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DEPARTMENT OF AGRICULTURE [NI]
AQUATIC SCIENCES RESEARCH DIVISION

CRUISE REPORT: LF/14/93 TECHNICAL CONSERVATION MEASURES

VESSEL: R.V Lough Foyle (DANI)

DATES: 11 - 19 May 1993

AREA OF OPERATION: Irish Sea; ICES Division VIIa

TYPE OF SURVEY: Gear Trial

PERSONNEL: R. Briggs, PSO [SIC]
J. Peel, ASO
S. Lapsley, Student
J. Robertson, SOAFD
P. Barkel, SOAFD

OBJECTIVES:

1. To film and study the selection characteristics of square mesh panels in whitefish nets (Semi-pelagic gear).
2. To assess the performance of grids in a *Nephrops* trawl with the aim of minimising the catch of juvenile prawns.

METHODS:

The gear was a midwater trawl net to which an 80mm mesh 'fish bag' had been attached, as is used commercially in the Northern Ireland semi-pelagic whitefish fishery. Figure 1 is a plan of the net and shows the positioning of square mesh panels used during the cruise.

Fish behaviour was studied using the SOAFD remote controlled television vehicle (RCTV). The RCTV was deployed over the ship's stern from the hydrographic winch by leading the winch wire through a pulley system to the 'A' frame. A new sonar attached to the vehicle facilitated location of the net and enabled transverse sections of the net to be viewed. This instrument proved to be a very worthwhile addition to the SOAFD suite of equipment.

Hauls were performed at stations where young fish were found to occur during previous ground-fish surveys (Figure 2). All catches were sorted to species level using the multiple stage sampling procedures used in DANI ground-fish surveys. Catches were quantified and length frequencies recorded for all

species captured. Usually the trawl was towed with the footrope about 1-2m off the seabed. On a few occasions the trawl was raised to about 5-10m off the seabed.

NARRATIVE:

Tuesday 11 May:

MRV *Lough Foyle* departed Belfast harbour at 08h.30 in a slight NE breeze and proceeded to Ayr in Scotland, docking at 15h.45. Messrs. Robertson and Barkel boarded at this time and work on assembling the SOAFD RCTV and ancillary equipment commenced while the vessel was in dock. Due to the tidal state of the Ayr berth *Lough Foyle* put to sea again at 18h.00 and steamed to the Co. Down coast where the night was spent at anchor in Dundrum Bay.

Wednesday 12 May: Calm weather conditions allowed assembly of the SOAFD equipment to continue while the vessel was on station (Figure 2) for testing the RCTV towards the end of the day. With all systems working the vessel returned to an anchorage in Dundrum Bay for the night.

Thursday 13 May: The net and RCTV were shot at 09h.27 as indicated in Figure 2 ($53^{\circ}44'N$ $5^{\circ}19'W$) using the semi-pelagic net without a square mesh panel. This proved to be a successful first trial and gave good film of the net meshes during trawling. The fish catch was small with 21-23cm whiting being the main species. Tow 2 was in the vicinity of tow 1 and gave more film of the net in action. Catches were again small, with whiting and grey gurnard predominating. Apart from some whiting and sprats passing through the codend, escapes were few. Sprats and sandeels (both less than 10cm) were found enmeshed along the net. The gear was hauled at 19h.07 and the vessel returned to anchor in Dundrum Bay for the night.

Friday 14 May: Severe northerly gales prevented the vessel working and so remained at anchor in Dundrum Bay. The day was spent editing film. The crew inserted a square mesh panel into the net in readiness to start work when the weather abated. The panel position was similar to that currently used by many Northern Ireland fishermen ie in the centre of the first tapered section of the net (Figure 1).

Saturday 15 May: An improvement in the weather allowed the vessel to sail at 07h.00 to a station off the Co Down Coast ($53^{\circ}58'N$ $5^{\circ}48'W$) where tow 3 was shot at 09h.19. More good film of the net was obtained in clear water. The meshes of the square mesh panel were fully open and occasional fish escapes through the panel were observed. The 80mm diamond mesh surrounding the panel were open by about 0.3 of the mesh length while those of the codend extension were open by about 0.1 of the mesh length. As fish seemed scarce in this area the net was hauled at 13h.35 and the vessel steamed south. The gear was shot again (Tow 4) in the vicinity of some of the more southern groundfish survey stations ($53^{\circ}58'N$ $5^{\circ}48'W$). More good views of the net were obtained and small numbers of fish were seen passing along the net below the selvages in

the region of the square mesh panel. Very few escapes were seen from either the SMP or the surrounding diamond meshes. A steady stream of very small fish (mainly sprats) were seen escaping through the codend meshes. The gear was hauled at 19h.05 and gave a very small catch, as predicted from the TV observations. *Lough Foyle* spent the night at anchor off Howth.

Sunday 16 May: In order to study the optimum position of the SMP, a second panel was inserted in the net extension behind the junction with the tapered section as indicated in Figure 1. The gear was then shot and towed northward at a station to the east of tow 4. Herring and sprat were observed passing mainly along the lower part of the net in the tapered section. As the straight extension section was encountered enmeshed fish were frequent. Although escapes were seen through the first SMP in the tapered section escapes were significantly more common through the more aft SMP in the straight extension. The catch from the tow was poor, with hardly any whiting. The scarcity of fish lead to a decision to steam north to stations off the Isle of Man which would also be more sheltered from the prevailing SE winds. Further deterioration in the weather made conditions unsuitable for work and *Lough Foyle* remained at anchor overnight off Peel.

Monday 17 May: Gales from the south made work impossible and a change in wind direction towards the SW rendered the anchorage off Peel uncomfortable. The decision was made to move to Belfast Lough for shelter and a further deterioration in the weather lead to the vessel docking in Belfast for the night.

Tuesday 18 May: With no improvement in the weather the day was spent in port editing video film from the cruise and dismantling the SOAFD equipment. DANI scientists disembarked and the vessel steamed through the night to Ayr where the SOAFD scientists and their equipment disembarked.

Wednesday 19 May: MRV *Lough Foyle* then returned to Belfast docking at 15h.15.

RESULTS:

Five tows were performed during the cruise. Two without a square mesh panel (SMP) and two with a SMP in the tapered section of the net (Figure 1). The fifth tow had a second SMP inserted in the straight extension piece of the net (Figure 1). The position of the stations is shown in Figure 2 and other details are given in Appendix 1. Work was severely restricted by poor weather conditions and a scarcity of fish (Table 1), despite the cruise covering stations with good catches during previous groundfish surveys. The size composition of whiting from tows 1 and 2 are shown in Figure 3. Catches of whiting in all other tows were negligible. Good video pictures were obtained of the net while fishing. These showed the extent of mesh opening in the various net sections. A more detailed analysis of these data will be performed at a later date. It seemed likely that the main region of potential escape for fish was the straight extension section of the net,

rather than the tapered section. Observations showed that escape behaviour of fish is most active when the fish are confined to a small cross section of net, as occurs in the straight extension piece. This was therefore considered to be the most appropriate position for the square mesh panel. Further trials on grounds of higher fish densities than those encountered on this cruise however would be require to confirm this observation. Additional notes from the video observations are presented in Appendix 2.

Unfortunately poor weather conditions resulted in there not being enough time to carry out the planned trials with *Nephrops* nets.

ACKNOWLEDGEMENTS:

Sincere thanks are extended to Captain Niblock, Officers and Crew of the *Lough Foyle* for their co-operation throughout the cruise. SOAFD are thanked for their collaboration in this study; especially Jack Robertson and Peter Barkel, who were on the cruise.

Signed:



19/5/93

Scientist in charge..... date
(Richard P. Briggs)

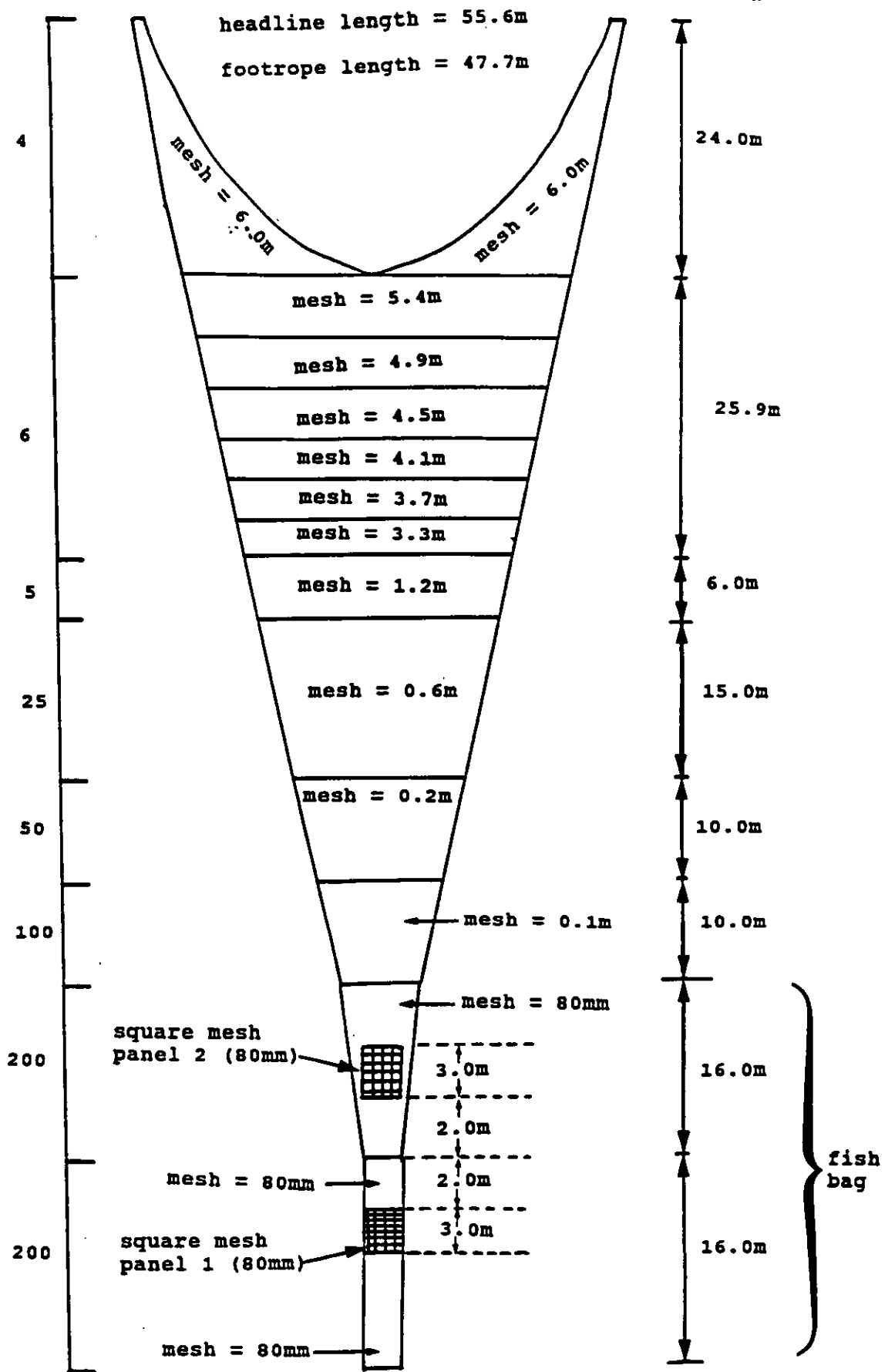


Figure 1

Plan of the top sheet of the net used during technical conservation cruise on MRV Lough Foyle showing position of square mesh panels.

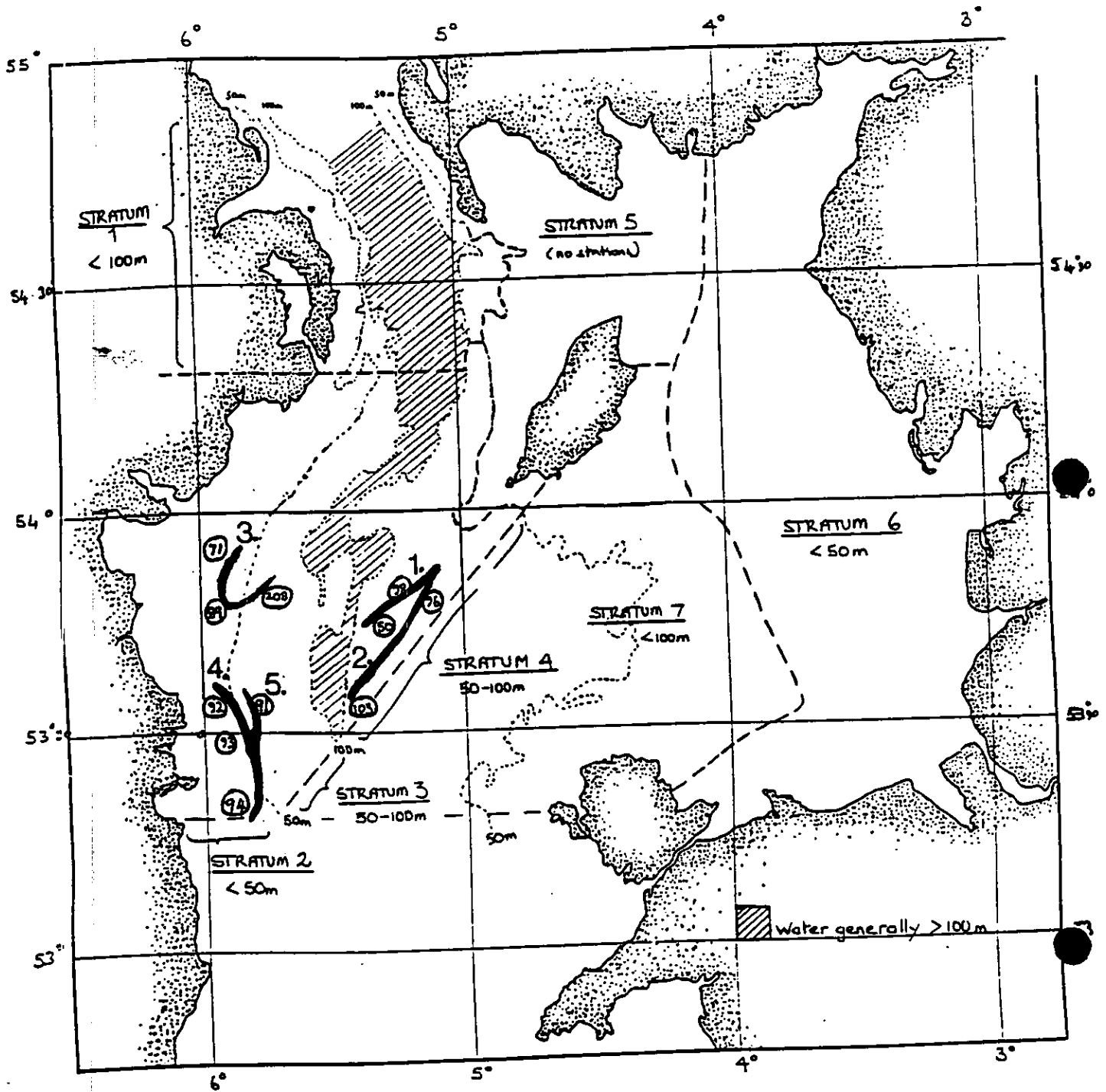
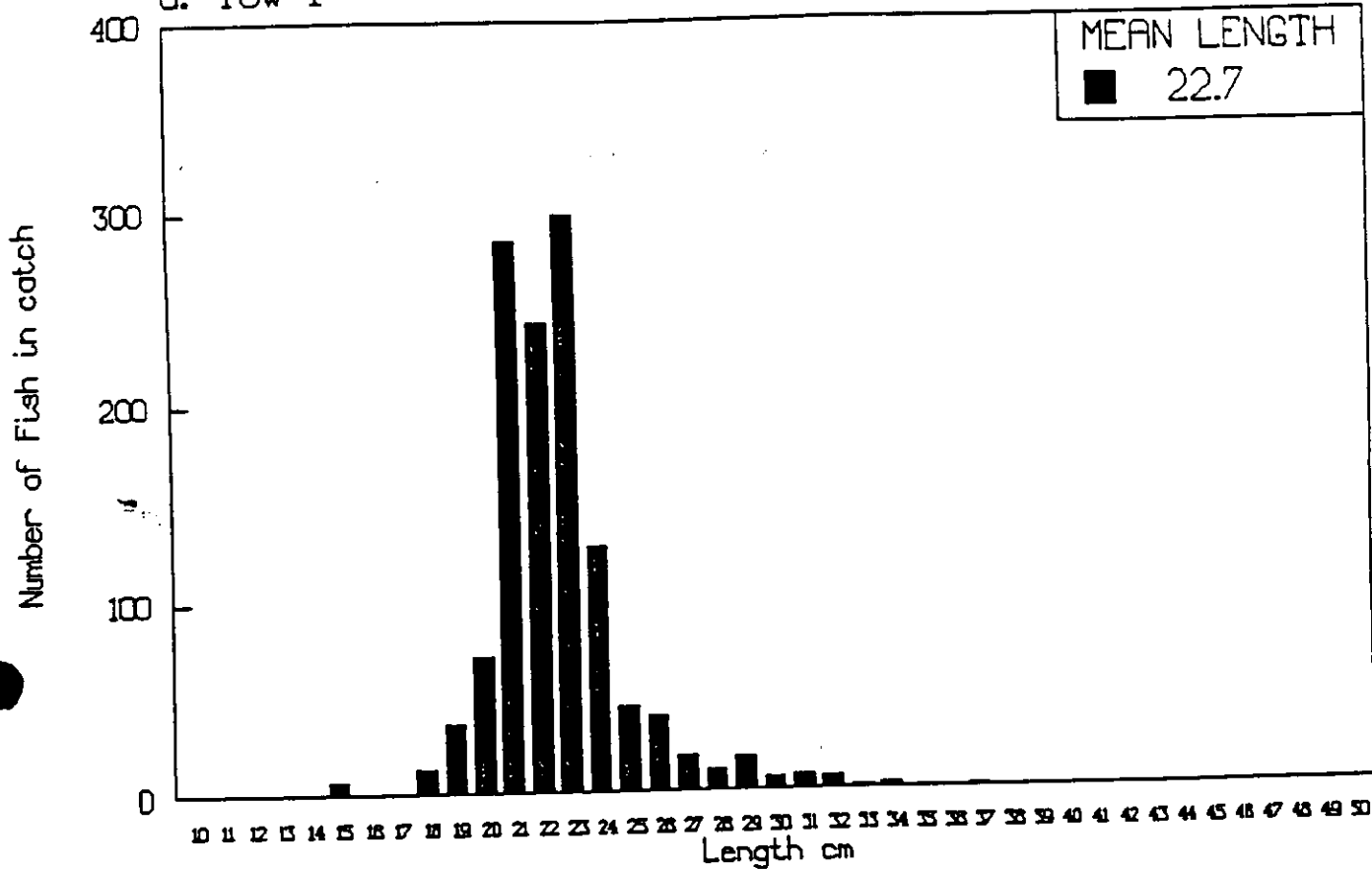


Figure 2.

Trawl stations (1-5) fished during the May 1993 Technical Conservation trials on MRV Lough Foyle. Stations were selected from strata 2, 3 and 4 of the DANI groundfish survey stations (circled).

Figure 3
Whiting Size Composition
a. Tow 1



b. Tow 2

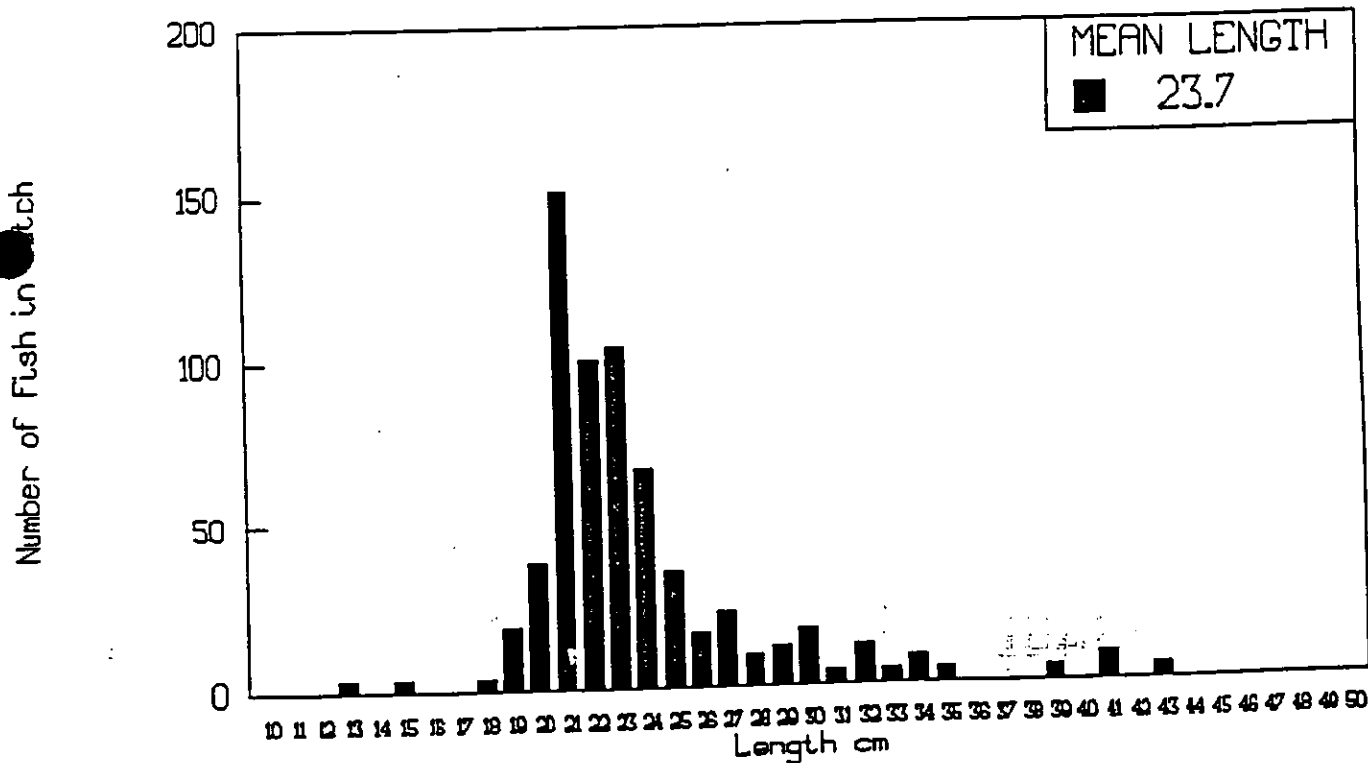


Table 1

Total Catch (Kg) by Tow

SPECIES	TOW 1	TOW 2	TOW 3	TOW 4	TOW 5
WHITING	123.80	49.88			2.21
COD	2.40	10.56			
HADDOCK	4.66	1.96			.61
SAITHE	2.33	5.25			
G. GURNARD	8.91	10.33	6.20		1.60
HERRING	.02	.22		2.73	.79
SPRAT	.01			.02	.24
N. POUT	.03				
HAKE		.35			
SPURDOG		1.21			
LS DOG		.59			
NERHROPS		.01			
N. POUT		.01			
DAB		.13			
P. COD				.01	
PLAICE				.11	
SCAD				.26	
SQUID				.01	
TOTAL	142.14	80.49	6.20	3.14	5.45

APPENDIX 1

BRIDGE DATA SHEET

CRUISE CIMB-29 *Jr. Briggs*
 START TOWING

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 MEASUREMENT

TOW	STATION	DATE	TIME SHOT	POSITION LONG-LAT	TIME HAULED	POSITION LONG-LAT	DISTANCE	DEPTH
1	50/96 ⁷⁶	13 th MAY	09:27	53° 43' 33" N 5° 18' 73" W	12.44	53° 49' 7" N 5° 05' 7" W	11.1	77/63/70
2	96/76 ⁷⁶	"	13:40	53° 50' 6" N 5° 04' 05" W	19.07	53° 37' 37" N 5° 24' 63" W	16.5	70/63/88
3	76/208 ⁷⁶ 76/87	15 th MAY	09:19	53° 57' 76" N 5° 47' 76" W	13.35	53° 23' 4" N 5° 51' 29" W	14.4	47/50
4	76/93/92	"	15:40	53° 50' 0" N 5° 50' 0" W	19.05	53° 30' 0" N 5° 50' 0" W	11.0	53
5	76/91/73	16 th MAY	08:35	53° 27' 13" N 5° 48' 00" W	12.36	53° 32' 8" N 5° 46' 3" W	9.75	65/49/66

Appendix 2

Specific Notes on Gear and Fish Behaviour

The trawl achieved a mouth opening on hauls 1 and 2 of 15.3m. This with 32.5m sweeps on haul 1 and 36m sweeps on haul 2. The trawl is about 120 meters long with mesh sizes graduated from the mouth to the codend of 5m to 80mm mesh. The meshes (80mm) in the first tapered section were open by about 0.25 to 0.3 of the mesh length.

Hauls 1 & 2

Few fish were observed in the trawl but those that were, comprised whiting/sprat/cod/herring/haddock/gurnard/sandeels. Whiting displayed usual patterns with head first and tail first drifts past either in passive or active mode. Rushes were sometimes attempted at the netting mostly upwards but occasionally down but no escapes were observed. Whiting behaviour in the straight extension was the same except that no observations were made of rushes downwards (perhaps a function of narrowness of the tunnel ie; the narrower the tunnel the more often they push upwards). Their usual "nosing" behaviour was evident with the body angle between 10 to 90 degrees to the top sheet in both passive and active mode. Mesh openings in the straight extension were about 0.1 to 0.2 of the stretched mesh size. No escapes were observed from this section. A few minutes observation at the codend were made with very little fish retained (mostly whiting) and few escapes. Most escapes were swirled around behind the codend in an apparent dead or near dead condition.

A couple of cod were observed to drift back along the lower sheet of both the last tapered and straight section. Usual behaviour patterns were observed with the fish apparently at ease and making few fin movements.

The only escapes observed were those of sandeels and sprat (both less than 10cm). Mostly the escapes were upwards but also sideways with few downwards. Vigorous punching movements were made through the meshes with a typical "burst" of fish through the meshes with quick tailbeats and fast swimming away from the net indicating that they had not been in the trawl long enough to become too exhausted. There were however, many meshed in the 80mm mesh tapered section and in the straight section which may conversely illustrate a degree of tiredness or that the trawl speed was too great for the animals to penetrate through the meshes quickly enough.

Overall there were few fish but it would appear that because the meshes in the last tapered section and the straight extension were generally fairly closed few fish other than very small species could escape. Whiting made escape attempts upwards but did not escape. Small sprat and sandeels escaped through the top and sides of the sections. Cod tended to stay low facing forward. The few haddock in the catch of haul 2 were not observed. Three quarters of a basket of gurnards in haul 2 were not observed.

Haul 3: Views of the square mesh panel which was 3 meters long by 30 bars across and placed about 5m forward of the tapered and straight extension join of the top sheet. No fish

were seen except for very few sprat escaping through the square meshes.

Towing speed = 2.5 to 3kts. Water depth = 46m. 15 to 23m headline height.

Haul 4: Species observed were sprat (mean length 10cm) and herring (mean length 14cm). The sprat were heavily meshed throughout the last two tapered sections on both the top and side sheets. Very good observations were made during a short spell at the codend where sprat and herring escapes were made. The fish made vigorous and upwards escapes. A few were tired but most seemed lively. At the square mesh window few escapes were noted, although when the camera was moved down the port side panel a steady stream of sprat and herring were observed drifting back along the extension. Most were at or below the selvedge level. Why more were not high in the net to encounter the square mesh panel is unknown but it may have been an artifact of them being low at the mouth of the net and staying low during their journey along the lower belly and extension. Certainly during their period in the confined diameter of the straight extension (measured as 1.5m at the front to 0.5m at the rear on the sonar) past the square panel they were spread evenly and making repeated attempts to escape but very few could do so through the closed diamond meshes.

In all areas of the net where the sprat and herring were observed all were swimming forward but being steadily overtaken by the trawl. The few which penetrated the square mesh did so quickly and at high angles to the netting and darted quickly away from the net. Some levelled off after escape and swam for short periods up to 0.6m outside and off the netting but quickly turned and either swam away or stopped or slowed down.

Haul 5

Two square mesh panels inserted in the tapered section and the front of the straight extension displayed different reactions of juvenile sprat and herring. Few escapes occurred from the front panel probably due to the fact that it was part of a large cross section ie; 2.5m to 3m. With steady streams but not large numbers of sprat and herring drifting back few encountered the panel. The aft panel being in a smaller cross section ie; 1m diameter, pushed the fish into a smaller area and this apparently caused them to attempt more escape manoeuvres. As a consequence of the more open square meshes many more escaped along the full length of the square mesh panel. Large numbers of sprat became meshed in the diamond meshes in front of this panel with equal numbers in the lower and upper sheets. This effect became less towards the front of the trawl where, around the first square mesh panel, many fewer meshed fish occurred. The distribution changed to most being in the lower sheet and the side panels with very few in the top sheet. In front of the square mesh panel the meshing reduced rapidly and quickly ran into clean meshes. The sprat and herring were all facing forward and gradually being overtaken by the trawl. Towing speed ranged from 2.5 to 3.0kts.