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FRV *Scotia*

Cruise 0604S

REPORT

5-16 April 2004

Personnel

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Objectives

1. To check the rigging of a full-scale prototype cod separating trawl with horizontal separating panels of three different lengths using the remote controlled TV vehicle.

2. To observe fish behaviour to each panel during day and night fishing and at different towing speeds, using both visual and acoustic methods where feasible.

3. To measure the separation of the main commercial fish species by each panel design into upper and lower codends, in each light and speed condition, as time permits.

Out-turn days: 7 days – C739; 5 days – MFo663

Narrative

A safety briefing for scientific staff was held prior to sailing at which the key elements of the cruise risk assessment were discussed. *Scotia* sailed at noon on Monday 5 April for the Moray Firth where a preliminary tow was made to check the gear. After an overnight steam, two days were spent fishing on grounds east of Orkney. A further shift to the Shetland area was followed by six days and nights of fishing, using the TV and acoustic equipment on the underwater vehicle to measure the geometry of the net and panel and to observe fish behaviour. Strong southerly winds developed on 13 April precluding the safe use of the vehicle and the vessel sailed south for the Moray Firth. Two further days fishing were possible before *Scotia* sailed for Aberdeen arriving overnight for unloading on Friday 16 April.

Results

40 hauls were completed testing three separating panel configurations. Demersal species including haddock, whiting, saithe, plaice, lemon sole and dab were regularly caught in adequate numbers to test the effectiveness of separation. There were rarely sufficient numbers of cod. On many hauls there was a substantial by-catch of herring and mackerel in the 40 mm mesh cod-ends.

By initial adjustment of the groundgear and separating panel, good ground contact and the correct panel height were achieved and fishing trials commenced with the leading edge of the panel 0.8 m directly above the centre of the groundrope. Satisfactory separation was achieved with haddock, whiting and saithe predominantly entering the upper codend and other species (cod, flatfish) mainly entering the lower codend. There were few cod although results for cod are quoted because of the importance of the species. Further analysis will be necessary to check the significance of these data. There was some indication that the panel was less effective at separating these species during the night compared to daylight hours. A standard towing speed was set at 3-3.25 knots. For comparison, higher towing speeds of up to 4 knots were also used. No clear change in separation with speed was seen although further analysis will be necessary on this point.

The panel was then cut back to a position approximately 9 m behind the groundrope centre where separation was again observed after some adjustment to the panel height by tailoring the forward edge of the panel. Separation was evident for haddock and flatfish during both day and night but deteriorated for whiting. Finally with the panel at a position approximately 16 m from the groundrope centre, separation was maintained for haddock but was not apparent for flatfish at night.

Preliminary results of separation for the main species in each case are shown in the table. The percentage by weight of haddock, whiting and saithe in the upper codend and of cod and all flats in the lower codend are shown. The figures are averages for two or three hauls in each case. It must be emphasised that these results are indicative only and should not be quoted until further analysis has been completed. In particular there may be differences in behaviour between the individual flatfish species although in the table they have been combined.

Gear	Day/ Night	Fast/ Slow	% by weight in upper codend			% by weight in lower codend	
			Haddock	Whiting	Saithe	Flats	Cod
Panel @ groundrope centre	D	S	92	88	90	99	88
	N	S	85	77	74	85	93
	D	F	92	86	97	98	93
	N	F	79	78	85	89	75
Panel @ 9 m behind groundrope	D	S	83	67	-	92	-
	N	S	88	53	-	95	76
Panel @ 16 m behind groundrope	D	S	75	43	-	95	88
	N	S	91	69	-	57	-

The RCTV performed well, with launch and recovery procedures working smoothly. Strong tides occasionally prevented the vehicle from reaching the gear. Many hours of SIT video footage and acoustic video data were collected from this platform. Low light video cameras were also deployed at various positions on the net to collect video for fish behaviour analysis. A new digital stills flash camera was used both on the RCTV and in a frame mounted on the net itself although there were some problems with water ingress into the connection to the flash.

Water clarity on the Shetland grounds was exceptionally good with visibility of up to 20 m at depths over 100 m without artificial light. A lot of SIT and net camera video was collected here during daylight hauls with the full-length panel. Net cameras were positioned on the wings orientated to look back into the mouth of the net and from the selvedge looking across the top of the panel. These videos will be used to analyse fish behaviour in the mouth of the net in relation to the panel. Limited video footage was obtained of the shortened panels largely due to the poorer visibility on the Moray Firth grounds. Net cameras were deployed on 14 daytime tows.

Video data were recorded from the Reson Seabat and Kongsberg Simrad SM2000 multi-beam sonars, which were mounted on the RCTV. The vehicle was positioned above the net with the sonars orientated to look downwards. Data were collected from a number of positions during both daylight and darkness:

1. At the net mouth just ahead of the full length panel
2. At the net mouth after the panel had been shortened
3. Just ahead of the shortened panel in both the 9 m and 16 m position.

These data will be processed using image analysis to quantify the position of fish in the net in relation to the panels.

R S T Ferro
12 May 2004

Seen in draft: Captain P Ramsay, OIC *Scotia*