

DEPARTMENT OF AGRICULTURE FOR N. IRELAND
AQUATIC SCIENCES RESEARCH DIVISION

CRUISE REPORT: LF/14/91

DEMERSAL FISH RECRUITMENT SURVEY, 3-12 JUNE 1991

PERSONNEL

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OBJECTIVES

1. To obtain indices of abundance of 1-year-old whiting, cod and hake for incorporation into predictions of the stock-size and yield of recruited fish in future years;
2. To investigate the diets of predatory fish species in relation to the abundances of their fish prey, with particular emphasis on consumption of juvenile gadoids;
3. To test the trawl data-capture software recently acquired from MAFF in Lowestoft.

CRUISE NARRATIVE

2-3 June: M.R.V. *Lough Foyle* left Belfast harbour at 22h.00 on Sunday 2 June and proceeded towards the first trawl station (83) which was located SE of Portavogie (Fig. 1). The Rockhopper trawl was shot on station 83 at 07h.00 on 3 June, and work proceeded smoothly in light to moderate northerly winds until stations 205 (new), 81, 17 and 87 had also been completed. Station 15 was not fished because of the presence of drift nets in the area.

4 June: Trawl stations 70, 11, 80, 88 and new station 203 off Annalong and Kilkeel were completed in calm weather. Station 11 had to be repeated because the codend was not tightly closed.

5 June: Stations 71, 89 (new), 79, 78 and 73 were successfully fished in the < 50m survey stratum off Dundalk Bay and Drogheda, in moderate SE winds. A boat-drill took place at 16h.30.

6 June: The 50-80m depth stratum off Clogher Head was surveyed, stations 75, 56 and new stations 208, 90 and 91 being successfully fished in 8-14 knot NE winds.

7 June: Two new stations (92 and 93) yielded good catches off Rockabill during the morning. After the second haul, the vessel proceeded towards Dublin and berthed at 12h.45 to take on water.

8 June: *Lough Foyle* departed Dublin at about 08h.00 and proceeded to station 94 (new), 8 miles off Howth. Stations 95 (new), 52 and 50 were then fished in deteriorating sea conditions with southerly winds reaching 28 knots by the afternoon. On completion of station 50 at about 18h.30, the vessel headed for sheltered water off Peel on the Isle of Man to spend the night.

9 June: In the morning the vessel headed southwards again to fish stations 51, 96 (new), 216 (new) and 48, to the SW of the Isle of Man. Sea conditions were rough with SW winds blowing at 25 - 30 knots throughout the day, making for unpleasant working conditions for crew and scientists. Plans to fish station 46 were abandoned, and shelter was sought off Ramsey on the Isle of Man, where the ship lay at anchor during the night.

10 June: With strong NW winds blowing, it was decided that the trawl stations off the Solway Firth, Wigtown Bay and between Luce Bay and the Isle of Man (64, 63 and 61) should be fished rather than attempt the stations off Peel which would have been too exposed. However, with winds reaching 40 knots by midday, station 61 had to be abandoned after 23 minutes and *Lough Foyle* headed to Belfast Lough where she lay at anchor for the night.

11 June: Station 86 off Donaghadee was fished in comparatively calm conditions in the early morning, and it was then decided to cross over to the Isle of Man to fish stations 46 and 97 in the 50-100m survey stratum off the west coast of the Island. These were successfully completed in 35-40 knot southerly winds and the ship then headed back to Belfast Lough where the final station (35) was fished at about 18h.00 local time in calm, sheltered conditions. On completion of the station, the vessel returned to Belfast harbour and docked at approximately 21h.00.

METHODS

CRUISE DESIGN

The cruise was designed on the basis of experience gained in 1988 and 1989 on similar surveys, and many of the trawlable stations identified in those surveys were retained. Due to the strong currents in the North Channel and the poor catches of juvenile gadoids in the deeper water there, this region was excluded from the survey to allow more stations to be occupied in the Western Irish Sea between Ardglass and

Howth, where highest densities of juvenile gadoids have previously been encountered. The region surveyed was divided into <50m and 50-100m depth strata as indicated on Figure 1. Depths in excess of 100m were generally excluded from the survey because of the comparative scarcity of juvenile cod and whiting there, and areas of soft mud were mostly avoided because the trawl gear is not designed for fishing on soft sediments (additional indices of abundance of juvenile gadoids on the muddy regions are however obtained from the Nephrops trawl surveys carried out by ASRD). New trawl stations (numbers 87 and over) were arbitrarily positioned to increase the survey effort in strata where most fish were expected, in order to improve the precision of the abundance estimates, and to avoid leaving large areas unsampled. Several of these new stations were ones occupied by MAFF research vessels during young-fish surveys in previous years (stations 203 - 216).

WORK PLAN

The heavy-duty Rockhopper trawl fitted with a fine-mesh cod-end, was towed for one hour (where possible) at approximately three knots. Each catch was initially sorted on deck to remove all the larger fish, and the mass of small fish and prawns remaining was determined by filling identically-sized baskets and sub-sampling these to determine the species composition. Catch masses and length-frequencies were recorded for all species, and otoliths were removed from samples of cod, whiting and hake for estimating the age-compositions. Stomachs were removed from predatory species and frozen for analysis on shore. Trawl data were captured using the new MAFF data-base, and selected data were also input to a spreadsheet. The MAFF trawl data base proved to be very easy to use and virtually fool-proof.

RESULTS

CATCH COMPOSITIONS

Table 1 gives the positions of each trawl station and the total catch of fish and prawns, and Tables 2 and 3 give the catch rates of selected species. Table 4 and Figures 2 to 4 give standardized catch rates of 1-year-old whiting, cod and hake (preliminary estimates pending otolith readings). The predominant species were whiting and herring, with sprats being abundant off the Mourne coast. Although the catches of one-year-old whiting (10-20 cm) were very variable from tow-to-tow, the average catch-rates were similar between the different survey strata (Table 4). However, catches at the stations deeper than 80m at the southern part of the Nephrops grounds were particularly poor whilst Nephrops catches were relatively high. One-year-old cod (16-40cm long) of the strong 1990 year-class were caught consistently

in fairly low numbers, but were generally most abundant in the southern part of the survey area. Juvenile hake (10-26 cm) were widespread and relatively abundant to as far south as Rockabill.

GEAR PERFORMANCE

The Rockhopper trawl was fished without correctly operating or inoperative tension-meters and wire-out indicators on the winches. Markers spliced onto the warps prior to the cruise were used to measure the amount of wire out, and showed the wire-out indicators to be giving errors of up to four meters for every 100m of wire shot. Without operative tension meters there was always the risk of bursting the net by towing for too long through dense patches of fish or jellyfish.

The Scanmar equipment needed frequent charging with the result that sea temperature at the net was not available for several tows while the batteries were being charged. The hull-mounted temperature sensor was found to give a reading 0.4°C less than obtained with a thermometer dipped in a bucket of water collected from just below the surface on the final day of the survey, indicating that a proper calibration may be needed. Due to the loss of the coastline files for the Microplot system, the latter was not used during the survey. Trawl positions were retrieved and new positions stored on the Shipmate RS2000.

RECOMMENDATIONS

From discussions with the Fishing Master, it is recommended that the following items should receive attention prior to future trawl surveys:

- 1) Replacement of tension and wire-out meters on winches;
- 2) The dimensions of the nets should be measured on a regular basis and adjustments made if necessary to ensure consistent performance from survey to survey;
- 3) The Roxan ground-discrimination system should be brought into service, and calibrated against grab samples.

ACKNOWLEDGEMENTS

Thanks are extended to the Captain, Fishing Master, Officers, Engineers and crew of the Lough Foyle for their willing and friendly assistance at all times during the cruise, and to the Cook and Steward for providing the scientific staff with the necessities of life, in great

style. I would also like to thank the scientific staff for their hard work which for several days had to be done in rough sea conditions.

M.J. Armstrong

[Scientist-in-charge]

TABLE 1. CRUISE LF/14/91 JUNE 1991 DEMERSAL FISH RECRUITMENT SURVEY
 DETAILS OF TRAWL STATIONS and TOTAL CATCH

STN	TIME (GMT)	SHOOTING LAT.	POSN. LONG.	HAULING LAT.	POSN. LONG.	DEPTH (m)	DIST. TOWED (n.m.)	CATCH (kg)
83	5.56	54,23.8	5,18.0	54,20.3	5,17.0	93	3.25	265
205	8.17	54,14.5	5,18.8	54,11.8	5,20.9	66	2.93	186
81	9.56	54,12.0	5,23.9	54,15.3	5,24.4	51	3.03	145
17	13.00	54,08.1	5,30.1	54,05.3	5,33.4	59	3.15	239
87	15.30	54,03.0	5,39.7	54,01.0	5,43.3	49	2.89	119
70	5.47	54,02.3	5,45.2	53,58.8	5,47.0	42	3.10	376
88	7.48	53,59.9	5,40.8	53,57.8	5,38.7	66	3.00	111
11	11.54	53,51.7	5,45.5	53,54.7	5,45.1	59	2.75	127
203	13.55	53,54.5	5,50.7	53,57.6	5,49.7	48	2.98	61
80	15.55	54,01.2	5,52.1	53,59.0	5,52.9	37	2.36	88
71	5.45	53,54.3	5,53.9	53,53.8	5,49.7	47	2.67	286
89	7.44	53,50.3	5,55.6	53,47.5	5,54.4	42	2.86	107
79	9.55	53,40.9	5,58.3	53,44.0	6,01.0	34	2.88	587
78	11.45	53,45.9	6,03.6	53,48.4	6,05.3	29	2.73	153
73	13.27	53,50.2	6,03.8	53,52.5	6,06.2	32	2.71	90
78	5.37	53,50.7	5,44.0	53,48.5	5,46.4	69	2.55	82
75	7.50	53,42.9	5,49.8	53,39.6	5,50.3	60	2.77	71
90	10.10	53,39.3	5,40.2	53,36.5	5,41.5	90	2.65	39
91	12.25	53,33.0	5,47.6	53,30.2	5,46.2	69	2.76	252
56	14.27	53,31.7	5,43.0	53,29.7	5,40.8	75	2.70	361
92	5.37	53,36.5	5,56.2	53,34.3	5,53.6	46	2.70	767
93	8.00	53,31.0	5,50.5	53,28.0	5,49.5	63	2.85	297
94	9.33	53,20.0	5,47.0	53,23.5	5,47.1	55	2.41	1073
95	12.15	53,31.8	5,38.9	52,33.8	5,35.6	96	2.77	50
52	14.04	53,34.6	5,32.1	53,37.4	5,30.8	109	2.87	20
50	16.20	53,44.1	5,20.9	53,47.3	5,20.1	84	3.10	64
51	6.00	53,51.3	4,58.2	53,54.3	4,59.1	81	2.98	305
96	8.42	53,51.8	5,06.3	53,49.5	5,06.9	74	2.60	133
216	11.23	53,55.9	5,12.1	53,58.5	5,09.7	69	2.98	440
48	13.55	53,58.6	4,58.0	54,01.5	4,59.3	65	2.89	220
64	6.05	54,35.0	3,43.5	54,37.9	3,44.1	26	2.83	219
63	9.15	54,37.1	4,11.6	54,35.9	4,17.7	66	3.20	252
61	12.12	54,32.6	4,33.8	54,32.4	4,36.3	52	1.60	74
86	5.45	54,36.4	5,26.4	54,37.9	5,26.9	43	1.85	105
46	10.06	54,11.4	4,57.0	54,09.2	4,55.4	84	2.32	120
97	12.42	54,19.1	4,54.9	54,17.9	4,53.9	80	1.20	68
35	17.14	54,44.3	5,38.0	54,42.9	5,41.1	20	2.80	164

BLE 2

 June 1991 demersal fish recruitment survey (LF/14/91)
 Catches in kg per 3km (approx 1 hour) towed

STN.	DISTANCE TOWED km.	COD	WHITING	HAKE	NORWAY POUT	POOR COD	HERRING	SPRAT
83	3.25	.46	192.92	8.22	1.38	23.54	.00	.00
205	2.93	.41	27.35	35.84	1.64	.90	65.60	44.67
81	3.03	1.09	36.81	1.84	.01	.00	93.85	5.46
17	3.15	.86	107.40	7.52	.53	.00	42.43	40.80
87	2.89	1.45	59.78	.42	.05	.00	4.26	40.43
70	3.10	8.03	66.32	.47	.00	.00	255.48	1.60
88	3.00	.00	2.60	3.65	5.94	.90	64.73	18.27
11	2.75	.00	3.65	2.33	.03	.11	85.40	43.33
203	2.98	.98	14.04	1.70	.00	.13	22.34	15.92
80	2.36	8.40	20.69	1.28	.00	7.40	30.51	.11
71	2.67	.74	32.66	2.48	.00	.03	18.54	258.43
89	2.86	.44	35.66	1.23	.00	.29	4.84	60.31
79	2.88	.26	549.17	2.75	.00	.58	38.10	25.98
78	2.73	.49	63.19	.37	.00	.00	1.55	82.42
73	2.71	.00	37.42	1.39	.00	.02	17.63	30.72
208	2.55	.64	21.81	1.38	.26	.02	2.79	62.35
	2.77	1.43	21.90	2.99	19.09	.18	6.17	17.57
90	2.65	3.22	8.78	.18	8.21	.45	2.94	.17
91	2.76	12.97	125.65	.00	22.73	5.27	54.28	.00
56	2.70	6.57	151.89	.00	28.04	18.08	162.57	.00
92	2.70	7.94	728.89	.91	6.91	2.74	.00	.00
93	2.85	9.60	55.49	1.06	41.22	35.22	15.75	.00
94	2.41	19.03	222.82	.67	35.32	8.04	278.84	.00
95	2.77	.04	.58	.00	.36	.48	1.47	.10
52	2.87	.29	.43	1.79	.27	.50	.75	.02
50	3.10	2.66	.82	26.32	3.49	4.15	.16	.02
51	2.98	14.65	97.43	11.35	18.12	51.24	19.61	.00
96	2.60	12.42	41.85	14.88	36.92	6.89	13.94	.00
216	2.98	1.21	11.09	7.88	9.21	2.80	319.33	68.05
48	2.89	5.81	15.29	30.26	.31	102.49	5.07	.00
64	2.83	1.58	129.86	.00	.23	10.60	7.00	6.47
63	3.20	5.31	22.63	.71	.01	7.59	.76	.20
61	1.60	5.44	2.63	.00	.00	.24	2.12	.00
86	1.85	21.21	98.12	.00	.00	1.88	19.78	.00
46	2.32	.54	85.99	19.25	10.58	6.92	9.13	.00
97	1.20	1.50	129.25	7.23	7.65	4.15	4.63	.00
35	2.80	1.09	27.42	1.40	4.70	.12	62.68	.99

BLE 3

June 1991 demersal fish recruitment survey (LF/14/91)
 Catches in kg per 3 km (approx 1 hour) towed

STN.	distance towed km	DAB	PLAICE	HAD- DOCK	GUR- NARDS	SPUR DOGFISH	L.SP. DOGFISH	NEPHROPS
83	3.25	.00	.16	.57	.59	.83	.92	12.46
205	2.93	.58	.23	.00	2.58	1.77	6.37	.40
81	3.03	.05	.21	.00	.11	.00	3.44	.14
17	3.15	1.13	.00	.00	1.26	.00	.23	.24
87	2.89	.16	7.97	.10	.19	.00	.00	.00
70	3.10	1.25	6.77	15.97	.15	.00	2.86	.00
88	3.00	.22	.00	.00	.67	.00	9.00	.02
11	2.75	1.27	.00	.00	.41	.00	.89	.08
203	2.98	.38	.29	.00	.33	.00	4.00	.00
80	2.36	.37	12.55	.13	.17	.00	20.11	.00
71	2.67	.42	.42	.00	.42	.00	3.00	.00
89	2.86	.45	4.93	.00	.63	.00	1.09	.06
79	2.88	3.46	12.57	.00	.61	.00	6.65	.00
78	2.73	1.20	9.03	.00	1.24	.00	5.08	.02
73	2.71	.38	3.48	.00	.19	.00	6.06	.01
78	2.55	.36	.16	.08	4.72	.00	.00	.41
75	2.77	.19	.19	.00	.38	.00	.00	.05
90	2.65	.00	.00	.00	.00	.00	.00	19.25
91	2.76	10.00	24.20	.10	.82	.00	.00	.34
56	2.70	14.31	6.17	.00	3.01	.00	.00	1.31
92	2.70	8.58	40.24	.00	4.40	.00	30.00	.00
93	2.85	14.06	80.59	3.27	14.61	.00	25.26	.52
94	2.41	6.10	68.84	.00	6.81	.00	.86	.00
95	2.77	.23	.31	.00	.09	.00	.00	49.05
52	2.87	.00	.00	.00	.14	.00	.00	16.72
50	3.10	.00	.00	.00	4.78	.00	.00	16.45
51	2.98	5.17	3.83	32.96	20.04	.00	13.70	.95
96	2.60	.70	7.95	.57	11.70	.00	.00	.35
216	2.98	.00	4.49	.00	15.30	.00	.00	1.45
48	2.89	.00	.00	15.26	1.54	.00	38.85	.00
64	2.83	30.46	22.81	.00	2.55	.00	2.97	.00
63	3.20	1.34	15.19	5.28	.92	.00	147.19	.00
61	1.60	.00	.00	.00	.39	90.00	27.94	.00
86	1.85	.83	1.39	.21	.50	.00	11.35	.00
46	2.32	.84	1.88	.00	.61	7.42	1.14	5.17
97	1.20	.43	4.35	.00	.80	.00	.00	1.68
35	2.80	1.83	14.73	1.21	1.73	.00	53.57	.19

BLE 4. cruise LF/14/91: Nos. 1-yr-old gadoids per 3 n.miles towed

station	raising factor	catch (nos)			catch per 3 nm towed		
		whiting	cod	hake	whiting	cod	hake
STRATUM 1: BELFAST LOUGH - STRANGFORD NARROWS <100m							
83	.923	3585	1	9	3308.96	.92	8.31
86	1.622	342	76	0	554.72	123.27	.00
35	1.071	304	8	29	325.58	8.57	31.06
mean					1396.42	44.25	13.12
CV					.69	.89	.71
STRATUM 2: IRISH SEA WEST < 50m							
81	.99	1085	6	50	1074.15	5.94	49.50
87	1.038	1009	7	9	1047.34	7.27	9.34
70	.968	1099	12	12	1063.83	11.62	11.62
203	1.007	278	3	35	279.95	3.02	35.25
80	1.271	118	15	6	149.98	19.07	7.63
71	1.124	599	3	32	673.28	3.37	35.97
89	1.049	836	3	25	876.96	3.15	26.23
79	1.042	8012	3	37	8348.50	3.13	38.55
83	1.099	1207	2	4	1326.49	2.20	4.40
73	1.107	664	0	16	735.05	.00	17.71
92	1.111	14588	21	0	16207.27	23.33	.00
mean					2889.35	7.46	21.47
CV					.52	.30	.23
STRATUM 3: IRISH SEA WEST 50-100 m							
205	1.024	569	2	349	582.66	2.05	357.38
17	.952	2578	4	70	2454.26	3.81	66.64
88	1	41	0	48	41.00	.00	48.00
11	1.091	98	0	51	106.92	.00	55.64
208	1.176	387	4	26	455.11	4.70	30.58
75	1.083	363	8	42	393.13	8.66	45.49
91	1.087	2455	13	0	2668.59	14.13	.00
56	1.111	2823	5	0	3136.35	5.56	.00
93	1.053	188	46	0	197.96	48.44	.00
94	1.245	2601	32	0	3238.25	39.84	.00
90	1.132	212	0	3	239.98	.00	3.40
95	1.083	17	0	0	18.41	.00	.00
mean					1127.72	10.60	50.59
CV					.34	.44	.57
STRATUM 4: IRISH SEA EAST 50-100 m							
51	1.007	1546	4	32	1556.82	4.03	32.22
96	1.154	825	2	14	952.05	2.31	16.16
216	1.007	274	4	19	275.92	4.03	19.13
48	1.038	184	2	2	190.99	2.08	2.08
46	1.293	965	2	69	1247.75	2.59	89.22
97	2.5	1301	3	20	3252.50	7.50	50.00
50	.968	15	1	4	14.52	.97	3.87
mean					1070.08	3.36	30.38
CV					.40	.24	.38
STRATUM 5: IRISH SEA NE <50m							
64	1.06	1541	8	0	1633.46	8.48	.00
63	.937	39	12	0	36.54	11.24	.00
61	1.875	0	3	0	.00	5.63	.00
mean					556.67	8.45	.00
CV					1.68	.33	



