

CRUISE REPORT: CRUISE LF1198 DEMERSAL FISH SURVEY

VESSEL. R V *Lough Foyle* (DANI)

DATES. 9 March - 19 March 1998

AREA OF OPERATION Irish Sea (North); ICES Division VIIa

TYPE OF SURVEY: Otter trawl

OBJECTIVES

1. To obtain information on spatial patterns of abundance of different size- and age-classes of demersal fish in the northern Irish Sea.
2. To obtain abundance indices for the ICES assessments of whiting, haddock, cod and herring.
3. To quantify external parasite loads in whiting and cod, by area.
4. To collect data and samples of sprat and juvenile herring for population / feeding study
5. To collect samples of flatfish for a feeding study at Port Erin Marine Laboratory
6. To record quantities of marine litter in trawl catches.
7. To collect tissue samples from cod for genetics study at the University of Hull.
8. To collect samples of dabs for contaminant analysis.

PERSONNEL

R. Briggs	DANI	(SIC) 9-14 Mar
M. Armstrong	DANI	(SIC) 15-20 Mar
W McCurdy	DANI	
M. McAliskey	DANI	
J. Peel	DANI	
R. Snyder	QUB	
F. Amezcua	PEML	

METHODS

A commercial Rockhopper trawl fitted with a 20 mm (stretched mesh) liner in the cod-end was towed over three nautical miles where possible at the stations shown in Figure 1. Gear and towing procedures were those employed on all previous DANI groundfish surveys. A stratified survey design with fixed station positions was employed. The survey area was divided into seven strata defined by depth and substratum, as shown in Fig 1. The species composition of the catch at each station was determined, and length-frequencies were recorded for each species. Sub-samples of cod, whiting, haddock and hake were taken for recording length, mass, sex and maturity stage, and for removal of otoliths for ageing. The level of infestation of whiting and cod by external parasites was estimated from the length-frequency

and biological samples collected at each station. Samples of large dabs were collected at selected stations and frozen for contaminant analysis. Samples of different species of flatfish were also collected for a feeding study at Port Erin Marine Laboratory. Sprats and juvenile herring were frozen for a feeding / population study at Queen's University. Quantities of different types of marine litter in each trawl catch were recorded. Pelvic fin tissue was removed from mature and immature cod in the western and eastern Irish Sea (up to 100 fish from each area), and preserved in ethanol for DNA analysis at Hull University.

CRUISE NARRATIVE

Monday 9 March

R.V. *Lough Foyle* departed Belfast Harbour at 06.00 and proceeded to station 35 (Fig. 1) where the trawl was shot at 07.46. This was followed by stations 83, 86, 97 and 46. The night was spent dodging off Peel, IOM.

Tuesday 10 March

Station 99 was fished in 20mph winds. Further deterioration in the weather resulted in fishing operations being suspended for the rest of the morning. An improvement in weather allowed the net to be shot at station 101 at 14h.07. This was followed by stations 81 and 17. The night was spent at anchor sheltering from strong NW winds in Dundrum Bay.

Wednesday 11 March

Improved weather accompanied by the shelter offered by the land enabled inshore station 100 to be fished. This was followed by stations 70, 88, 216, 96 and 51. The night was spent at anchor in Port St Mary Bay.

Thursday 12 March

Stations 48, 50, 208, 71 and 73 were completed and the night was spent at anchor in Dundalk Bay.

Friday 13 March

Trawl stations 79, 75 and 92 were completed in fine weather conditions. The vessel was then berthed in Dublin for the mid-cruise break.

Sunday 15 March

Stations 94, 56, 93 and 90 were fished in 10 - 15 mph westerly winds. The vessel then dodged in the vicinity of station 103 for the night.

Monday 16 March

Stations 103, 105, 102, 77 and 76 were completed in light to moderate SW winds. On completion of station 76, samples of frozen flatfish were off-loaded at Douglas using the inflatable work-boat. The vessel then proceeded overnight to station 245

Tuesday 17 March

Stations 245, 246 and 249 were fished in light to moderate westerly winds. The survey was then interrupted to put one of the ship's officers ashore at Douglas, IOM, due to a bereavement. The vessel remained at anchor off Douglas harbour during the night

Wednesday 18 March

Stations 243, 242, 250, 259 and 257 were completed in good conditions. On completion of work the ship was anchored at Ramsey for the night

Thursday 19 March.

Four stations (258, 64, 256 and 63) were successfully completed in calm to slight sea conditions. The bottom sheet and wing of the net were torn at station 61 resulting in a very small catch. On completion of the survey at station 61, the *Lough Foyle* was returned to Belfast, berthing during the evening.

WORK COMPLETED

A total of 44 hauls were completed, with one lost due to gear damage (Fig. 1). Positions of trawl stations are given in Table 1. The trawl gear fished well throughout the survey. The width of seabed swept by the trawl doors increased from around 35m in shallow water (30m sounding) to around 45m in deeper water (80m sounding), with variations due to tidal flow. An average headline height of 2.5 - 3.0 metres off the seabed was recorded. These trawl parameters were consistent with previous surveys.

Length measures were carried out on all fish species at each station. Catch weights were recorded for most invertebrates. In addition, a total of 396 cod, 1100 whiting, 750 haddock and 46 hake were analysed for length, mass and maturity and age. Samples of cod and whiting taken for length frequency and biological analysis were screened for parasites. A record was kept of quantity and type of marine litter in each catch. A sample of large dabs at selected stations was frozen for contaminant analysis. A sample of the remaining dabs and the other flatfish species was frozen for a feeding study at Port Erin Marine Laboratory. DNA tissue samples were collected from 100 cod from the western Irish Sea and 100 from the east. Samples of sprats and juvenile herring were taken for analysis of diet and population structure. Trawl data and length frequencies were archived using the groundfish survey data base.

PRELIMINARY RESULTS

The overall catch-rates of selected species are given in Table 2. Length distributions of whiting in selected survey strata are shown in Figure 2. Length compositions of whiting, cod, haddock, plaice and herring averaged over survey strata and weighted by areas of the strata are shown in Fig. 3. Catch rates of whiting and haddock above the minimum landing size (MLS) are shown in Table 3, and the time series of survey estimates for these species are shown in Fig. 4. Preliminary indices of abundance of one-year-old cod, whiting and haddock are given in Table 4.

One-year-old whiting of the 1997 year class (fish < 20 cm long) were abundant in the western Irish Sea. The preliminary index for one-year-olds shows the 1997 year class to be close to average. Whilst the catch rates of whiting above the minimum landing size of 27cm were very poor off the Irish coast, they were much higher off the English coast (stratum 6; Table 3). Overall, the abundance of whiting of commercial size has fluctuated randomly over the survey series, with no definite trend (Fig. 4). Haddock were widespread due to the substantial growth of the stock during the 1990s which has been followed closely during this survey series. Catch rates of haddock above the MLS were lower than in 1997 but similar to those recorded in 1996 (Fig. 4), and were dominated by fish of the very strong 1996 year class (20 - 35 cm fish; Fig. 3). Spawning by haddock was widespread. The preliminary index for one-year-old haddock indicates that the 1997 year class is much weaker than the 1994 and 1996 year classes (Table 4). Catches of cod were dominated by 2-year-old fish of the 1996 year class (34 - 50 cm fish; Fig. 3), which were most abundant in the eastern Irish Sea. One-year-old cod were scarce, confirming the results of the October 1997 survey which showed the 1997 year class to be weak (Table 4). Young herring were abundant in the catches in the western Irish Sea. Plaice were caught over a wide area, with highest catch rates close to the Irish and English coasts. The length distributions from the two areas were similar, with a slightly higher mean length in the east (Fig. 3).

Data collected during cruise LF1198 will be incorporated in the stock assessments of Irish Sea cod, whiting and haddock at the ICES Northern Shelf Working Group in June 1998, and in the ICES assessment of herring in March 1999.

ACKNOWLEDGMENTS

The Master and personnel of the *Lough Foyle* are thanked for their cooperation throughout the cruise and for ensuring efficient and consistent trawling operations. The scientific personnel are thanked for the very thorough work completed.

Signed:

Scientist - in charge: M. J. Armstrong date 19/3/98

Ships master: [Signature] date 19.3.1998

Head, AESD Aquatic Systems: A. J. Henry date 30.3.98

Table 1 Details of trawls during cruise LF1198

(Time in G.M.T.)

Date	Station	Time shot	Shooting position		Hauling position		Mean Depth (m)	Distance towed (nm)
			Latitude	Longitude	Latitude	Longitude		
09-Mar	35	07h.46	54 42.83	5 41.53	54 43.70	5 36.47	19.5	3.04
	83	10h.03	54 37.72	5 26.95	54 34.80	5 25.37	44.0	3.07
	86	12h.44	54 23.41	5 17.79	54 20.35	5 16.82	84.5	3.00
	97	15h.16	54 20.85	4 55.67	54 18.00	4 53.00	75.0	3.00
	46	17h.14	54 12.90	4 56.54	54 10.32	4 59.24	82.5	3.00
10-Mar	99	07h.08	54 7.51	5 1.17	54 5.16	5 4.19	80.5	3.00
	101	14h.07	54 7.52	5 19.25	54 4.56	5 18.94	96.5	3.00
	81	16h.17	54 11.98	5 24.07	54 15.01	5 23.33	47.0	3.00
	17	18h.19	54 8.61	5 29.92	54 6.28	5 32.93	51.0	3.00
11-Mar	100	07h.31	54 11.32	5 41.39	54 8.26	5 40.78	27.5	3.00
	70	9h.28	54 1.80	5 45.50	53 58.80	5 44.78	43.5	3.00
	88	10h.58	53 59.22	5 40.68	53 59.69	5 35.70	56.0	3.00
	216	13h.39	53 54.01	5 14.96	53 56.31	5 11.83	79.5	3.00
	96	15h.30	53 52.08	5 6.78	53 49.23	5 5.10	66.5	3.00
	51	17h.35	53 51.76	4 58.21	53 54.52	4 59.92	73.5	3.00
12-Mar	48	07h.35	54 0.53	4 59.67	53 57.76	4 57.73	53.0	3.00
	50	10h.37	53 46.42	5 20.28	53 43.57	5 22.14	80.5	3.00
	208	13h.23	53 48.26	5 45.18	53 49.71	5 49.72	58.0	3.00
	71	15h.29	53 53.03	5 52.13	53 54.43	5 56.60	38.5	3.00
	73	17h.52	53 51.69	6 5.53	53 48.90	6 4.01	26.5	3.00
13-Mar	79	07h.00	53 43.81	6 0.50	53 41.12	5 58.7	30.5	3.00
	75	08h.52	53 42.4	5 50.29	53 39.41	5 50.9	55.0	3.00
	92	10h.55	53 36.8	5 56.76	53 34.16	5 54.1	40.5	3.00
15-Mar	94	10h.00	53 22.3	5 46.0	53 25.3	5 47.4	86	3.00
	56	12h.02	53 30.1	5 38.8	53 30.2	5 44.1	74	3.00
	93	13h.51	53 29.0	5 48.8	53 31.9	5 50.2	73	3.00
	90	16h.05	53 38.0	5 42.2	53 35.1	5 40.2	83	3.02
16-Mar	103	07h.07	53 33.3	5 25.9	53 36.0	5 23.4	84	3.00
	105	09h.53	53 40.8	5 5.8	53 42.9	5 2.1	73	3.00
	102	12h.16	53 44.1	4 39.0	53 46.9	4 40.8	63	3.00
	77	13h.55	53 48.6	4 45.0	53 50.6	4 41.2	90	3.00
	76	16h.25	53 59.3	4 28.9	54 0.6	4 25.0	41	2.60
17-Mar	245	06h.56	53 31.4	4 16.7	53 30.0	4 12.1	41	3.00
	246	09h.15	53 28.4	3 48.7	53 29.1	3 43.8	32	3.00
	249	12h.10	53 45.9	3 41.1	53 48.0	3 45.0	40	3.01
18-Mar	243	07h.10	53 47.2	4 7.3	53 49.3	4 11.0	43	3.00
	242	09h.55	54 4.6	4 1.5	54 7.6	4 2.5	32	3.00
	250	12h.35	54 3.7	3 37.8	54 6.5	3 39.9	32	3.00
	259	14h.35	54 15.0	3 42.0	54 17.9	3 43.3	38	3.00
	257	16h.30	54 23.2	3 44.3	54 26.1	3 46.1	30	3.00
19-Mar	258	06h.35	54 18.5	3 56.6	54 21.4	3 56.9	34	3.00
	64	09h.03	54 34.3	3 46.4	54 36.7	3 43.5	18	3.00
	256	11h.02	54 38.4	3 54.5	54 36.6	3 58.6	32	3.00
	63	13h.00	54 37.4	4 10.1	54 36.4	4 15.0	57	3.00
	61	—invalid tow— net torn—						

STRATUM 1	Stn. 35	Stn. 86	Stn. 83
Cod	1.98	15.76	9.30
Whiting	399.00	349.16	220.29
Hake	0.00	0.00	0.62
Haddock	2.14	10.69	10.46
Norway Pout	0.00	0.00	3.47
Poor cod	0.34	0.70	14.56
Herring	450.50	0.00	0.72
Sprat	21.28	0.00	0.24
Plaice	5.53	1.49	0.66
Dab	0.10	0.00	0.10
Flounder	0.00	0.00	0.00
Anglerfish	1.69	0.76	4.81
Gurnards	2.47	0.81	0.55
Less. sp. dogfish	0.00	8.70	0.00
Nephrops	0.00	0.00	29.75

STRATUM 2	Stn. 81	Stn. 100	Stn. 70	Stn. 71	Stn. 73	Stn. 79	Stn. 92
Cod	1.67	1.30	14.49	1.13	3.57	0.00	2.00
Whiting	112.22	363.60	280.88	251.71	365.36	155.54	395.19
Hake	0.11	0.00	1.15	0.63	0.00	0.00	0.24
Haddock	0.66	259.60	47.00	30.92	97.05	12.98	163.26
Norway Pout	0.18	0.00	6.44	0.15	0.05	0.00	0.50
Poor cod	5.68	0.51	0.70	1.75	0.14	0.00	0.66
Herring	368.17	49.68	151.42	794.05	116.10	390.30	249.36
Sprat	0.00	0.05	11.77	21.73	52.99	4.24	0.21
Plaice	1.28	104.52	18.43	6.36	344.28	47.57	38.72
Dab	0.74	151.29	37.41	6.61	205.70	65.63	41.19
Flounder	0.00	9.68	0.00	0.45	10.07	0.42	0.00
Anglerfish	0.00	0.00	1.24	0.00	0.00	0.00	0.00
Gurnards	0.79	0.78	0.81	0.74	0.42	0.49	4.13
Less. sp. dogfish	0.00	3.40	0.00	0.00	3.66	0.00	0.00
Nephrops	18.21	2.94	0.06	0.50	19.46	8.43	8.01

STRATUM 3	Stn. 101	Stn. 17	Stn. 88	Stn. 208	Stn. 75	Stn. 90	Stn. 56	Stn. 93	Stn. 94
Cod	8.22	3.20	24.43	6.80	4.14	13.64	2.50	14.61	5.38
Whiting	130.15	125.59	112.13	161.35	197.60	66.92	116.50	117.70	86.54
Hake	1.19	1.34	1.16	1.45	0.82	0.07	0.00	0.00	0.00
Haddock	11.39	5.28	13.00	4.61	19.69	12.28	28.30	68.27	11.70
Norway Pout	3.46	5.76	51.68	7.17	0.98	0.74	0.51	1.50	1.03
Poor cod	6.26	6.27	6.76	3.82	0.69	0.79	1.15	3.72	5.99
Herring	16.10	113.32	233.09	801.97	85.50	2.74	12.88	10.54	1.45
Sprat	0.86	0.16	0.69	2.01	1.21	0.22	0.18	0.18	0.04
Plaice	0.18	1.26	2.49	1.94	7.79	0.55	8.56	3.23	11.36
Dab	0.03	8.76	6.88	2.30	5.06	0.20	0.28	0.31	0.23
Flounder	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anglerfish	1.76	0.00	0.56	4.53	0.00	0.00	0.00	0.00	0.00
Gurnards	20.07	0.93	6.84	4.46	1.71	0.14	0.03	0.03	0.02
Less. sp. dogfish	0.01	0.00	0.00	0.00	0.37	0.00	0.00	0.01	4.18
Nephrops	20.20	16.97	2.62	14.72	7.75	0.39	3.78	1.89	0.00

ite 2 continued

STRATUM 4	Stn. 97	Stn. 46	Stn. 99	Stn. 216	Stn. 51	Stn. 96	Stn. 50	Stn. 48	Stn. 103
Cod	7.31	4.51	13.65	44.46	8.57	33.75	1.47	29.15	15.30
Whiting	136.52	95.86	131.94	120.16	186.60	571.00	63.34	502.70	88.80
Hake	5.46	2.29	1.43	3.16	0.00	1.05	0.20	0.00	2.03
Haddock	72.88	8.10	55.10	77.28	70.80	31.14	15.71	203.80	61.16
Norway Pout	19.20	9.18	41.71	33.72	16.04	57.82	5.47	19.79	4.79
Poor cod	10.23	5.91	5.96	3.23	1.60	7.30	2.35	42.12	2.44
Herring	5.73	1.51	2.39	10.36	0.86	8.16	16.65	75.48	2.18
Sprat	0.15	0.17	0.02	0.08	0.27	0.05	1.06	0.07	0.30
Plaice	1.67	1.68	2.22	3.40	5.63	5.34	1.49	4.76	5.88
Dab	0.52	0.30	0.08	1.18	26.18	5.34	0.38	3.03	0.11
Flounder	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anglerfish	4.45	0.00	1.48	0.12	0.86	0.00	0.00	0.20	1.19
Gurnards	6.56	1.64	34.00	39.89	11.03	48.90	51.48	4.60	15.15
Less. sp. dogfish	1.76	0.15	1.07	0.00	9.56	0.00	3.07	49.28	0.00
Nephrops	8.96	22.55	38.65	13.56	0.81	17.89	10.06	0.00	0.00

STRATUM 6	Stn. 256	Stn. 64	Stn. 257	Stn. 258	Stn. 259	Stn. 242	Stn. 250	Stn. 249	Stn. 246
Cod	3.12	0.60	10.90	17.50	20.10	23.60	25.90	11.20	0.94
Whiting	19.50	203.00	137.00	197.00	29.90	1001.00	440.00	312.00	1147.00
Hake	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Haddock	0.80	0.00	1.85	0.13	0.00	83.10	0.11	6.85	0.00
Norway Pout	0.00	0.00	0.00	1.13	0.00	0.00	0.00	0.01	0.07
Poor cod	0.41	0.06	2.53	2.04	2.79	0.57	3.06	2.64	8.35
Herring	7.11	1.26	2.69	69.00	3.47	25.70	15.80	8.58	16.68
Sprat	6.04	54.00	1.75	11.50	0.01	176.00	3.08	0.03	0.23
Plaice	2.21	16.00	19.00	36.90	4.63	61.20	9.20	5.92	101.00
Dab	0.80	6.97	14.50	24.50	18.40	9.89	164.00	16.60	238.00
Flounder	1.58	6.00	5.45	9.82	0.09	11.20	4.16	5.22	10.40
Anglerfish	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gurnards	0.02	0.37	0.06	0.79	0.24	2.38	0.51	0.20	6.20
Less. sp. dogfish	11.20	17.90	0.21	0.70	0.00	111.00	2.33	12.40	32.90
Nephrops	0.00	0.22	26.40	7.62	5.24	0.00	23.20	0.00	0.00

STRATUM 7	Stn. 105	Stn. 77	Stn. 102	Stn. 76	Stn. 243	Stn. 245
Cod	7.70	7.73	19.85	1.85	14.30	8.14
Whiting	22.13	60.15	48.97	26.28	12.90	32.09
Hake	0.00	0.00	0.00	0.00	0.00	0.00
Haddock	24.08	18.08	34.04	30.26	2.22	2.19
Norway Pout	0.03	0.15	0.14	0.03	0.01	2.11
Poor cod	0.89	4.31	2.86	8.83	2.03	4.71
Herring	0.32	1.26	0.30	6.65	6.00	4.25
Sprat	0.23	1.25	1.17	0.02	0.03	0.21
Plaice	16.60	3.55	5.03	0.50	0.88	1.43
Dab	0.74	0.17	0.03	0.00	0.53	0.52
Flounder	0.00	0.00	0.00	0.00	12.00	46.29
Anglerfish	0.00	0.00	0.00	2.83	0.00	0.00
Gurnards	71.39	7.44	24.89	30.38	8.06	1.13
Less. sp. dogfish	0.00	5.10	7.17	8.03	72.50	34.42
Nephrops	0.00	0.00	0.00	0.00	0.00	0.00

STRATUM 5	Stn. 63	Stn. 61
	35.90	
	13.80	
	0.00	
	26.92	
	0.07	
	20.09	
	18.26	
	0.00	
	4.62	
	0.04	
	0.49	
	0.00	
	0.93	
	76.90	
	0.00	

ble 3 Catches in kg per 3 nautical miles (approx 1 hour) towed, for fish below and at or above the minimum landing size of 27 cm (whiting) and 30 cm (haddock) during cruise LF1198.

STRATUM	STATION	WHITING		HADDOCK	
		below MLS	above MLS	below MLS	above MLS
1	35	399.0	0.0	2.1	0.0
	86	246.3	102.8	8.9	1.8
	83	206.5	13.8	0.7	9.7
2	81	95.9	16.3	0.7	0.0
	100	331.4	32.2	237.2	22.5
	70	272.4	8.5	46.5	0.5
	71	241.1	10.6	26.9	4.0
	73	349.0	16.3	85.1	11.9
	79	151.3	4.2	9.5	3.5
	92	386.9	8.3	106.0	57.2
3	101	124.2	5.9	4.1	7.3
	17	121.7	3.9	2.7	2.6
	88	106.7	5.4	3.7	9.3
	208	160.3	1.0	0.0	4.6
	75	196.6	1.0	3.9	15.8
	90	66.1	0.9	0.7	11.5
	56	113.4	3.2	12.3	16.0
	93	116.0	1.7	27.5	40.8
	94	85.6	0.9	3.9	7.8
4	97	109.4	27.1	6.2	66.7
	46	89.6	6.2	0.2	7.9
	99	123.8	8.2	3.9	51.2
	48	261.9	240.8	113.3	90.4
	216	114.0	6.2	1.3	75.9
	51	139.5	47.1	15.6	55.2
	96	544.4	26.6	1.9	29.3
	50	61.8	1.6	0.7	15.0
	103	85.7	3.1	5.4	55.8
	5	63	9.4	4.4	7.9
61					
7	77	51.9	8.3	4.1	14.0
	102	44.7	4.3	9.6	24.5
	76	6.8	19.5	11.2	19.1
	243	7.0	6.0	0.0	2.2
	245	20.4	11.7	0.5	1.7
	105	19.7	2.4	5.1	19.0
6	246	815.0	332.0	0.0	0.0
	242	670.6	329.9	2.7	80.4
	249	212.1	100.2	0.3	6.5
	250	212.1	228.4	0.1	0.0
	258	142.0	54.9	0.1	0.0
	259	23.2	6.7	0.0	0.0
	257	107.6	29.0	0.0	1.9
	256	16.3	3.2	0.4	0.4
	64	143.1	59.7	0.0	0.0
Mean: Strata 2 - 4		177.9	19.5	28.8	26.5

ble 4 Preliminary indices of abundance of 0-group and 1-group cod, whiting and haddock from cruise LF1198, based on length frequency data only. Data are mean numbers caught per 3 nautical miles towed. Indices from previous March surveys covering the eastern and western Irish Sea are also given. Indices for autumn surveys are given in Table (b).

(a) March surveys

SURVEY	COD		WHITING		HADDOCK	
		1-gp		1-gp		1-gp
1992		23.4		1477		15.3
1993		1.7		667		1.4
1994		13.8		1790		6.4
1995		7.1		1696		248.0
1996		11.3		1478		10.7
1997		5.4		1419		250.0
LF1198 1998		1.7		1512		36.0

(b) Autumn surveys

SURVEY	COD		WHITING		HADDOCK	
	0-gp	1-gp	0-gp	1-gp	0-gp	1-gp
1991					175 ¹	
1992	0.6	10.8	1454	995	1	7.8
1993	7.9	5.5	1554	425	45	1.0
1994	13.3	9.5	2450	686	567	11.4
1995	7.8	12.1	3199	483	17	102.0
1996	14.8	4.8	2628	605	1433	11.7
1997	4.2	13.0	3242	n/a	161	401.0

1. Assuming zero abundance in eastern Irish Sea

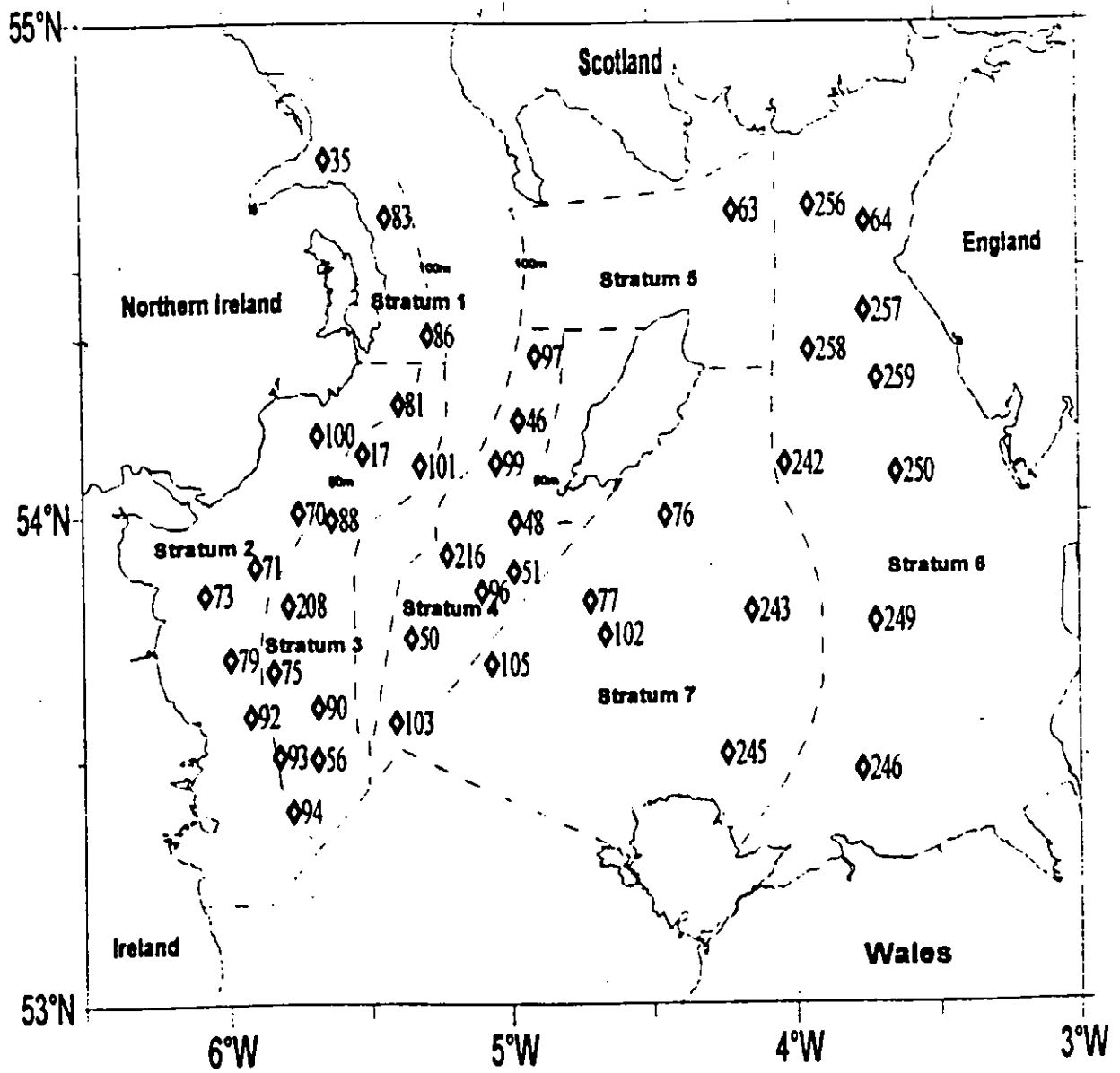


Fig. 1 Positions of trawl stations fished in cruise LF1198

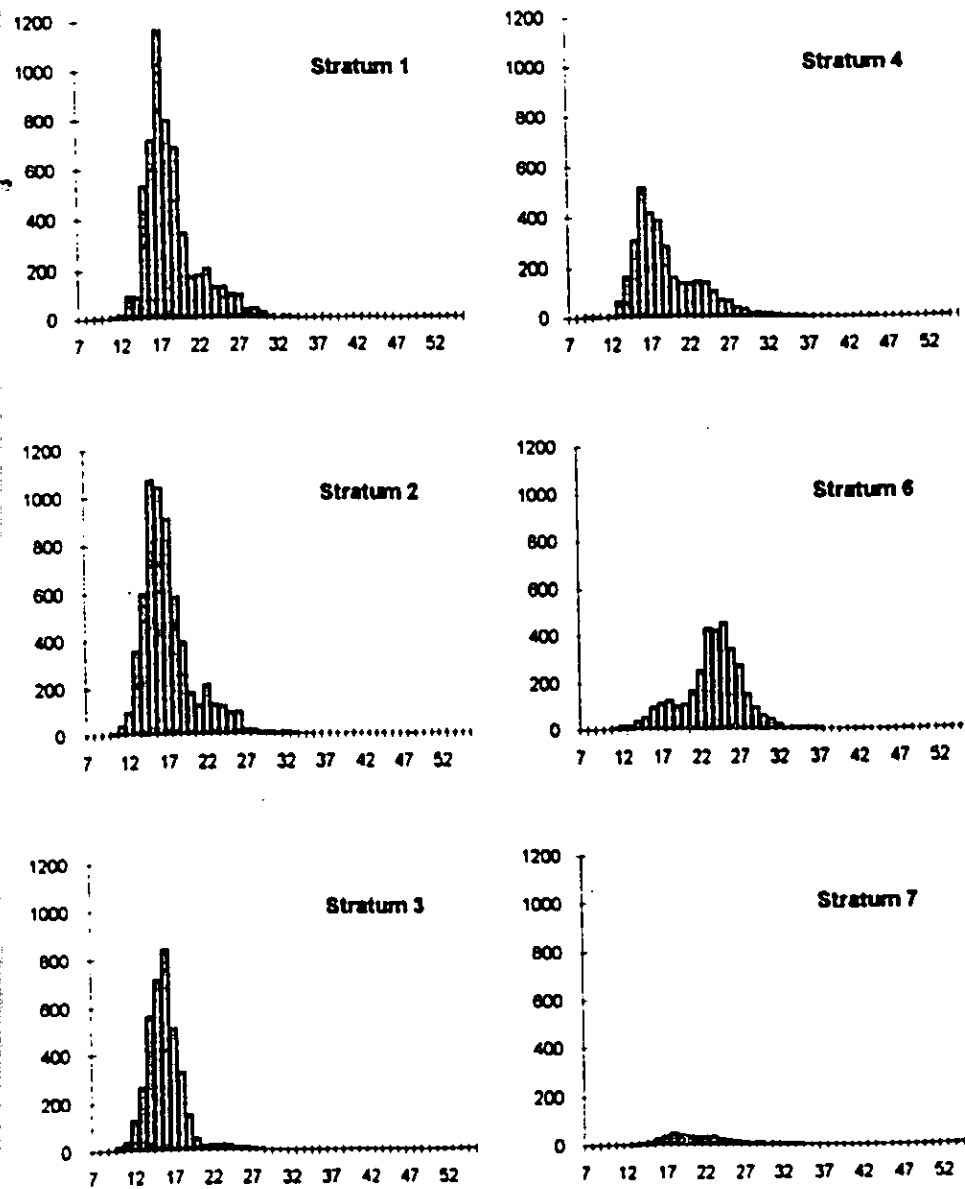


Fig. 2 Length distributions of whiting in strata 1 to 7 (excluding 5) during cruise LF1198. Figures are numbers caught per 3 miles towed. Length classes are in cm.

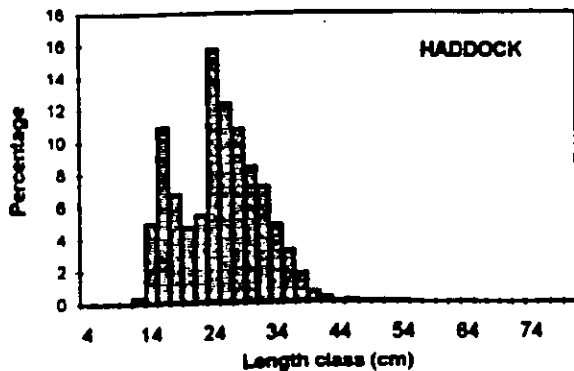
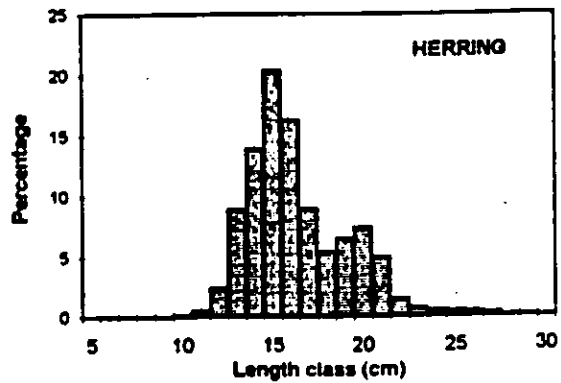
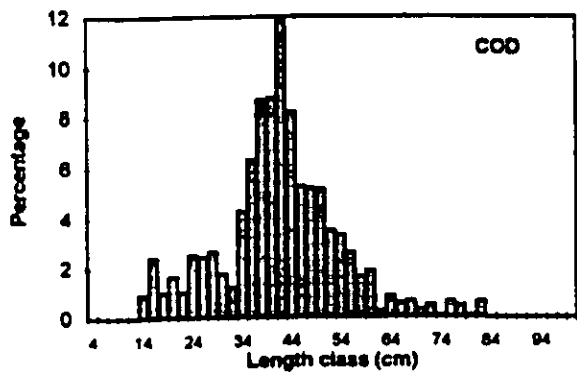
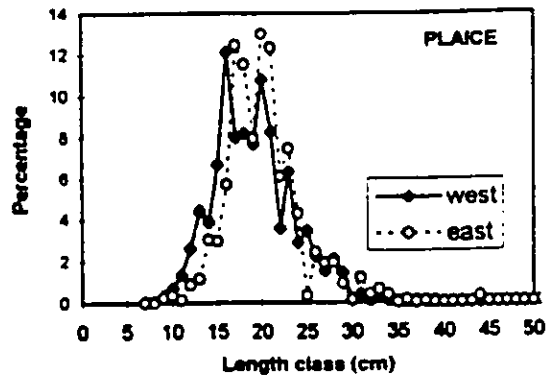
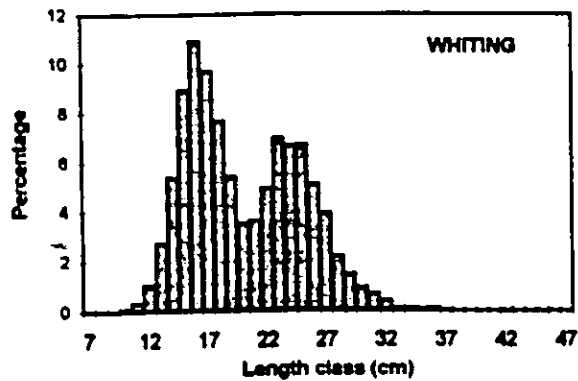


Fig. 3 Average percentage length compositions of whiting, cod, haddock, plaice and herring during cruise LF1198. Data for plaice are shown for the western and eastern Irish Sea.

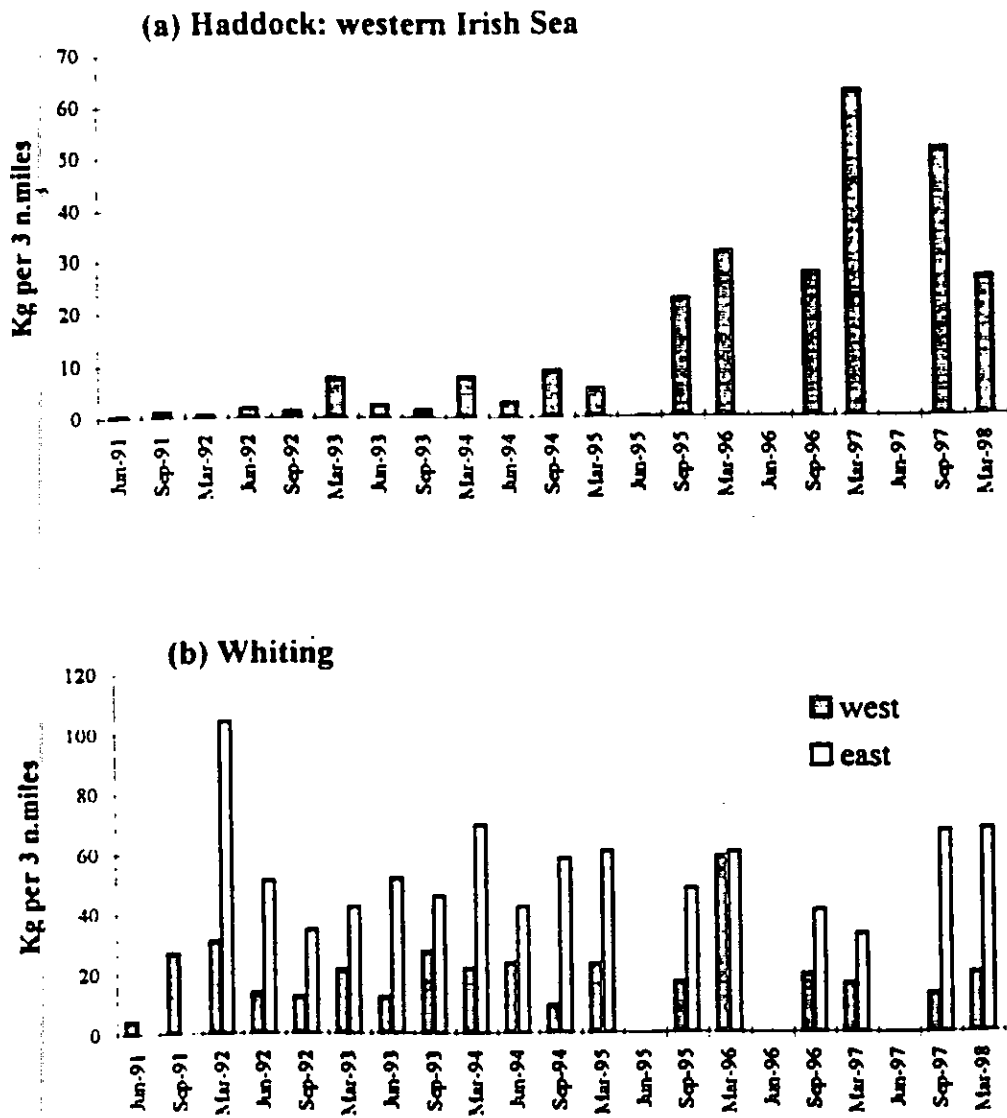


Fig. 4 Trends in abundance of (a) haddock and (b) whiting, estimated from the DANI trawl survey series, for fish at and above the minimum landing sizes for the commercial fisheries (27 cm for whiting; 30 cm for haddock). Note: June surveys finished in 1994.