27 | 225 | 85 | 39 | 15 |
| 176 | 1068 | 86 | 178 | 29 | 321 | 92 | 29 | 8 |
| 177 | 617 | 95 | 55 | 13 | 187 | 93 | 13 | 7 |
| 178 | 1462 | 84 | 270 | 16 | 32 | 86 | 5 | 14 |
| Average 79% | | | | | Average 91% | | | |

This one haul had the grid fitted in the bottom, 45° angle with 40 mm spacing between bars.



| | | | | | | | | |
|-----|----|----|----|----|-----|----|----|----|
| 174 | 12 | 22 | 42 | 78 | 225 | 85 | 39 | 15 |
|-----|----|----|----|----|-----|----|----|----|

Haddock and whiting 20 cms and greater - grid fitted at the top, 45° angle and 40 mm spacing between bars.

| | | | | | | | | |
|-----|-----|----|-----|----|-----|----|----|----|
| 175 | 325 | 91 | 232 | 6 | 185 | 83 | 39 | 17 |
| 176 | 122 | 61 | 77 | 39 | 97 | 81 | 23 | 19 |
| 177 | 53 | 83 | 11 | 17 | 82 | 89 | 10 | 11 |
| 178 | 226 | 70 | 97 | 30 | 31 | 86 | 5 | 14 |

Haddock and whiting 20 cms and greater - grid fitted at the top, 45° angle and 40 mm spacing between bars.

| | | | | |
|-------|--------|--------|--------|-------|
| 175 | 26 | 42 | 6 | 3 |
| 176 | 6 | 23 | 1 | 0 |
| 177 | 0 | 1 | 0 | 0 |
| 178 | 28 | 19 | 7 | 0 |
| Total | 60 41% | 85 59% | 14 82% | 3 18% |

Grid fitted at the top, 45° angle and 40 mm spacing between bars. Flatfish include lemon sole, plaice and common dab in the size range 10-32 cms with the majority between 10-18 cms are as follows

| Haul | Top cod-end | | Bottom cod-end | |
|------|-------------|----|----------------|----|
| | | | | |
| 166 | 94 | 73 | 34 | 27 |
| 168 | 163 | 86 | 26 | 14 |
| 170 | 121 | 76 | 39 | 24 |
| 171 | 115 | 79 | 30 | 21 |
| 172 | 58 | 56 | 45 | 44 |
| 175 | 455 | 63 | 271 | 37 |
| 176 | 128 | 53 | 113 | 47 |
| 177 | 76 | 68 | 35 | 32 |
| 178 | 132 | 59 | 90 | 41 |