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THE RESULTS OF THE INTERNATIONAL 0-GROUP GADOID
SURVEY IN THE NORTH SEA, 1978

by

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INTRODUCTION

The survey was carried out in the period 11 June - 11 July by 4 vessels, CORELLA (England), EXPLORER (Scotland), JOHAN HJORT (Norway) and TRIDENS (Netherlands). The gears used, the design of the experiment and the method of fishing were all as described for the 1976 survey by Daan et al. (1976).

RESULTS

Area fished

The statistical squares fished by each vessel are shown in Figures 1 and 2. Because all the ships were not available during the same period and because the JOHAN HJORT had to carry out a mackerel egg and larval survey at the same time as the 0-group gadoid survey, the time interval between sampling each statistical square varied from a minimum of 1 day to a maximum of 19 days. Two statistical squares (49E9 and 45E8) were fished three times and one square (42E7) only once.

For this reason, the average numbers per haul, mean length, standard deviation and range for all species by groups of 4 statistical rectangles were calculated by one week periods (Tables 1-4).

Distribution

The numbers of 0-group gadoids caught in each statistical square are shown in Figures 3-7.

Cod were found in three main areas, off the Danish coast, to the southeast of the Shetlands and in the Moray Firth/Orkney region. The area of highest abundance was off the Danish coast. Cod were scarce along the English coast.

Haddock were present in moderate numbers east and south-east of the Shetlands and off the Danish coast. These are the two areas in which the abundance of haddock has been highest in past surveys. However, in 1978 haddock were unusually abundant to the west of Fair Isle and around the Orkneys, the catch rates in these areas being as high as those in the area east of the Shetlands. Comparison of the catches made in the Orkney area during the first and second times of sampling shows that the distribution of the fish changed. This suggest that there may have been an influx of 0-group haddock to the North Sea, possibly from a spawning area to the west.

Whiting were found mainly to the west of Fair Isle and the Orkneys and off the Danish coast. Over the rest of the survey area catches were small, with the exception of a single large catch (636 fish) in rectangle 50F3 (Fig. 5).

Norway pout were restricted to the area between the Shetlands and the Norwegian Deeps, except for a single large catch (2280 fish) made in 47E5 (Fig. 6).

Saithe were scarce, as is usual, and were distributed mainly along the eastern part of the northern North Sea (Fig. 7).

Prediction of year-class size

Examination of the catch-rates for the 3 standard areas (Danish Coast, English coast and Northern area, (see Fig. 1) showed that there were statistically significant differences between the first and second times of fishing for all species and areas, except haddock in the Danish Coast area (Table 5). However, to get an average value to use as an index of year-class abundance, results from both surveys were combined, using the standard areas for each species shown in Fig. 3-5 for cod, haddock and whiting respectively. The results are given in Table 6.

Compared with previous years, when the main distribution of haddock was east of the Shetlands, 1978 haddock were also around the Orkneys (Fig. 4). As this region of high density includes rectangles which have not been used in previous years in calculating the index of haddock abundance, it was decided that a mean based on the whole of the Northern area would provide a better index of abundance for year to year comparison of year-class size. Data for previous years (1974-77) were re-calculated on this basis (Table 7). The mean abundances for Norway pout, which have not previously been given for 1974-77, were also calculated on this basis.

The mean abundances of cod, haddock, whiting and Norway pout by standard areas are shown in Table 8 together with the indices of abundance of cod, haddock and whiting from the International Young Herring Survey (Anon, 1978a) and the estimates of year-class size from virtual population analysis (Anon. 1978b).

Since the 1978 North Sea Roundfish Working Group entered an estimated recruitment figure from the IYHS for the 1976 year-class in the VPA, the data series of independent VPA estimates for comparison has not been extended from last year. Because the number of data sets is limited, regression analyses were not done. The data in Table 8 indicate that the 1978 year-classes of cod, haddock and whiting are below average. The distribution of cod and haddock off the British east coast indicates that, in this area, their abundance may be very low.

Planning of future surveys

The group agreed that the dates for the 1979 survey should be similar to those of 1977-78. However, in view of the atypical distribution of 0-group haddock in 1978, it was considered that it would be very desirable to extend the area of the survey to include statistical squares in the north Minch and to the north of the Outer Hebrides and also to increase the number of squares sampled off the Danish coast. However, it would be necessary to increase the number of ships in the survey to do this because the area sampled now is as large as is possible with the 4 ships currently committed to this survey.

By-catch data

The catches of herring, sprat and sandeel are given in Tables 9-11. These and by-catch data for other species will be fully reported in Annales Biologiques.

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Table 1. Catch rates, mean lengths (cm), standard deviations and ranges of lengths by species and blocks of 4 statistical rectangles, 11-19 June 1978.

Block	Date	Ships	Cod				Haddock				Whiting				Saithe				Norway Pout									
			N	N/hr	L	Sd	Range	N	N/hr	L	Sd	Range	N	N/hr	L	Sd	Range	N	N/hr	L	Sd	Range						
0-49	E8-9	12, 16/6	J, T	5	3	3.95	0.97	2.0-4.9	214	107	4.37	0.96	2.0-7.4	0				0				6148	3074	3.16	0.54	2.0-5.4		
0-49	F0-1	11, 12, 13/6	J	1	<1	3.75	-	3.5-3.9	57	14	4.23	1.14	2.0-6.9	1 <1	4.25	-	4.0-4.4	10	3	3.75	1.15	2.5-6.4	3045	761	3.06	0.47	2.0-4.4	
0-49	F2-3	11, 13, 15/6	J	0					114	29	4.39	1.26	2.0-7.9	0				316	79	3.51	0.46	2.5-4.9	5029	1257	3.73	0.57	2.0-4.9	
3-47	E6-7	19/6	T	2	2	3.75	-	3.5-3.9	15	15	3.88	0.81	2.5-6.4	4	4	3.63	0.48	3.0-4.4	0				6	6	3.33	0.38	2.5-3.9	
3-47	E8-9	16, 17, 19/6	J, T	25	3	3.27	0.65	2.0-5.4	466	58	3.37	0.81	2.0-7.4	1 <1	5.25	-	5.0-5.4	1 <1	5.25	-	5.0-5.4	14464	1808	3.95	0.55	2.0-5.4		
3-47	F0-1	15, 16, 17, 19/6	J	56	14	4.09	0.57	3.0-5.4	179	45	4.50	1.21	2.0-7.9	5	1	4.45	0.84	3.0-5.4	3	1	4.25	0.87	3.0-4.9	21951	5488	3.95	0.72	2.0-5.9
3-47	F2-3	15, 19/6	J	9	2	3.92	0.94	2.5-5.4	64	16	4.80	1.28	2.5-7.9	3	1	3.75	-	3.5-3.9	11	3	3.52	0.34	2.5-3.9	19245	4811	3.60	0.45	2.0-4.9
6-45	E6-7	19/6	C	25	13	3.67	0.75	2.0-4.9	12	6	4.00	0.81	2.0-4.9	21	11	3.37	0.44	2.5-4.4	2	1	5.25	0.71	4.5-5.9	0				
6-45	E8-9	16, 17, 18, 19/6	C, J, T	2	<1	2.75	0.71	2.0-3.9	85	17	3.90	0.54	2.5-4.9	1 <1	3.25	-	3.0-3.4	1	1	4.75	-	4.5-4.9	32	6	4.50	0.49	3.0-5.4	
6-45	F0-1	18/6	J	0					9	2	3.25	0.43	2.5-3.9	0				0				0						
4-43	E6-7	19/6	C	4	2	3.25	0.71	2.0-3.9	0					4	2	3.50	0.29	3.0-3.9	1	1	5.75	-	5.5-5.9	1	1	4.25	-	4.0-4.4
4-43	E8-9	17, 18/6	C	1	<1	4.25	-	4.0-4.4	56	14	3.78	0.74	2.5-5.9	1 <1	2.75	-	2.5-2.9	0				0						
4-43	F0-1	15/6	T	16	4	3.00	0.41	2.0-3.9	190	48	4.03	0.84	1.5-5.9	0				3	1	4.92	1.15	4.0-6.4	2	1	3.25	0.71	2.5-3.9	
4-43	F2-3	15/6	T	3	2	2.58	0.58	2.0-3.4	0					0				2	1	5.00	0.35	4.5-5.4	0					
2-41	E6-7	16, 17/6	C	17	9	2.81	0.56	1.5-3.9	2	1	2.25	-	2.0-2.4	2	1	4.25	0.71	3.5-4.9	0				0					
2-41	E8-9	16, 17/6	C	0					0					0				0				0						
2-41	F0-1	15/6	C	0					0					0				0				0						
2-41	F4-5	14/6	T	408	102	3.84	0.59	1.5-5.4	21	5	1.94	0.40	1.0-2.9	5	1	2.95	0.97	2.0-4.4	0				0					
2-41	F6-7	13, 14/6	T	226	57	3.58	0.46	2.0-4.9	115	29	2.97	0.87	1.5-5.9	1 <1	5.25	-	5.0-5.4	0				0						
0-39	E8-9	14, 15/6	C	0					0					0				0				0						
0-39	F0-1	14, 15/6	C	0					0					0				0				0						
3-37	E8-9	13, 14/6	C	3	1	2.25	-	2.0-2.4	0					0				0				0						
3-37	F0-1	13/6	C	0					0					0				0				0						
SPANISH COAST			634	3.75	0.56	1.5-5.4	136	2.81	0.90	1.0-5.9	6	3.33	1.28	2.0-5.4	0				0									
ENGLISH COAST			20	2.73	0.55	1.5-3.9	2	2.25	-	2.0-2.4	2	4.25	0.71	3.5-4.9	0				0									
COTTISH COAST			64	3.49	0.74	2.0-5.4	848	3.72	0.92	2.0-7.4	32	3.42	0.45	2.5-5.4	5	5.25	0.50	4.5-5.9	20651	3.72	0.66	2.0-5.4						
NORWEGIAN DEEPS			85	3.81	0.75	2.0-5.4	613	4.32	1.14	1.5-7.9	9	4.19	0.68	3.0-5.4	345	3.54	0.53	2.5-6.4	49272	3.74	0.64	2.0-5.9						

Table 2. Catch rates, mean lengths (cm), standard deviations and ranges of lengths by species and blocks of four statistical rectangles, 20-26 June 1978.

Block	Date	Ships	Cod				Haddock				Whiting				Saithe				Norway Pout									
			N	N/hr	L	Sd	Range	N	N/hr	L	Sd	Range	N	N/hr	L	Sd	N	N/hr	L	Sd	Range							
0-49	E8-9	23	E	4	4	4.00	0.29	3.5-4.4	178	178	3.32	0.45	2.5-6.4	1	1	3.25	-	3.0-3.4	0	1923	1923	4.22	0.51	2.0-5.4				
0-49	F0-1	20	T	44	11	4.03	0.61	2.0-4.9	1529	382	4.20	1.13	1.5-8.9	43	11	2.39	0.63	1.0-5.4	3	1	3.42	0.58	2.5-3.9	21222	5306	3.50	0.74	1.5-5.4
3-47	E4-5	22	C	10	10	4.10	0.58	3.0-4.9	108	108	4.46	1.04	2.0-8.4	32	32	3.39	0.57	2.0-4.9	0	50	50	2.66	0.48	1.5-5.9				
3-47	E6-7	21	C	74	25	3.53	0.55	2.5-4.9	210	70	3.46	0.96	1.5-6.4	217	72	2.86	0.73	1.5-4.9	0	174	58	2.40	0.49	1.5-4.4				
3-47	F0-1	20, 21	T	263	66	4.33	0.78	2.5-6.4	409	102	4.27	1.25	2.0-8.9	8	2	4.38	0.95	3.0-5.4	0	63456	15864	4.32	0.53	2.5-5.9				
6-45	E4-5	22	C	12	12	3.54	0.50	2.5-6.4	226	226	4.75	1.30	2.5-9.9	44	44	3.69	0.36	2.0-5.9	0	1	1	3.75	-	3.5-3.9				
6-45	E6-7	20, 22	C	14	7	3.36	0.59	2.5-4.9	39	20	3.76	0.74	2.5-6.4	56	28	3.43	0.84	1.5-5.4	0	0	0	0	0	0				
6-45	E8-9	21, 22, 23	T	1	1	2.75	-	2.5-2.9	57	19	4.63	0.53	3.0-5.9	0	0	0	0	0	0	33	11	4.20	1.16	2.0-5.4				
6-45	F0-1	21, 22	T	9	2	3.92	0.66	2.5-4.9	21	5	3.94	0.84	2.5-5.9	0	0	0	0	0	0	94	24	4.36	0.52	3.0-5.4				
6-45	F2-3	20, 21	J	10	3	4.65	0.39	4.0-5.4	2	1	4.75	0.00	4.5-4.9	0	0	0	3	1	3.92	0.58	3.0-4.9	896	224	4.22	0.51	2.5-5.9		
4-43	E8-9	23	T	2	1	3.25	0.00	3.0-3.4	40	20	4.35	0.80	2.5-6.4	3	2	3.75	1.32	2.5-5.4	0	3	2	3.75	0.87	3.0-4.9				
4-43	F0-1	23	C, J	5	1	3.45	0.27	3.0-3.9	153	38	4.94	0.84	2.5-7.4	0	0	0	0	0	0	5	1	4.95	0.27	4.5-5.4				
4-43	F2-3	24	J	1	1	4.25	-	4.0-4.4	0	0	0	0	0	0	0	0	0	0	0	3	2	4.25	0.34	3.5-4.9				
4-41	E6-7	26	T	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
4-41	E8-9	26	T	40	10	3.79	0.86	2.0-4.9	7	2	5.11	0.75	4.0-6.4	16	4	2.91	0.30	2.0-3.4	0	0	0	0	0	0				
4-39	E8-9	24	C	7	2	3.04	0.57	2.0-3.9	2	1	2.50	0.35	2.0-2.9	0	0	0	0	0	0	0	0	0	0	0				
4-37	E8-9	25, 26	C	4	1	2.63	0.63	1.5-3.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
4-37	F0-1	25, 26	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
ENGLISH COAST			51	3.60	0.81	1.5-4.9	9	4.53	1.33	2.0-6.4	16	2.91	0.30	2.0-3.4	0	0	0	0	0	0	0	0	0					
COTTISH COAST			117	3.56	0.65	2.5-4.9	858	4.03	1.14	1.5-9.9	353	3.11	0.77	1.5-5.9	0	0	0	2184	4.04	0.75	1.5-5.9	0	0					
NORWEGIAN DEEPS			332	4.28	0.76	2.0-6.4	2114	4.27	1.15	1.5-8.9	51	2.70	1.00	1.0-5.4	6	3.67	0.59	2.5-4.9	85676	4.12	0.69	1.5-5.9	0	0				

Table 3. Catch rates, mean length (cm), standard deviations and ranges of lengths by species and blocks of four statistical rectangles, 27 June - 3 July 1978.

Block	Date	Ships	Cod				Haddock				Whiting				Saithe				Norway Pout								
			N	N/hr	L	Sd	Range	N	N/hr	L	Sd	Range	N	N/hr	L	Sd	N	N/hr	L	Sd	Range						
50-49	F2, F3	24/6	E	160	40	4.38	0.76	2.5-5.9	1122	280	4.23	1.31	1.0-10.4	716	179	2.89	0.62	1.5-4.9	6	1	4.42	0.68	3.5-4.9				
48-47	F2, F3	28/6	E	36	9	4.96	0.80	3.5-5.9	98	24	5.58	1.29	3.0-7.9	13	3	4.52	0.53	3.5-5.4	2	<1	6.25	1.41	5.0-6.9				
46-45	F2-3	29/6	E	117	29	5.19	0.72	3.5-6.4	61	15	5.75	0.96	3.0-6.9	3	<1	4.75	-	4.5-4.9	0								
42-41	F4-5	1/7	E	24	6	3.06	1.40	1.0-5.9	20	5	4.85	1.28	2.5-6.9	742	185	3.89	0.96	1.0-5.9	0								
42-41	F6-7	2/7	E	159	40	3.50	0.42	2.0-3.9	36	9	5.04	1.48	3.0-8.4	597	149	4.71	1.19	1.0-7.9	0								
42-41	F0-1	27/6	T	0					0					0			0										
40-39	F0-1	27/6	T	0					0					0			0										
DANISH COAST			183	23	3.44	0.65	1.0-5.9	56	7	4.97	1.40	2.5-8.4	1339	167	4.25	1.14	1.0-7.9	0									
ENGLISH COAST			0						0					0			0										
SCOTTISH COAST			0						0					0			0										
NORWEGIAN DEEPS			313	26	4.75	0.84	2.5-6.4	1220	153	4.34	1.36	1.0-7.9	732	61	2.93	0.66	1.5-5.4	8	1	4.87	1.16	3.5-6.9	5666	472	4.45	0.74	1.0-6.4

Table 4. Catch rates, mean lengths (cm), standard deviations and ranges of lengths by species and blocks of four statistical rectangles, 5-11 July 1978.

Block	Date	Ships	Cod				Haddock				Whiting				Saithe				Norway Pout								
			N	N/hr	L	Sd	Range	N	N/hr	L	Sd	Range	N	N/hr	L	Sd	N	N/hr	L	Sd	Range						
48-47	E6-7 8,9,10	E	15	4	4.08	0.45	3.0-4.9	2031	508	5.62	0.92	3.5-9.9	790	198	4.35	0.99	2.0-9.4	0					8	2	2.26	0.18	2.0-2.9
48-47	E4-5 9	E	9	9	4.47	0.71	3.0-5.9	133	133	6.01	1.27	3.5-9.9	269	269	4.61	0.94	2.0-8.9	0					2280	2280	5.56	0.80	1.5-7.4
46-45	E8-9 11	E	15	15	4.55	0.39	3.0-5.4	241	241	6.33	0.98	4.0-8.9	49	49	3.63	0.73	2.0-5.9	0					121	121	4.26	1.41	2.0-7.9
46-45	E6-7 7,8,9	E	18	5	3.89	1.04	2.5-7.4	209	52	4.59	0.66	3.0-6.9	136	34	4.53	1.04	2.0-10.4	0					1	<1	2.75	-	2.5-2.9
46-45	E4-5 9	E	0					16	16	5.63	0.50	4.5-6.4	70	70	5.01	0.91	2.0-7.9	0					0				
44-43	E8-9 5,11	E	10	5	4.50	0.59	3.5-5.4	44	22	5.24	0.96	3.0-7.9	16	8	4.16	0.71	2.5-5.9	0					0				
44-43	E6-7 7	E	3	2	4.42	0.29	4.0-4.9	23	12	4.99	1.02	3.0-7.4	28	14	4.59	1.08	2.5-7.4	0					2	1	3.25	-	3.0-3.4
SCOTTISH COAST			70	5	4.26	0.72	2.5-5.9	2697	180	5.61	1.00	3.0-9.9	1358	91	4.43	1.00	2.0-10.4	0					2412	161	5.48	0.89	1.5-7.9

Table 5. Geometric means and 95% confidence limits for all species for the first and second times of sampling and for the whole survey.

	Danish Coast		British East Coast		Northern area	
	Mean	95%	Mean	95%	Mean	95%
1 st time		No.of obs.= 8		No.of obs.= 18		No.of obs.= 57
Cod	98.4	28.7-237.5	0.7	0.5-0.9	3.6	2.6-4.8
Haddock	15.3	3.6-65.9	0.1	0.09-0.11	39.0	24.0-63.3
Whiting	0.6	0.4-1.1	0.1	0.09-0.11	3.5	2.5-4.9
Norway pout	0.0		0.0		2620	1089-6303
Saithe	0.0		0.0		1.3	1.0-1.6
2 nd time		No.of obs.= 8		No.of obs.= 17		No.of obs.= 59
Cod	21.9	6.2-77.2	2.2	1.3-3.9	9.1	6.3-13.1
Haddock	7.3	2.5-21.0	0.43	0.33-0.56	168.0	98.6-286.5
Whiting	549.9	68.2-4435.6	0.53	0.37-0.75	23.2	14.0-38.3
Norway pout	0.0		0.0		191.1	810-4505
Saithe	0.0		0.0		0.2	
Whole survey		No.of obs.= 16		No.of obs.= 35		No.of obs.= 116
Cod	62.4	26.1-149.4	2.1	1.4-3.2	6.0	4.7-7.7
Haddock	10.6	4.8-23.3	0.25	0.22-0.29	85.3	59.0-123.
Whiting	112.7	29.4-431.5	0.29	0.24-0.35	10.2	7.5-13.9
Norway pout	0.0		0.0		2239	1215-4125
Saithe	0.0		0.0		0.7	0.6-0.8

Table 6. Geometric means and 95% confidence limits for cod, haddock and whiting by standard areas (see text) for first and second time of sampling and for whole survey. n = number of observations.

	1 st time of sampling			2 nd time of sampling			Whole survey		
	n	Mean	95%	n	Mean	95%	n	Mean	95%
Cod	20	41.5	16.9-102.1	20	40.6	20.0-82.1	40	43.3	24.9-75.5
Haddock	19	53.1	21.6-130.7	20	495.4	178.3-1376.6	39	230.9	114.5-465.5
Whiting	38	0.8	0.6-1.0	39	53.7	27.5-104.8	77	12.8	8.6-19.1

Table 7. Geometric means and 95% confidence limits for haddock and Norway pout for the northern area for 1974-1977. n = number of observations.

Year	Haddock			Norway pout	
	n	Mean	95%	Mean	95%
1974	55	828.0	423.4-1619.1	2599	1112-6073
1975	50	65.4	35.0-122.2	1269	542-2969
1976	104	154.5	98.6-241.9	19845	9724-40498
1977	97	33.4	23.4-47.9	209	124-352

Table 8. Indices of year-class abundance for cod, haddock and whiting from the 0-group surveys (a = standard area, b = northern North Sea area) and from the IYHS and virtual population analysis and for Norway pout from the 0-group survey only : figures in parentheses are based on non-standard survey results.

Year	Cod			Haddock				Whiting			Norway pout 0-gp
	0-gp	IYHS	VPA	0-gp	IYHS	VPA	0-gp	IYHS	VPA		
	(a)			(a)	(b)						
1969	-	60	367	248	-	35	109			71	777
1970	-	89	450	34	-	1545	899			225	849
1971	-	3	82	4068	-	957	1325			356	1782
1972	(26)	32	158	93	-	230	259	(138)	1161	2337	
1973	(8)	11	138	301	-	1314	1298	(40)	325	1631	
1974	157	55	228	2173	828	1370	2541	276	943	2392	2599
1975	17	6	121	622	65	212	552	70	832	965	1269
1976	188	44		579	155	189		16	436		19845
1977	35	12		143	32	458		4	474		209
1978	43			231	85			13			2239

Table 9. Herring by-catch

NORTH SEA INTERNATIONAL O-GROUP GADOID SURVEY

COUNTRY..... ENGLAND.

VESSEL COKELA

YEAR..... 1978

978

SPECIES HERRING

NORTH SEA INTERNATIONAL O-GROUP GADOID SURVEY

COUNTRY SCOTLAND

VESSEL EXPLORER

YEAR 1978

SPECIES HERRING *

Comments: * All unidentified clavigerids (≤ 5.0 cm) have been recorded as sprats.

Table 9. (contd.)

NORTH SEA INTERNATIONAL O-GROUP GADOID SURVEY

COUNTRY	VESSEL, JOMAN HJORT								YEAR	SPECIES, HERRING							
ICES RECTANGLE	50F2	50F3	49F3	48F2	48E9	47F2	46F2										
SURVEY NUMBER																	
DATE	11.6	15.6	15.6	16.6	17.6	19.6	21.6										
HAUL	1	8	9	13	19	26	29										
LENGTH IN 0.5 cm GROUPS	0.5																
	1.0																
	1.5																
	2.0																
	2.5			1	1												
	3.0	1	4	1													
	3.5		7		1												
	4.0		3					20									
	4.5																
	5.0																
	5.5																
	6.0																
	6.5																
	7.0																
	7.5																
	8.0																
	8.5																
	9.0																
	9.5																
	10.0																
	10.5																
	11.0																
	11.5																
	12.0																
	12.5																
	13.0																
	13.5																
	14.0																
	14.5																
	15.0																
NUMBER PER HOUR	1	1	15	1	2	20	2										
MEAN LENGTH																	
STANDARD DEVIATION																	
STANDARD ERROR																	
COMMENTS																	

NORTH SEA INTERNATIONAL O-GROUP GADOID SURVEY

COUNTRY	VESSEL, TRIJDENS								YEAR	SPECIES, HERRING							
ICES RECTANGLE	41F7	42F6	42F4	43F2	44F1	47E9	46E8	46F8	45F0	45E9	41E7	39F0					
SURVEY NUMBER																	
DATE	13/6	14/6	14/6	15/6	15/6	16/6	19/6	21/6	22/6	22/6	26/6	27/6					
HAUL	2	4	8	10	14	15	19	25	34	35	38	46					
LENGTH IN 0.5 cm GROUPS	0.5																
	1.0																
	1.5																
	2.0	1															
	2.5												1				
	3.0												1				
	3.5												33	10			
	4.0												81	3			
	4.5																
	5.0																
	5.5																
	6.0																
	6.5																
	7.0																
	7.5																
	8.0																
	8.5																
	9.0																
	9.5																
	10.0																
	10.5																
	11.0																
	11.5																
	12.0																
	12.5																
	13.0																
	13.5	3															
	14.0	1															
	14.5	3															
	15.0	37															
NUMBER PER HOUR	44	1	1	1	1	1	6	1	114	15	38	1					
MEAN LENGTH																	
STANDARD DEVIATION																	
STANDARD ERROR																	
COMMENTS																	

IDENTIFICATION OF HERRING
AND SPRAT UNCERTAIN

Table 10. Sprat by-catch

NORTH SEA INTERNATIONAL O-GROUP GADOID SURVEY

COUNTRY	ENGLAND	VESSEL	SORELLA	YEAR	1978	SPECIES	SPRAT
ICES RECTANGLE	37E9	38E8	37F0	38F0	41E8	42E8	42E8
SURVEY NUMBER							
DATE	13.6	14.6	13.6	16.6	16.6	16.6	17.6
HAUL	8.	6.	3.	6.	15.	17.	18.
0·5							
1·0							
1·5							
2·0							
2·5							
3·0							
3·5							
4·0							
4·5							
5·0							
5·5							
6·0							
6·5							
7·0							
7·5							
8·0							
8·5							
9·0							
9·5							
10·0							
10·5							
11·0							
11·5							
12·0							
12·5							
13·0							
13·5							
14·0							
14·5							
15·0							
NUMBER PER HOUR	252	1330	3024	1572	3	12	6230
MEAN LENGTH							
STANDARD DEVIATION							
STANDARD ERROR							
COMMENTS							

NORTH SEA INTERNATIONAL O-GROUP GADOID SURVEY

COUNTRY	ENGLAND	VESSEL	SORELLA	YEAR	1978	SPECIES	SPRAT
ICES RECTANGLE	46E5	40E9	40E8	39E8	39E9	38F0	37F0
SURVEY NUMBER							
DATE	22.6	24.6	24.6	24.6	21.6	25.6	26.6
HAUL	35	40	41	42	43	44	47
0·5							
1·0							
1·5							
2·0							
2·5							
3·0							
3·5							
4·0							
4·5							
5·0							
5·5							
6·0							
6·5							
7·0							
7·5							
8·0							
8·5							
9·0							
9·5							
10·0							
10·5							
11·0							
11·5							
12·0							
12·5							
13·0							
13·5							
14·0							
14·5							
15·0							
NUMBER PER HOUR	1	3	9	16360	2	1623	1465
MEAN LENGTH							
STANDARD DEVIATION							
STANDARD ERROR							
COMMENTS							

Table 10. (contd.)

NORTH SEA INTERNATIONAL O-GROUP GADOID SURVEY

NORTH SEA INTERNATIONAL Q-GROUP GACOID SURVEY

Table 10. (contd.)

NORTH SEA INTERNATIONAL O-GROUP GADOID SURVEY

Table 11. Sandeel by-catch

NORTH SEA INTERNATIONAL O-GROUP GADOID SURVEY

Table 11. (contd.)

NORTH SEA - INTERNATIONAL O- GROUP GADOID SURVEY

COUNTRY... ENGLAND

VESSEL... CORELLA

YEAR 1978

SANDERS
SPECIES (AMMODYTES MARINUS)

NORTH SEA INTERNATIONAL Q-GROUP GACOID SURVEY

COUNTRY Scotland

VESEEL EXPLORER

1878

BAND 651 8

Table 11. (contd.)

NORTH SEA INTERNATIONAL O-GROUP GADOID SURVEY

COUNTRY	SCOTLAND	VESSEL	EXPLORER	YEAR	1978	SPECIES	SANDEELS
ICES RECTANGLE	47E6	47E5	48E6	48E7	45E8	43E9	
SURVEY NUMBER							
DATE	9.7	9.7	10.7	10.7	11.7	11.7	
HAUL	164	167	168	169	170	171	
LENGTH IN 0.5cm GROUPS							
0.5							
1.0							
1.5							
2.0							
2.5							
3.0							
3.5							
4.0							
4.5							
5.0							
5.5	5	1		3	18		
6.0	28	57		23	24		
6.5	40	92		36	76		
7.0	44	52	3	39	66		
7.5	66	23		33	60		
8.0	56	2		16	60		
8.5	34			101	66		
9.0	58			111	51		
9.5	36			159	93		
10.0	56		308	72	54		
10.5	14	2	484	42	60		
11.0	4			10	18		
11.5			880				
12.0	2	1		764			
12.5				836			
13.0				308			
13.5				242			
14.0				66			
14.5				144			
15.0					1		
NUMBER PER HOUR	4145	237	6	3872	645	649	
MEAN LENGTH							
STANDARD DEVIATION							
STANDARD ERROR							
COMMENTS							

NORTH SEA INTERNATIONAL O-GROUP GABOUD SURVEY

COUNTRY NORWAY

VESSEL JOHAN HJORT

YEAR 1978

SPECIES SANDEEL

Table 11. (contd.)

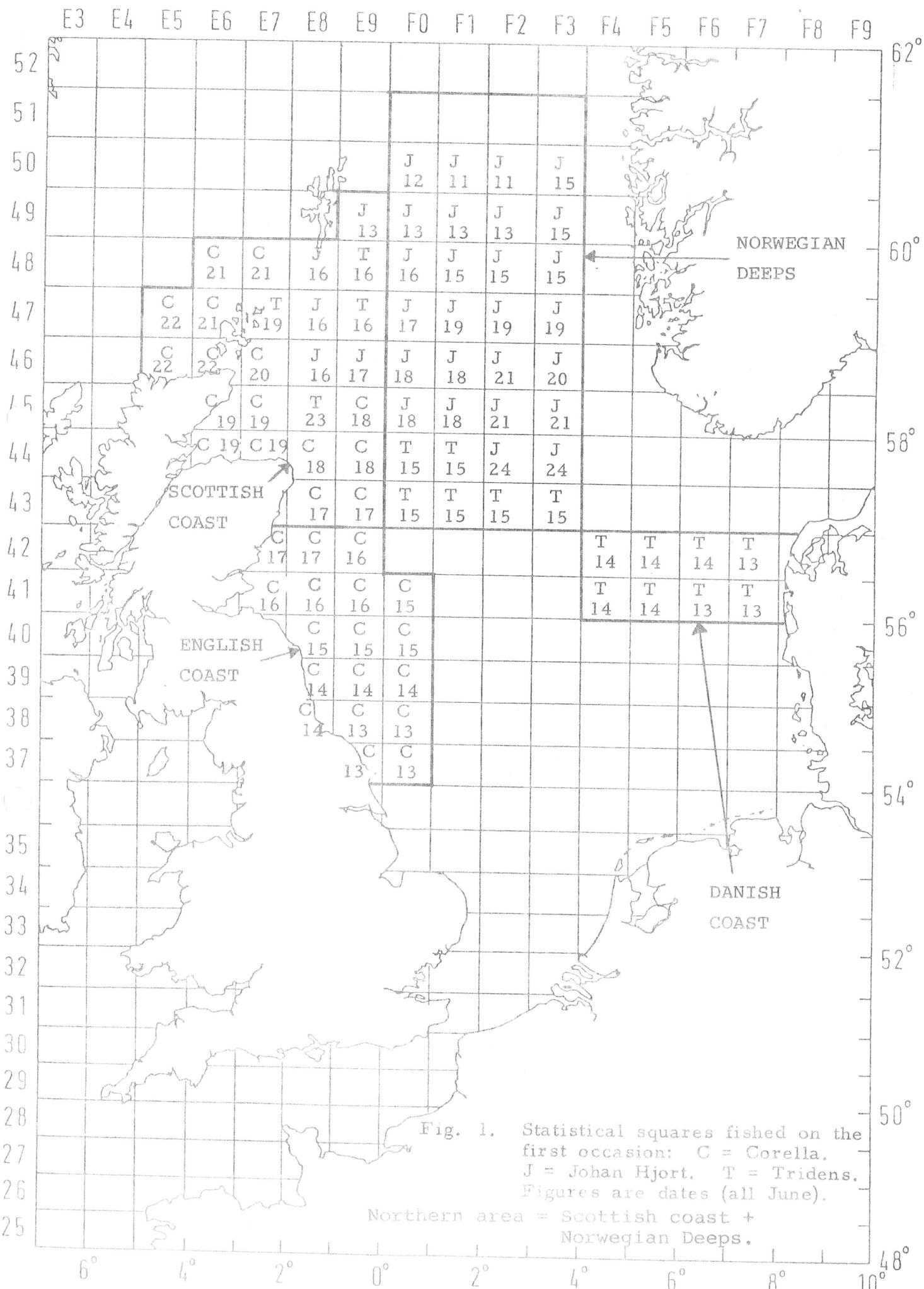
NORTH SEA INTERNATIONAL O-GROUP GADOID SURVEY

COUNTRY...NETHERLANDS	VESSEL...TRIDENS	YEAR...1978	SPECIES...Ammodytes
ICES RECTANGLE	41F6	41F7	42F6
SURVEY NUMBER	42F5	41P5	41F4
DATE	13/6	13/6	14/6
HAUL	1	2	4
0-5			
1-0			
1-5			
2-0		4	
2-5		3	2
3-0		7	4
3-5		3	14
4-0		7	72
4-5		2	11
5-0		24	20
5-5			40
6-0			10
6-5			16
7-0	24		18
7-5	28		20
8-0	16		10
8-5	28		16
9-0	12		8
9-5			4
10-0			16
10-5			24
11-0			32
11-5			40
12-0	3		48
12-5			56
13-0	1	8	64
13-5			72
14-0		15	80
14-5			88
≥15-0	5	43*	96
NUMBER PER HOUR	108	6	152
MEAN LENGTH		29	184
STANDARD DEVIATION		27	40
STANDARD ERROR		112	38
COMMENTS	* Including & Amm. lanceolatus		

77-94

NORTH SEA INTERNATIONAL O-GROUP GADOID SURVEY

COUNTRY...NETHERLANDS	VESSEL...TRIDENS	YEAR...1978	SPECIES...Ammodytes
ICES RECTANGLE	47FO	46FO	46ES
SURVEY NUMBER	47FI	46FI	45EO
DATE	21/6	21/6	22/6
HAUL	28	29	30
0-5			
1-0			
1-5			
2-0			
2-5			
3-0			
3-5			
4-0			
4-5			
5-0			
5-5	16	8	128
6-0	240	640	112
6-5	28	384	3
7-0	10	286	128
7-5	26	96	2
8-0	20	640	320
8-5	10	2544	224
9-0		2689	224
9-5		1536	1
10-0		128	13
10-5			96
11-0			28
11-5			24
12-0			67
12-5			4
13-0			16
13-5			2
14-0			32
14-5			3
≥15-0			128
NUMBER PER HOUR	108	992	6016
MEAN LENGTH		256	13
STANDARD DEVIATION		8960	560
STANDARD ERROR		2352	14336
COMMENTS	* 794) 336) 2016		



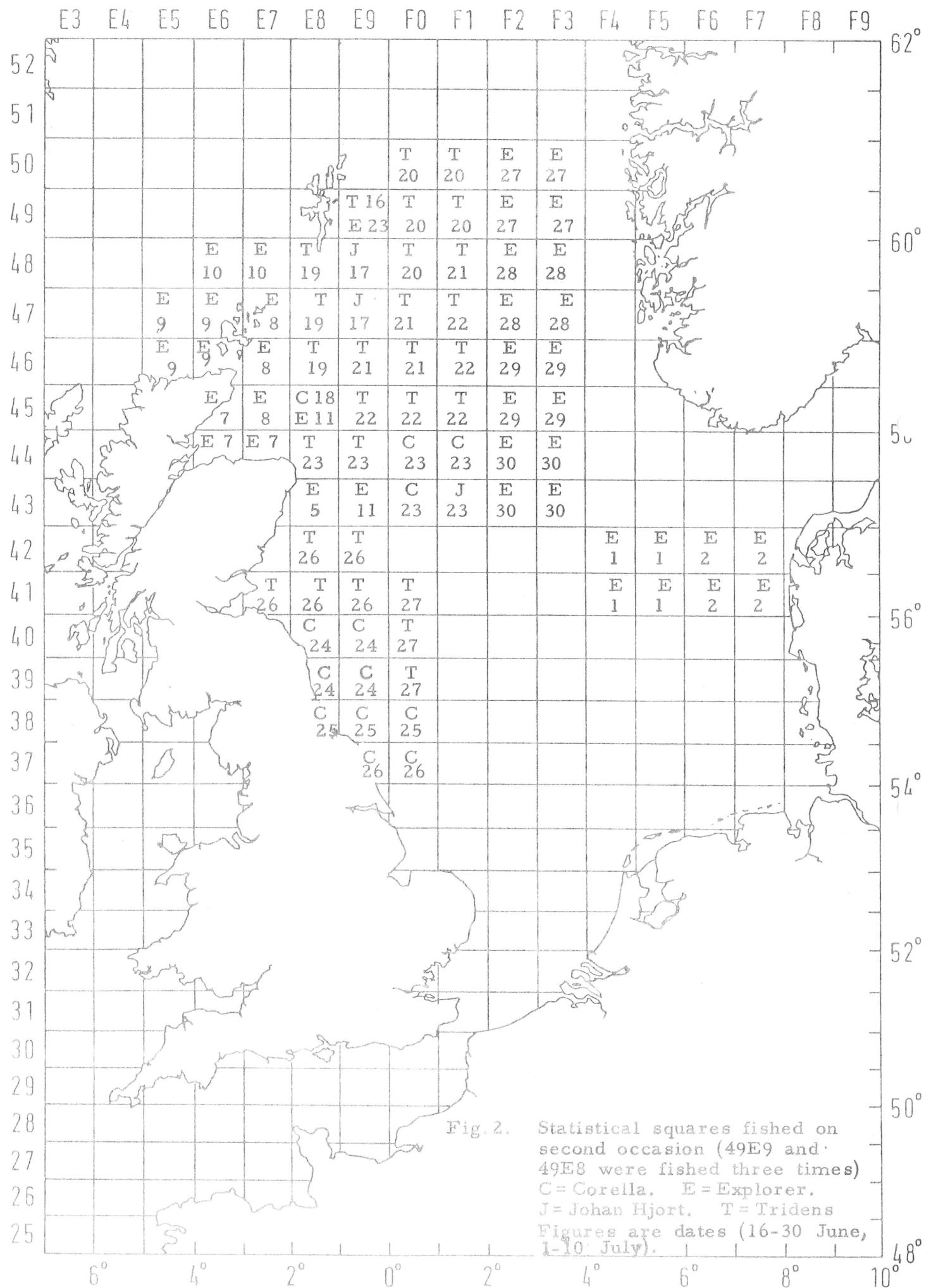


Fig. 2. Statistical squares fished on second occasion (49E9 and 49E8 were fished three times)
 C = Corella. E = Explorer.
 J = Johan Hjort. T = Tridens
 Figures are dates (16-30 June,
 1-10 July).

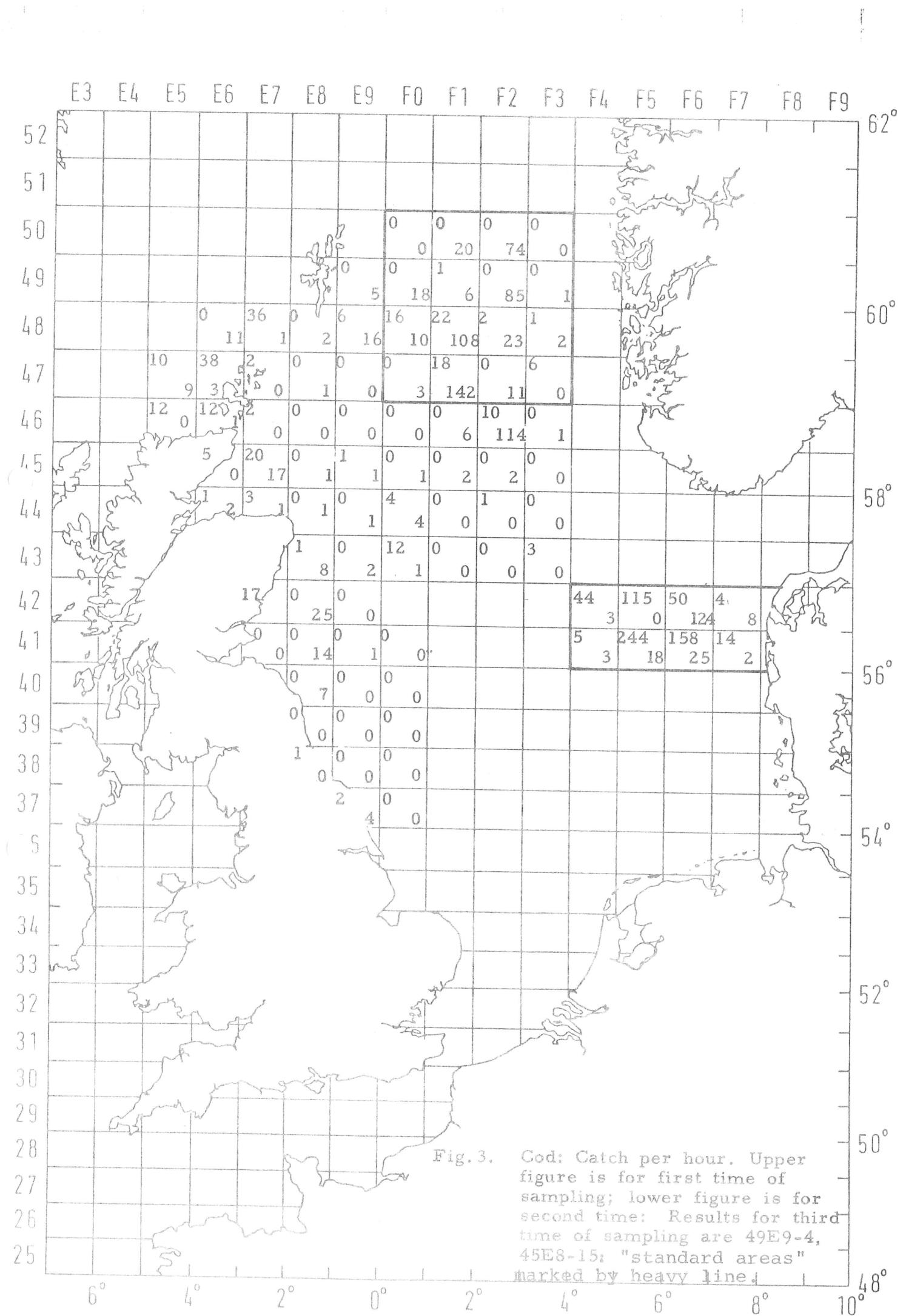


Fig. 3. Cod: Catch per hour. Upper figure is for first time of sampling; lower figure is for second time: Results for third time of sampling are 49E9-4, 45E8-15; "standard areas" marked by heavy line.

48°

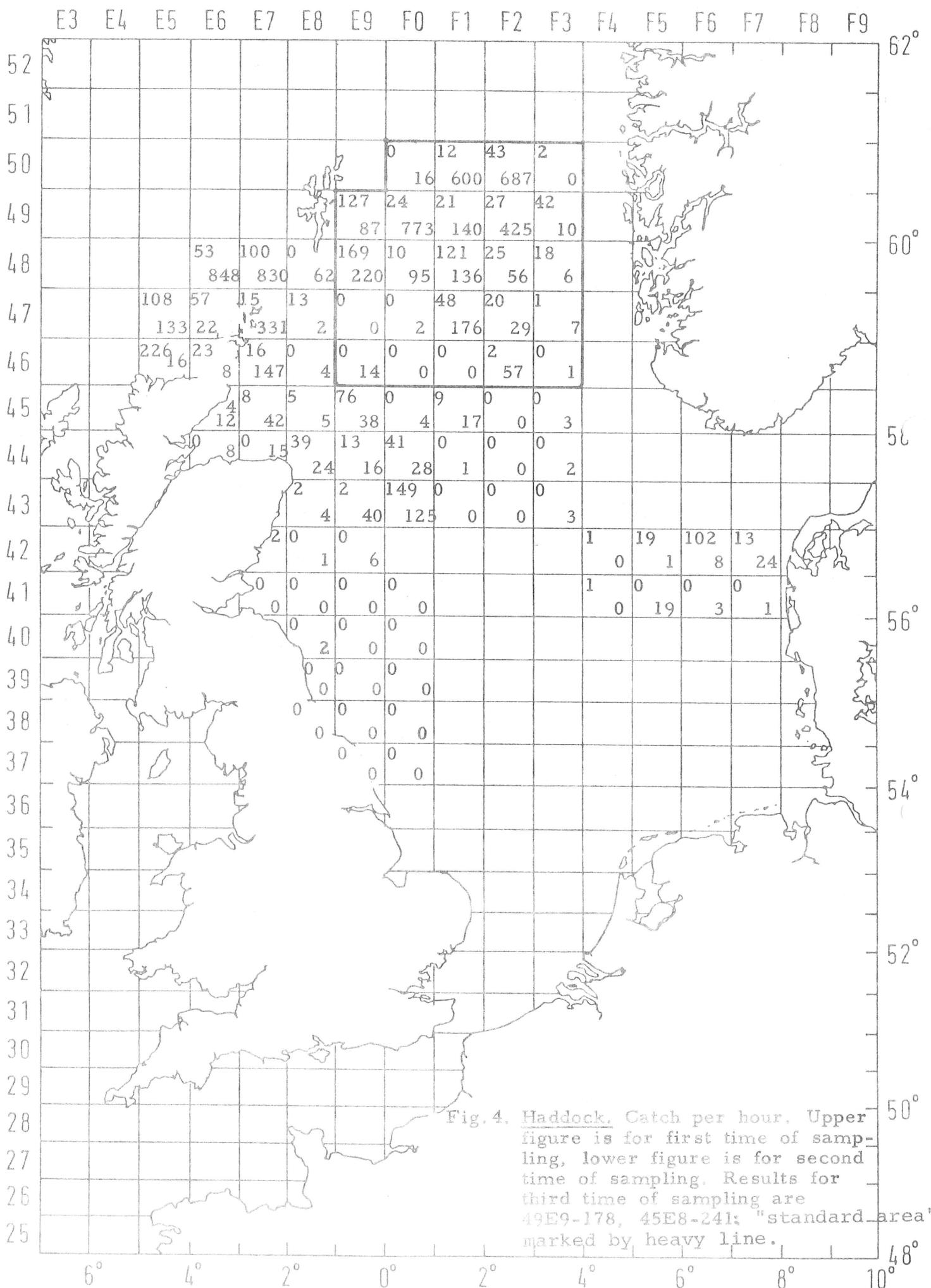
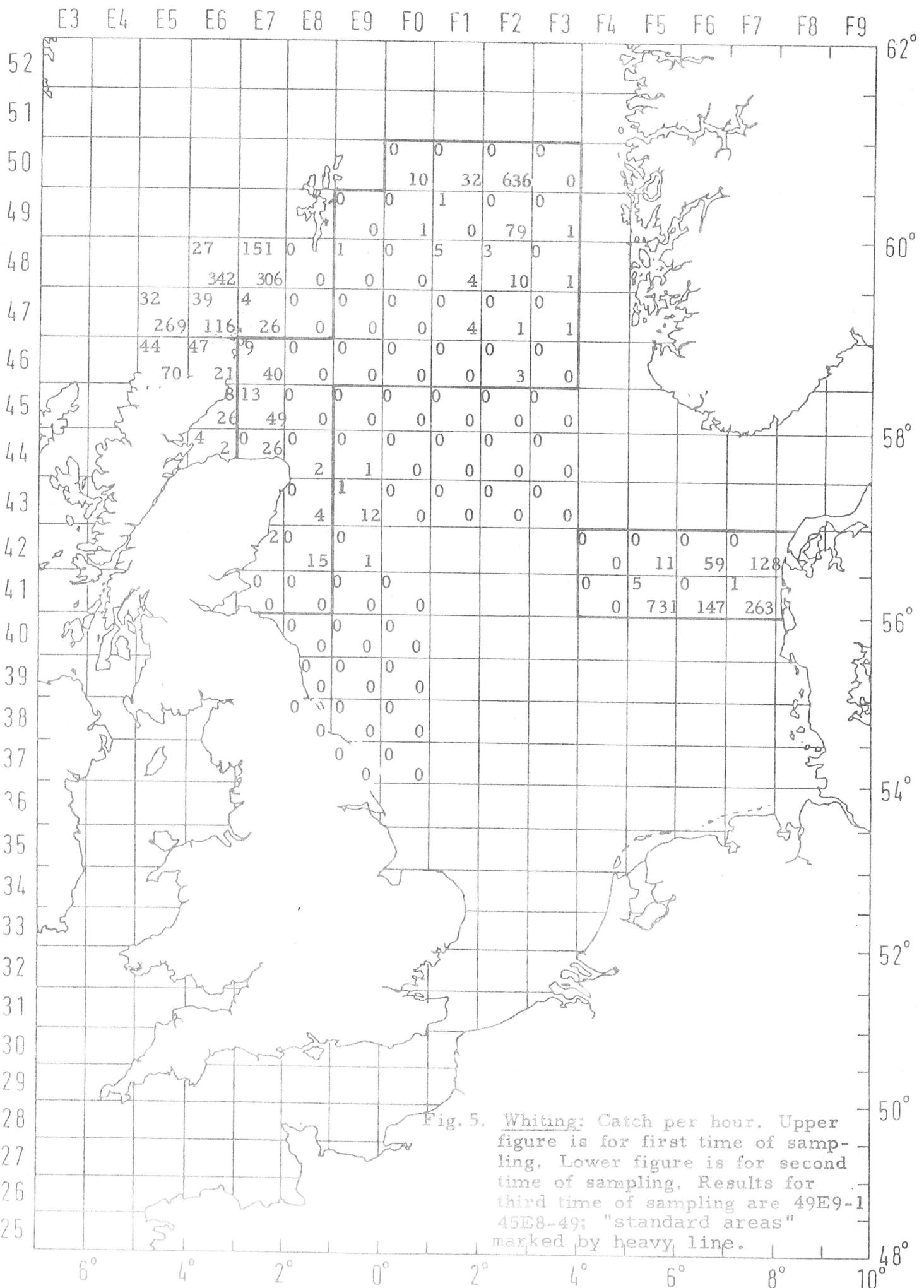


Fig. 4. Haddock. Catch per hour. Upper figure is for first time of sampling, lower figure is for second time of sampling. Results for third time of sampling are 49E9-178, 45E8-241; "standard area" marked by heavy line.



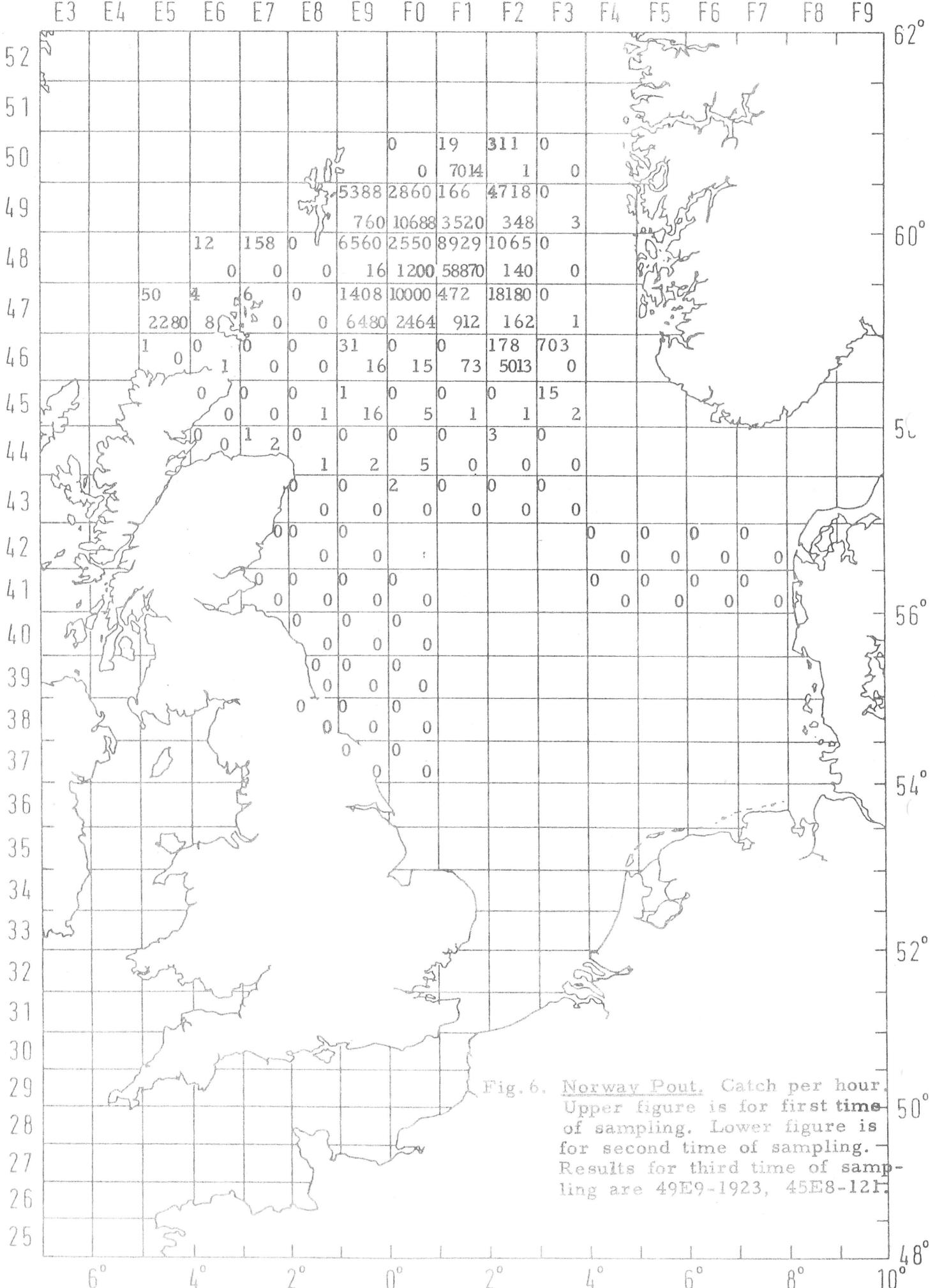


Fig. 6. Norway Pout. Catch per hour
Upper figure is for first time
of sampling. Lower figure is
for second time of sampling.
Results for third time of sam-
pling are 49E9-1923, 45E8-12F.

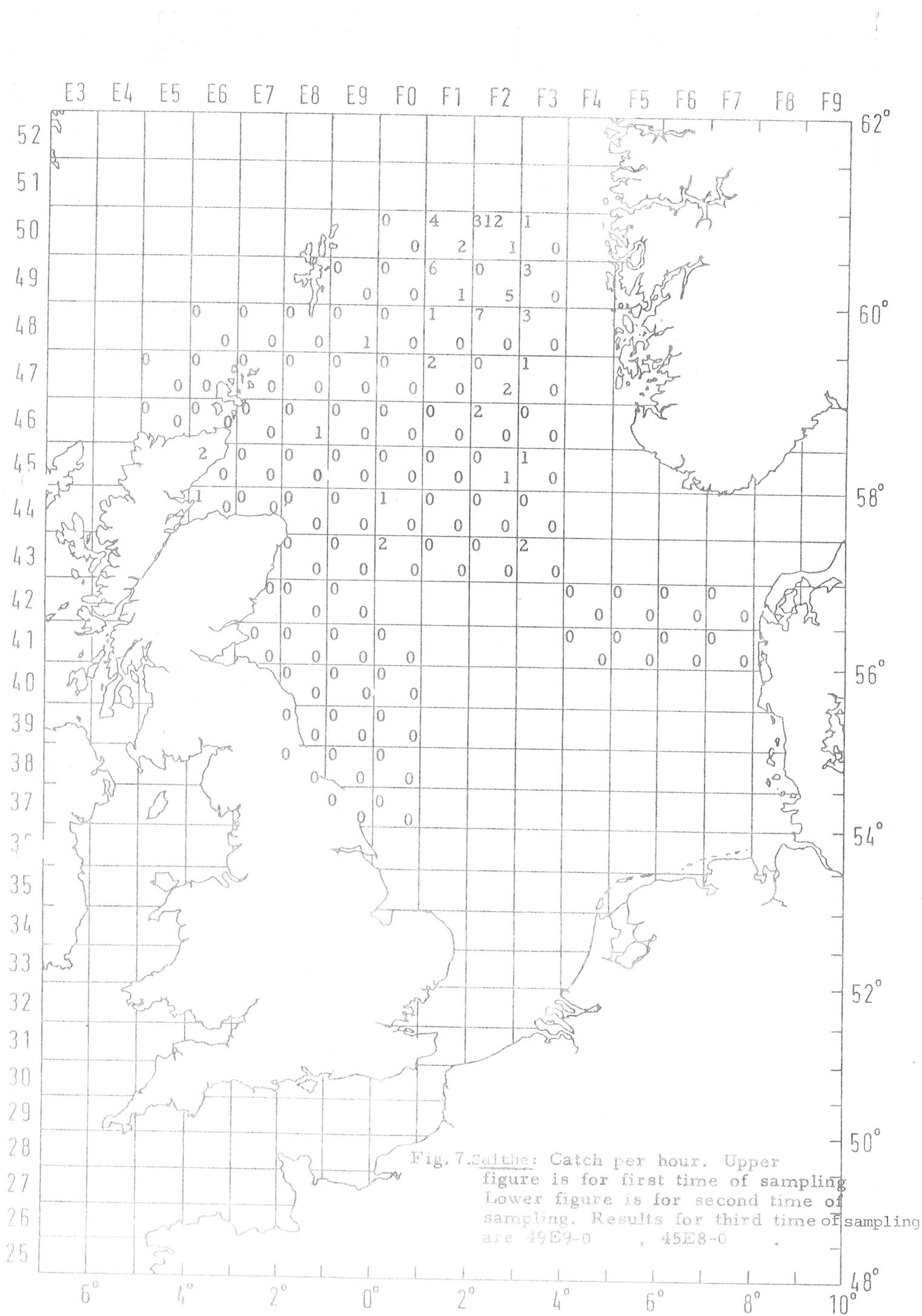


Fig. 7. Saithe: Catch per hour. Upper figure is for first time of sampling. Lower figure is for second time of sampling. Results for third time of sampling are 49E9-0, 45E8-0.

- a) Area
- b) 2 vessels T.H and G.O.Sav.
- c) Period 10 ~~pebbles~~ - 10 polished
- d) App 200 trawls. of bottom and pl.