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THE RESULTS OF THE INTERNATIONAL O-GROUP GADOID SURVEY IN THE NORTH SEA 1979
AND OF AN O-GROUP GADOID SURVEY TO THE WEST OF SCOTLAND.

by

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The results of the International O-group Gadoid
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INTRODUCTION

The survey was carried out in the period 13 June to 5 July by 4 vessels, CORELLA (England), EXPLORER (Scotland), JOHAN HJORT (Norway) and TRIDENS (The Netherlands).

The gear used, the design of the experiment and the method of fishing were all as described for the 1976 survey by Daan et al (1976). In addition, a survey was made to the west of Scotland by the R.V. CLUPEA in a preliminary attempt to delineate the western distribution of O-group gadoids because the results of previous international North Sea surveys had shown that the distribution of O-group gadoids does not stop at 5°W, the present western limit of the international survey. In particular, the distribution of O-group haddock in 1978 suggested that these might be moving from west of Scotland into the North Sea.

(Benjaminsen et al, 1978). The survey by the CLUPEA was carried out in the standard manner from 5-14 June. The results from this survey and the international survey are presented separately but are considered together in the general discussion.

All by-catch data for herring, sprat and sandeel are given in tables VI -XVIII.

THE INTERNATIONAL SURVEY

Area fished

The statistical squares fished by each vessel are shown in figures 1 and 2.

Four statistical squares, 45-E7, 44-E7, 41-E8 and 41-E7, were fished three times, and, as a result of bad weather, 5 statistical squares, 47-E8, 47-E9, 47-F0, 46-E6 and 46-E9, were fished only once. Six statistical squares which are outside the standard survey area (see Daan et al, 1976) were also fished to check on the distribution of O-group gadoids: these squares were 40-F4, 40-F5, 40-F6, 40-F7, 39-F5 and 38-F5. Because all the ships were not available at the same time and because the JOHAN HJORT was doing a mackerel egg and larval survey at the same time as the O-group survey, the time interval between sampling each statistical square varied from 1 to 14 days.

The average numbers per haul, mean lengths, standard deviations and ranges for all species by groups of 4 statistical rectangles were calculated for 3 separate periods. The duration of each period was set so that either all the hauls, or the majority of them, made in one of the 4 main area groupings were included in two of the three periods. (Tables I - III).

Distribution

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

Cod (fig. 3) were most abundant in the 3 areas where they are always most common, to the south-east of the Shetlands, from west of the Orkneys to the Moray Firth and off the Danish coast. Off the Danish coast they were very abundant and the average number caught the second time the area was surveyed (2292, table III) exceeds any other single survey by a factor of 3.6 (634 O-group cod the first time the area was surveyed in 1978). The haul of 13500 fish in 42-F4 was also a record catch. O-group cod were very scarce off the east coasts of England and of Scotland as far as the Moray Firth; this was similar to 1978.

Haddock (fig. 4) were moderately abundant east of the Shetlands and west of the Orkneys. They also occurred in the Moray Firth and offshore off the east coast of Scotland and also off the Danish coast. A notable feature of the survey was that in the Norwegian Deep area the JOHAN HJORT caught very few O-group haddock the first time of sampling whereas the EXPLORER caught large numbers the second time. As the mean length of the haddock during the second time of fishing was 3.49 cm and the maximum interval between fishing the same statistical square was 8 days, the difference cannot be entirely attributed to haddock becoming available to the gear by growth. The growth rate at this stage is of the order of 1 mm a day and JOHAN HJORT was catching Norway pout as small as 1 cm.

Whiting (fig. 5) were most abundant west of the Orkneys and off the Danish coast and to a lesser extent off to the east of the Shetlands. As with haddock, whiting were less abundant during the first part of the survey. Almost no whiting were caught off the east coasts of England and Scotland as far north as the Moray Firth.

Norway pout (fig. 6) were, as usual, most abundant east of the Shetlands, although their distribution stretched to 57°30'N which is more southerly than in previous years.

Saithe (fig. 7) were widely distributed with the area of highest abundance being off the coast of Norway. Usually very few saithe are caught.

PREDICTION OF YEAR CLASS SIZE

Standard areas

The Group discussed whether the standard areas, originally defined in 1976, were still appropriate in the light of data accumulated since then. In particular, the standard area for whiting excluded the area of high abundance off the north coast of Scotland and around the Orkneys.

Although it was agreed that the areas should be revised, there was considerable discussion as to what should be the criteria on which the new areas should be based. The idea that the criteria should be all statistical squares in which the long term mean exceeded a certain value was rejected on the basis that this might result in the exclusion of squares in which high abundance occurred from time to time as a result of variations in distribution.

Eventually it was agreed that the standard areas should be drawn to include all statistical squares in which the abundance of any one species had been high in the period 1974-79. Although the assessment of high abundance was necessarily subjective, it was considered that this did not matter in calculating indices of abundance because they would be comparable from year to year. The revised standard areas for each species are shown in figs. 3-6. A standard area was not drawn for saithe because this species is not usually caught in large numbers during the survey.

Indices of abundance

Following the method determined by the I-group Gadoid Group at its 1979 meeting, indices of abundance were re-calculated using the formula:

$$\text{Index} = \exp \left[\frac{\sum \ln(\bar{x} + 1)}{n} \right]$$

where \bar{x} = the arithmetic mean of the numbers of observations in one statistical square

and n = the number of statistical squares in the standard area for each species.

The results are given in table IV together with indices of abundance of I-group gadoids from the international Young Fish Surveys and from virtual population analyses. The O-group data series does not start until 1974 for cod and whiting but sufficient of the revised standard areas for haddock and Norway pout were sampled in a standard manner in 1973 to include them in the data series. Although sampling was not carried out in a standard manner prior to 1974 and the surveys were made mainly in July, most of the standard area for haddock was covered to warrant including the data for 1969-73. These values are shown in parentheses in table IV. There are no independent VPA estimates from 1976 onwards.

The linear regressions of I-group on O-group were calculated for the periods shown. They were statistically significant for all species except Norway pout. There were too few data points to allow correlation of O-group indices with VPA data except for haddock. This gave an intercept = -20.507, slope = 0.0526 and $r = 0.93$ which is statistically significant for 5 degrees of freedom at less than the 5% level of probability.

On the basis of this year's results, the 1979 year class of cod is good but only half the size of the very large 1976 year class, that of haddock about the average of recent years and that of whiting also average. However, the very high abundance of cod off the Danish coast suggests that the 1979 year class may be concentrated in this area.

THE WEST OF SCOTLAND SURVEY

Results

Area fished

The statistical squares fished are shown in figure 8.

Distribution

The numbers of O-group gadoids caught in each statistical square are shown in figure 9. The highest abundance of all species was in the Minches and in general the level of abundance for each species was similar to that found in the Orkney area. There was also no discontinuity in the distribution between the west of Scotland and the North Sea for any species.

The west of Scotland survey was made before the North Sea survey and overlapped part of the area covered by the latter. Comparison of the statistical rectangles fished during both surveys shows that there was an increase in numbers in these squares for cod, haddock and whiting suggesting that O-groups of these three species are carried into the North Sea.

The numbers per haul, mean lengths, standard deviations and ranges of length by species and by 4 statistical rectangles for this survey are given in table V.

THE PATTERN OF FUTURE SURVEYS

The Group discussed the pattern of future surveys in the light of the results from the west of Scotland survey. These indicated that recruitment of gadoids to the North Sea populations may be dependent to some extent on spawnings to the west of Scotland. For this reason it was concluded that the area to the west of Scotland should be included in the international survey in future years. It was also considered that the area surveyed in the North Sea should be increased, especially in the German Bight because it is clear from fig. 3 that the area inhabited by cod is not being fully sampled.

In order to accomodate this increase in the area sampled, it was agreed that:

1. all the statistical squares in the revised standard areas should be sampled twice.
2. statistical squares outside the revised standard areas but within the present standard survey area should be sampled only once.
3. the time made available should be used to sample statistical squares outside the present standard survey area, as determined by the co-ordinator.

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TABLE I - Catch rates, mean lengths(cm), standard deviations and ranges of lengths by species and by blocks of 4 statistical rectangles for 1979 for stations sampled between 13-18 June inclusive:international survey.

BLOCK	DATES	SHIP	COD				HADDOCK				WHITING				SAITHE				NORWAY POUT				
			N/h	\bar{L}	Sd	Range	N/h	\bar{L}	Sd	Range	N/h	\bar{L}	Sd	Range	N/h	\bar{L}	Sd	Range	N/h	\bar{L}	Sd	Range	
52-51	F0-1	13	J	0	-	-	-	1	4.25	0.0	4.0-4.4	0	-	-	-	2	3.08	0.77	2.0-3.9	4	2.04	0.57	1.0-2.9
52-51	F2-3	13	J	0	-	-	-	0	-	-	-	0	-	-	-	3	3.45	0.76	2.0-4.4	2	3.08	0.29	2.5-3.4
50-49	F0-1	14, 15	J	0	-	-	-	1	6.00	1.06	5.0-6.9	0	-	-	-	43	3.58	0.49	2.5-4.9	77	2.63	0.56	1.5-4.4
50-49	F2-3	14, 15	J	0	-	-	-	0	-	-	-	0	-	-	-	232	3.61	0.53	2.0-5.9	0	-	-	-
48-47	F0-1	16, 18	J	< 1	5.50	1.06	4.5-6.4	5	4.96	0.90	3.0-7.4	0	-	-	-	1	3.85	0.74	2.5-4.9	2223	3.79	0.62	2.0-5.4
48-47	F2-3	17, 18	J	0	-	-	-	0	-	-	-	0	-	-	-	204	3.71	0.69	2.5-6.4	118	3.72	0.64	2.5-5.4
NORWEGIAN DEEPS				< 1	5.50	1.06	4.5-6.4	1	5.01	0.90	3.0-7.4	0	-	-	-	81	3.65	0.60	2.0-6.4	404	3.75	0.66	1.0-5.4
50-49	E8-9	16	J	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	200	2.96	0.47	2.0-4.4
48-47	E4-5	18	E	56	3.21	0.39	2.0-4.4	321	3.16	0.53	2.0-5.4	191	2.63	0.52	1.0-3.9	4	2.38	0.75	1.5-3.4	1	2.25	0.0	2.0-2.4
48-47	E6-7	17, 18	E	27	3.46	0.47	2.0-4.9	65	3.48	0.66	2.0-6.9	12	2.58	0.35	2.0-3.4	4	2.96	0.57	2.0-3.5	28	3.48	0.46	1.5-4.4
48-47	E8-9	16, 18	J	3	5.00	0.79	4.0-5.9	121	4.00	0.93	2.0-7.4	0	-	-	-	0	-	-	-	513	3.78	0.71	2.5-5.4
46-45	E4-5	18	E	41	3.46	0.61	2.0-5.4	45	3.99	1.10	2.5-6.9	10	2.65	0.46	1.5-3.4	2	2.00	0.35	1.5-2.4	0	-	-	-
46-45	E6-7	16, 17	E	15	3.33	0.46	2.0-4.4	20	3.48	0.69	2.0-5.4	11	2.75	0.47	1.5-3.9	9	3.61	0.85	2.5-5.4	10	3.40	0.32	2.0-4.4
46-45	E8-9	15	E	1	3.25	0.0	3.0-3.4	6	4.88	2.01	2.0-7.9	1	2.25	0.71	1.5-2.9	2	3.85	0.42	3.0-4.4	3	3.92	0.30	3.5-4.4
44-43	E6-7	16	E	21	3.25	0.42	2.0-4.4	3	3.85	0.65	2.0-4.9	5	2.75	0.43	2.0-3.4	2	6.25	0.50	5.5-6.9	1	2.50	0.35	2.0-2.9
44-43	E8-9	14, 15	E	2	3.42	0.56	2.0-3.9	14	4.16	1.31	2.0-9.4	2	2.75	0.71	1.0-3.4	6	5.82	0.55	4.0-6.9	1	2.50	0.35	2.0-2.9
SCOTTISH COAST				18	3.36	0.54	2.0-5.9	66	3.48	0.84	2.0-9.4	26	2.64	0.50	1.0-3.9	3	3.90	1.52	1.5-6.9	84	3.54	0.74	1.5-5.4
42-41	E6-7	13	E	0	-	-	-	0	-	-	-	0	-	-	-	3	4.50	1.21	3.0-6.4	0	-	-	-
42-41	E8-9	13, 14	E	2	2.55	0.27	2.0-2.9	19	3.63	0.49	2.5-4.9	0	-	-	-	< 1	3.75	0.0	3.5-3.9	0	-	-	-
ENGLISH COAST				1	2.55	0.27	2.0-2.9	10	3.63	0.49	2.5-4.9	0	-	-	-	2	4.31	1.06	3.0-6.4	0	-	-	-

TABLE II - Catch rates, mean lengths (cm), standard deviations and ranges of lengths by species and by blocks of 4 statistical rectangles for 1979 for stations sampled between 19-28 June inclusive: international survey.

BLOCK	DATES	SHIP	COD				HADDOCK				WHITING				SAITHE				NORWAY POUT				
			N/h	\bar{L}	Sd	Range	N/h	\bar{L}	Sd	Range	N/h	\bar{L}	Sd	Range	N/h	\bar{L}	Sd	Range	N/h	\bar{L}	Sd	Range	
52-51	F0-1	21	E	1	2.75	0.0	2.5-2.9	15	2.42	0.38	1.5-3.4	3	1.85	0.42	1.0-2.4	3	3.30	0.74	2.5-4.4	2	1.88	0.25	1.5-2.0
52-51	F2-3	20	E	1	3.25	0.0	3.0-3.4	0	-	-	-	0	-	-	-	7	4.67	0.67	2.5-5.4	0	-	-	-
50-49	F0-1	21, 22, 23	E	24	3.14	0.50	2.0-4.4	613	2.99	0.74	1.5-7.4	220	2.41	0.45	1.0-4.0	7	3.27	0.57	1.5-4.4	1	2.12	0.25	1.5-2.4
50-49	F2-3	22, 23	E	7	3.70	0.67	2.5-5.9	96	3.35	0.62	1.0-6.4	5	2.35	0.46	1.5-3.4	139	4.25	0.65	1.5-6.9	2	2.37	0.79	1.0-3.9
48-47	F0-1	24, 25, 26	E	61	3.69	0.66	2.0-5.9	760	3.88	1.03	2.0-7.4	29	2.96	0.57	1.0-3.9	13	5.07	1.09	3.0-6.4	19228	4.16	0.59	2.0-5.9
48-47	F2-3	25	E	2	4.14	1.09	3.0-6.9	7	3.96	0.96	2.0-6.4	1	2.35	0.42	1.5-2.9	62	3.68	0.68	2.0-7.4	662	4.42	0.50	2.5-5.9
46-45	F0-1	19-22, 25, 26	J, T	1	3.58	0.29	3.0-3.9	4	4.98	1.55	2.5-8.4	0	-	-	-	40	4.34	1.29	2.5-7.9	78	4.45	0.54	2.5-5.4
46-45	F2-3	20, 21, 26, 27	J, T	1	3.50	0.35	3.0-3.9	2	4.35	0.79	3.0-5.9	0	-	-	-	34	4.51	1.21	2.5-7.4	533	4.40	0.62	2.0-5.9
44-43	F0-1	22, 25, 27, 28	J, T	2	3.97	0.57	3.0-5.9	19	5.08	1.11	2.5-8.9	0	-	-	-	1	6.00	2.04	3.0-8.4	1477	4.16	0.42	3.5-5.9
44-43	F2-3	22, 25, 27, 28	J, T	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	3	4.10	0.40	3.0-4.9
NORWEGIAN DEEPS				10	3.56	0.66	2.0-6.9	152	3.49	1.02	1.0-8.9	26	2.46	0.50	1.0-4.0	31	4.19	0.93	1.5-8.4	2199	4.17	0.58	1.0-5.9
50-49	E8-9	23	E	15	3.45	0.37	2.5-4.4	215	2.78	0.55	1.0-4.9	138	2.09	0.54	1.0-3.4	1	3.75	0.0	3.5-3.9	434	2.22	0.29	1.5-2.9
48-47	E6-7	19, 25, 28	C, E	13	3.90	0.47	2.5-5.4	46	3.74	1.24	2.0-7.9	61	3.10	0.53	1.5-5.9	3	2.86	0.94	1.5-3.9	3	3.71	0.56	2.0-4.4
48-47	E8-9	24	E	11	3.98	0.74	2.0-5.9	272	3.66	1.23	2.0-7.9	64	2.42	0.46	2.0-3.9	1	3.95	0.67	3.0-4.9	2932	3.35	0.49	2.0-5.4
46-45	E6-7	19, 24, 27	C, E, J	14	3.51	0.39	2.5-4.9	40	3.62	0.84	2.0-7.9	23	3.00	0.46	1.5-5.4	2	4.53	1.33	3.0-6.9	2	3.67	0.20	3.0-3.9
46-45	E8-9	19, 23, 27	C, E, J	1	3.58	0.68	2.5-4.4	19	3.87	1.27	2.0-7.4	10	2.86	0.63	1.5-4.4	4	5.01	1.13	3.0-6.9	42	3.76	0.52	1.5-5.4
44-43	E6-7	24	C	31	3.60	0.43	3.0-4.9	4	4.63	1.51	3.0-7.9	4	3.25	0.27	2.5-3.9	0	-	-	-	1	4.25	0.0	4.0-4.4
44-43	E8-9	22, 23, 25	C, T	3	3.92	0.54	2.5-4.9	8	5.01	1.57	2.5-8.9	17	3.23	0.59	1.5-4.9	2	5.25	2.15	3.0-8.4	3	3.75	0.58	2.5-4.9
SCOTTISH COAST				13	3.66	0.50	2.0-6.9	56	3.71	1.22	1.0-8.9	45	2.52	0.68	1.0-5.9	2	4.30	1.37	1.5-8.4	488	3.21	0.61	1.5-5.4
42-41	E6-7	22	C	8	3.51	0.59	2.0-4.9	0	-	-	-	0	-	-	-	1	6.75	0.0	6.5-6.9	1	2.75	0.0	2.5-2.9
42-41	E8-9	21, 22	C, T	1	3.25	0.0	3.0-3.4	1	3.25	0.0	3.0-3.4	0	-	-	-	1	6.50	1.06	5.5-7.4	0	-	-	-
42-41	F0-1	21	C	0	-	-	-	0	-	-	-	1	3.75	0.0	3.5-3.9	3	2.75	0.50	2.0-3.4	0	-	-	-
40-39	E8-9	20, 21, 22	C	0	-	-	-	0	-	-	-	0	-	-	-	1	5.25	0.0	5.0-5.4	0	-	-	-
40-39	F0-1	20, 21	C	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-
38-37	E8-9	19, 20	C	0	-	-	-	0	-	-	-	0	-	-	-	1	5.10	0.26	4.5-5.4	0	-	-	-
38-37	F0-1	19	C	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-
ENGLISH COAST				1	3.48	0.56	2.0-4.9	< 1	3.25	0.0	3.0-3.4	< 1	3.75	0.0	3.5-3.9	1	4.55	1.81	2.0-7.4	< 1	2.75	0.0	2.5-2.9
42-41	F2-3	19, 28	T	71	3.08	0.64	2.0-4.9	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-
42-41	F4-5	19, 21, 26	T	179	3.32	0.60	1.0-4.9	5	3.54	0.51	2.0-4.4	3	2.88	0.43	2.0-3.9	0	-	-	-	0	-	-	-
42-41	F6-7	20, 21	T	1738	3.72	0.53	1.5-6.4	9	4.07	0.77	2.5-5.9	123	3.45	0.59	2.0-4.9	< 1	5.25	0.0	5.0-5.4	0	-	-	-
40-39	F4-5	19	T	618	3.39	0.52	2.0-5.4	12	3.40	0.48	2.0-4.4	26	2.78	0.42	2.0-4.4	0	-	-	-	0	-	-	-
40-39	F6-7	20	T	5	3.65	0.81	2.0-4.4	0	-	-	-	12	2.27	0.97	1.0-4.4	3	4.75	0.0	4.0-4.4	0	-	-	-
DANISH COAST (Standard area only)				125	3.25	0.62	1.0-4.9	3	3.54	0.51	2.0-4.4	2	2.88	0.43	2.0-3.9	0	-	-	-	0	-	-	-

TABLE III - Catch rates, mean lengths (cm), standard deviations and ranges of lengths by species and by blocks of 4 statistical rectangles for 1979 for stations sampled between 29 June and 5 July inclusive: international survey.

BLOCK	DATES	SHIP	COD				HADDOCK				WHITING				SAITHE				NORWAY POUT				
			N/h	\bar{L}	Sd	Range	N/h	\bar{L}	Sd	Range	N/h	\bar{L}	Sd	Range	N/h	\bar{L}	Sd	Range	N/h	\bar{L}	Sd	Range	
48-47	E4-5	29	C	72	3.81	0.49	3.0-4.9	817	3.65	0.74	2.0-6.9	1756	3.22	0.41	2.0-4.4	0	-	-	-	3	3.25	0.0	3.0-3.4
48-47	E6-7	29	C	3	3.42	0.58	2.5-3.9	9	3.69	0.46	3.0-4.4	10	3.55	0.59	2.0-4.4	0	-	-	-	0	-	-	-
46-45	E4-5	30	C	108	4.01	0.30	3.0-5.4	206	4.21	1.08	2.5-8.9	251	3.28	0.41	2.5-4.4	0	-	-	-	0	-	-	-
46-45	E6-7	1	C	7	3.68	0.45	2.5-4.4	18	4.11	0.85	2.5-5.9	20	2.65	0.50	2.0-3.9	0	-	-	-	0	-	-	-
44-43	E6-7	1	C	21	3.53	0.37	2.5-4.4	15	4.35	1.28	3.0-7.4	19	3.12	0.60	2.0-4.4	0	-	-	-	0	-	-	-
SCOTTISH COAST				42	3.87	0.42	2.5-5.4	213	3.78	0.86	2.0-8.9	411	3.22	0.42	2.0-4.4	0	-	-	-	1	3.25	0.0	3.0-3.4
42-41	E6-7	3	C	13	3.87	0.58	2.5-4.4	1	6.75	0.0	6.5-6.9	3	2.42	0.29	2.0-2.9	0	-	-	-	0	-	-	-
42-41	E8-9	1, 3	C	3	3.55	0.76	2.5-4.9	3	6.35	0.97	4.5-7.4	1	2.25	0.0	2.0-2.4	0	-	-	-	0	-	-	-
42-41	F0-1	2	C	4	2.87	0.25	2.5-3.4	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-
40-39	E8-9	2, 3, 4	C	3	4.35	0.39	3.5-5.4	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-
40-39	F0-1	2	C	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-
38-37	E8-9	4, 5	C	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-
38-37	F0-1	5	C	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-
ENGLISH COAST				3	3.72	0.68	2.5-5.4	1	6.45	0.82	4.5-7.4	1	2.38	0.25	2.0-2.9	0	-	-	-	0	-	-	-
42-41	F4-5	29, 2, 3	T	3454	3.84	0.49	1.5-4.9	7	4.98	1.13	2.0-6.9	26	3.46	0.89	1.5-5.4	0	-	-	-	0	-	-	-
42-41	F6-7	29, 2	T	1129	3.84	0.49	2.0-8.4	58	5.32	1.12	2.5-7.9	221	4.22	1.02	2.0-7.4	0	-	-	-	0	-	-	-
40-39	F4-5	3	T	132	2.79	0.58	1.5-4.9	5	4.59	0.90	3.0-5.9	55	3.37	0.84	1.5-5.9	0	-	-	-	0	-	-	-
40-39	F6-7	3	T	8	4.42	1.42	2.0-6.9	0	-	-	-	21	3.23	0.85	1.5-5.9	0	-	-	-	0	-	-	-
38-37	F4-5	3	T	3	2.92	0.76	2.0-3.9	0	-	-	-	4	3.63	1.11	2.5-5.4	0	-	-	-	0	-	-	-
DANISH COAST (Standard area only)				2292	3.84	0.49	1.5-8.4	33	5.28	1.12	2.0-7.9	124	4.14	1.03	1.5-7.4	0	-	-	-	0	-	-	-

TABLE IV - Indices of abundance by species from the 0- and I-group gadoid surveys and from virtual population analysis together with linear regression coefficients: see text for explanation.

YEAR CLASS	COD			HADDOCK			WHITING			NORWAY POUT		
	0-group	I-group	VPA	0-group	I-group	VPA	0-group	I-group	VPA	0-group	I-group	
1969	-	14	368	(5)	6	109	-	19	777	-	-	
1970	-	15	451	(10)	133	899	-	70	849	-	-	
1971	-	1	83	(21)	61	1325	-	59	1782	-	-	
1972	-	5	160	(6)	12	259	-	191	2337	32	75	
1973	-	3	145	17	206	1298	-	58	1631	213	603	
1974	14	5	245	179	542	2541	27	235	2392	471	91	
1975	3	2	124	20	32	552	13	80	965	129	106	
1976	28	7	-	40	38	-	6	89	-	2222	186	
1977	11	3	-	12	71	-	5	45	-	122	39	
1978	7	2	-	40	83	-	8	100	-	609	65	
1979	13	-	-	42	-	-	11	-	-	207	-	
<u>Regression coefficients 0- vs I-group</u>												
Years	74 - 78			73 - 78		69 - 78		74 - 78			72 - 78	
No. obs.	5			6		10		5			7	
Slope	0.2180			2.8108		2.7890		7.5453			0.0036	
Intercept	1.0537			17.7127		20.7837		20.7656			164.4534	
r	0.96			0.91		0.91		0.93			0.01	
P	< 0.01			< 0.05		< 0.01		< 0.05			> 0.05	

TABLE V - Catch rates, mean lengths (cm), standard deviations and ranges of lengths by species and by blocks of 4 statistical rectangles for 1979 for stations sampled by R.V. "CLUPEA", 5 - 14 June.

BLOCK	DATES	COD				HADDOCK				WHITING				SAITHE				NORWAY POUT			
		N/h	\bar{L}	Sd	Range	N/h	\bar{L}	Sd	Range	N/h	\bar{L}	Sd	Range	N/h	\bar{L}	Sd	Range	N/h	\bar{L}	Sd	Range
48-47 E2-3	7, 12	2	2.75	0	2.5-2.9	325	2.35	0.65	1.0-4.9	135	1.95	0.47	1.0-3.4	5	2.75	0.53	2.0-3.9	1	2.00	0.35	1.5-2.4
48-47 E4-5	6, 7, 12, 13	6	2.77	0.39	2.0-3.4	63	2.67	0.63	1.0-5.9	19	2.00	0.41	1.0-2.9	3	2.59	0.32	2.0-3.4	3	1.98	0.36	1.0-2.9
48-47 E6-7	6, 13, 14	3	3.02	0.41	2.0-3.9	9	2.75	0.81	1.5-4.9	3	2.20	0.65	1.0-3.4	2	2.70	0.52	1.5-3.4	6	2.43	0.45	1.5-3.4
48-47 E8-9	13	0	-	-	-	2	3.50	1.77	2.0-4.9	0	-	-	-	1	2.25	0.0	2.0-2.4	10	2.10	0.47	1.0-2.9
46-45 E2-3	7, 8, 11	24	2.79	0.77	1.6-3.4	147	2.51	0.61	1.0-6.4	93	1.89	0.49	1.0-3.4	9	2.50	0.42	1.5-3.4	217	2.00	0.30	1.0-3.4
46-45 E4-5	6, 7, 8, 12	65	3.02	0.39	1.5-4.4	116	2.61	0.65	1.0-5.9	45	2.12	0.37	1.0-2.9	11	2.56	0.32	1.5-3.4	5	2.12	0.50	1.5-3.4
46-45 E6-7	5, 6, 14	26	2.69	0.41	1.5-4.4	10	2.93	0.62	1.5-4.4	5	2.30	0.46	1.5-3.4	9	3.56	1.08	2.0-5.9	19	2.88	0.55	1.5-3.9
44-43 E2-3	8	154	3.01	0.45	1.5-4.4	358	2.79	0.71	1.5-5.4	221	2.35	0.48	1.5-4.9	8	2.63	0.44	2.0-3.4	28	2.27	0.50	1.0-3.4
44-43 E4-5	8	136	2.38	0.44	1.5-3.9	164	2.37	0.70	1.0-4.9	78	2.08	0.47	1.0-3.4	20	2.23	0.30	1.5-2.9	47	2.05	0.40	1.0-2.9
44-43 E6-7	5	1	3.75	0.0	3.5-3.9	0	-	-	-	11	2.27	0.33	1.5-2.9	1	4.25	0.0	4.0-4.4	5	2.35	0.32	1.5-2.9
ALL SURVEY		42	2.77	0.51	1.5-4.4	119	2.56	0.70	1.0-6.4	61	2.13	0.50	1.0-4.9	7	2.63	0.67	1.5-5.9	34	2.10	0.42	1.0-3.9

TABLE VI

NORTH SEA INTERNATIONAL O-GROUP GADOID SURVEY

COUNTRY England VESSEL LORELLA YEAR 1979 SPECIES SPRAT

ICES RECTANGLE	37E9	37FO	33FO	38E9	38E8	34E8	39E9	40FO	40E8	41E8	42E7	45E9	44E7	44E6	47E7	48E7	48E6	47E5	44E7	41FO
SURVEY NUMBER	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2
DATE	19.6.79	19.6.79	19.6.79	20.6.79	20.6.79	20.6.79	20.6.79	21.6.79	22.6.79	22.6.79	22.6.79	22.6.79	24.6.79	24.6.79	25.6.79	25.6.79	28.6.79	29.6.79	1.7.79	2.7.79
HAUL	1	2	3	4	5	6	7	9	13	14	16	18	21	22	25	26	27	28	32	33
LENGTH IN 0.5 cm GROUPS	0.5																			
	1.0																			
	1.5																			
	2.0																			
	2.5																			
	3.0																			
	3.5																			
	4.0																			
	4.5																			
	5.0					3				183										
	5.5	30				2				183										
	6.0	60				3				852		2								
	6.5	200				2				730										
	7.0	170				2				669										
	7.5	260	10			2			1	609										
	8.0	120	20			5	4	3		487										7
	8.5	20	30			3	1	2												9
	9.0		50			2	2		1		4			2	49					8
	9.5		15			1	2									149	2			9
10.0		25				5				5			3	297	248	10			5	
10.5		30				8		1				1		643	298		1		5	
11.0		50				3		1						741	447				2	
11.5		20				1							1	99	99				1	
12.0		30				3				4				445	245	14		1	1	
12.5		20				1								445	298	10				
13.0		10				1							1	643	99	12				
13.5		10	2			2								494	50	14	1			
14.0						1		1						148		16				
14.5		5				1								49	50	10				
15.0 +																2				
NUMBER PER HOUR	860	325	2	2	25	34	5	5	3713	13	2	1	8	4053	1986	102	2	1	47	1
MEAN LENGTH																				
STANDARD DEVIATION																				
STANDARD ERROR																				
COMMENTS				Not measured	+2 damaged															

TABLE VI ctd

NORTH SEA INTERNATIONAL 0-GROUP GADOID SURVEY

COUNTRY ENGLAND VESSEL CORELLA YEAR 1979 SPECIES SPRAT

ICES RECTANGLE	39EG	40EG	41ES	41E7	40ES	37FC	37E9												
SURVEY NUMBER	2	2	2	2	2	2	2												
DATE	2.7.79	3.7.79	3.7.79	3.7.79	4.7.79	5.7.79	5.7.79												
HAUL	36	37	39	40	41	46	47												
0.5																			
1.0																			
1.5																			
2.0																			
2.5																			
3.0																			
3.5																			
4.0																			
4.5																			
5.0																			
5.5					10		1												
6.0					57		1												
6.5					46		8												
7.0			10	36	128		14												
7.5			10		273		7												
8.0	5		5		225		1												
8.5	18		10		112		2												
9.0	10		10		32														
9.5	74		20		32														
10.0	23		20			48	1												
10.5	9		25			90	1												
11.0			10			90													
11.5						54													
12.0			5			12													
12.5																			
13.0		1					6												
13.5																			
14.0							6												
14.5																			
15.0 +																			
NUMBER PER HOUR	231	1	125	179	802	306	36												
MEAN LENGTH																			
STANDARD DEVIATION																			
STANDARD ERROR																			
COMMENTS																			

TABLE IX

NORTH SEA INTERNATIONAL 0-GROUP GADOID SURVEY

COUNTRY NETHERLANDS VESSEL TRIDENS YEAR 1979 SPECIES SPRAT

ICES RECTANGLE SURVEY NUMBER	40F4	41F6	41F7	40F7	42E9	42E8	43E9	41F7	42F7	38FS										
DATE	196	206	206	206	226	226	256	27	27	37										
HAUL	1	7	8	9	14	15	17	39	40	48										
0.5																				
1.0																				
1.5																				
2.0																				
2.5																				
3.0																				
3.5																				
4.0																				
4.5	1		1																	
5.0	2						1													
5.5	1																			
6.0	1		1	800																
6.5			1	4800		1				1										
7.0		1		21600			1													
7.5				14400				672												
8.0				1600				5376	1											
8.5								4480	2											
9.0								2464												
9.5								224												
10.0																				
10.5																				
11.0					1															
11.5																				
12.0			1																	
12.5					1															
13.0																				
13.5																				
14.0								4												
14.5								2												
15.0																				
NUMBER PER HOUR	5	1	4	43200	2	2	1	13222	3	1										
MEAN LENGTH																				
STANDARD DEVIATION																				
STANDARD ERROR																				
COMMENTS																				

TABLE X

NORTH SEA INTERNATIONAL O-GROUP GADOID SURVEY

COUNTRY	CONTAINER	VESSEL	COKETTA	YEAR	SPECIES				
				1979	HERRING				
ICES RECTANGLE	37E9	37FO	38E8	39E8	40E8	44E7	45E6	44E7	37E9
SURVEY NUMBER	1	1	1	1	1	1	1	2	2
DATE	19.6.79	19.6.79	20.6.79	20.6.79	22.6.79	24.6.79	24.6.79	1.7.79	5.7.79
HAIL	2	5	6	6	13	21	22	32	47
0.5									
1.0									
1.5									
2.0									
2.5									
3.0									
3.5							2		
4.0	206		3	1					
4.5	339		2	1	270				4
5.0	60		6		563				11
5.5			2		473				6
6.0			1		22				
6.5							30		
7.0									
7.5									
8.0									
8.5									
9.0									
9.5									
10.0									
10.5									
11.0									
11.5									
12.0									
12.5							30		
13.0							30		
13.5							241		
14.0							422	1	
14.5							452	4	
15.0							301	3	
NUMBER PER HOUR		2		2	1328	2	40	3	21
MEAN LENGTH	605	2	14	2	1328	4	1516	13	21
STANDARD DEVIATION									
STANDARD ERROR									
COMMENTS									

TABLE XI

NORTH SEA INTERNATIONAL 0-GROUP GADOID SURVEY

COUNTRY SCOTLAND VESSEL FRV EXPLORER YEAR 1979 SPECIES HERRING

ICES RECTANGLE	41E7	42E7	42E8	44E7	47E6	48E6	44E6	48E7	47E7	51F1	50F3	46E7	45E6	46E6						
SURVEY NUMBER																				
DATE	13.6.79	13.6.79	13.6.79	16.6.79	17.6.79	18.6.79	16.6.79	19.6.79	19.6.79	21.6.79	22.6.79	27.6.79	16.6.79	17.6.79						
HAUL	ETA/77	ETA/78	ETA/79	88	93	94	89	97	98	102	107	122	96	92						
LENGTH IN 0.5 CM GROUPS	0.5																			
	1.0																			
	1.5																			
	2.0																			
	2.5																			
	3.0																			
	3.5																			
	4.0		2																	
	4.5	95			5								4							
	5.0	5			164															
	5.5				284															
	6.0				77															
	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			1/6.5																	
13.5																				
14.0																				
14.5																				
15.0																				
NUMBER PER HOUR	20	2	1	530	231	6	19	15	1	3	1	9	4	13						
MEAN LENGTH																				
STANDARD DEVIATION																				
STANDARD ERROR																				
COMMENTS					* Includes a small proportion of sprats															

TABLE XIII

NORTH SEA INTERNATIONAL 0-GROUP GADOID SURVEY

COUNTRY	NETHERLANDS																		
VESSEL	TRIDENS																		
YEAR	1979																		
SPECIES	HERRING																		
ICES RECTANGLE SURVEY NUMBER	40F4	40FS	41FS	41F4	41F7	40F7	42F7	42F6	42E8	43E9	41FS	41F6	40F7	41F7	42F7	40F4	40FS	39FS	
DATE	19.6	19.6	19.6	19.6	20.6	20.6	21.6	21.6	22.6	25.6	29.6	29.6	29.6	2.7	2.7	3.7	3.7	3.7	
HAUL	1	2	3	4	8	9	10	11	15	17	35	36	38	39	40	45	46	47	
LENGTH IN 0.5 CM GROUPS	0.5																		
	1.0																		
	1.5																		
	2.0																		
	2.5																		
	3.0																		
	3.5		1		2	2			2				1				1		1
	4.0		1	1		9	5	2				5	1	1			1	1	
	4.5				14	2						4						1	
	5.0				5	1		4			1								
	5.5																		
	6.0														56	1			1
	6.5																		
	7.0																		
	7.5																		
	8.0	✓ 24.5 cm																	
	8.5					Cm 21	2	3		Cm 25	1				Cm 12	2			1
	9.0					.5				.5	1				.5	6			
	9.5					22	2			26	2				13	6			
	10.0					.5	1			.5	7				.5	22			
10.5					23	1			27	8				14	4				
11.0							5		.5	1				.5	10				
11.5									28	2				15	12				
12.0						25			.5	2				.5	8				
12.5						30			29	2				16	2				
13.0						30			.5	3				.5	2				
13.5						45			30	2				17	2				
14.0						40			.5	2				.5					
14.5						40													
15.0						25 7/15								190	4				
NUMBER PER HOUR	1	2	1	18	20	250	6	2	33	1	9	2	1	136	2	2	3	2	
MEAN LENGTH																			
STANDARD DEVIATION																			
STANDARD ERROR																			
COMMENTS																			

TABLE XIV

NORTH SEA INTERNATIONAL O-GROUP GADOID SURVEY

COUNTRY ENGLAND VESSEL CORELLA YEAR 1979 SPECIES SANDEEL (SMRETT 1)

ICES RECTANGLE	37E9	37FO	38FO	38E8	39E8	39E9	39FO	40E8	41E8	42E7	44E9	45E8	44E8	44E7	44E6	45E6	45E7	47E7	48E7	48E6	
SURVEY NUMBER	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	
DATE	19.6.79	19.6.79	19.6.79	20.6.79	20.6.79	20.6.79	20.6.79	22.6.79	22.6.79	22.6.79	22.6.79	22.6.79	23.6.79	23.6.79	24.6.79	24.6.79	24.6.79	24.6.79	25.6.79	25.6.79	28.6.79
HAUL	1	2	3	5	6	7	8	13	14	16	17	19	20	21	22	23	24	25	26	27	
LENGTH IN 0.5 cm GROUPS	0.5																				
	1.0																				
	1.5																				
	2.0																				
	2.5																				
	3.0																				
	3.5																				
	4.0					10				158							248				
	4.5					29				315							124				
	5.0					38		540		1104						10	620				
	5.5					95	42	2700		4100	6					5	744				
	6.0					57	168	540		4257	6	6					1861				
	6.5						399	1620		1577	36	38					1241	48		12	
	7.0						357			158	108	82		2			496			12	4229
	7.5						126	540		158	198	126		2	7	5				86	17971
	8.0							1080			72	50	30	45	10	124				132	17971
	8.5											31	50	26	16					72	4229
	9.0							1080				6	6	23	9	16		24	3085	48	3171
	9.5							1080						10		10	124	192	3085	72	1057
10.0		37	2				3780	3240							10	124	96	5827	72	6343	
10.5	1	259	1				15660	9720				6	2		26		192	1714	84	8457	
11.0		666	3				16200	12460				6			5		120	343	36	7400	
11.5		777				1	14040	13608				6	2	4	10		96	686	24	7400	
12.0		333				1	7020	3888				6	2		5		72	1028	84	1057	
12.5	2	111				4	9180	1296				19			10				96	1057	
13.0		37		1		2	5400	1944						2	5	124			60	1057	
13.5						4	3240	1296							5					60	
14.0		37				1	1620								5					84	
14.5				2			1080													12	
15.0 +	1	111		24		2	5400	648												1714	
NUMBER PER HOUR	4	2368	6	27	229	1107		91800	48600	11827	432	383	123	93	148	5830	840	17482	996	81399	
MEAN LENGTH																					
STANDARD DEVIATION																					
STANDARD ERROR																					
COMMENTS									Approx 50 fish Estimated Length 6-7cm												

TABLE XIV ctd

NORTH SEA INTERNATIONAL 0-GROUP GADOID SURVEY

COUNTRY ENGLAND VESSEL CORELLA YEAR 1979 SPECIES SANDEEL (SHEET 2)

ICES RECTANGLE	46E5	45E7	40E9	41E8	40E8	37E9												
SURVEY NUMBER	2	2	2	2	2	2												
DATE	3.6.79	1.7.79	3.7.79	3.7.79	4.7.79	5.7.79												
HAUL	30	31	37	39	41	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	61	1392	2	61319	3960	18												
MEAN LENGTH																		
STANDARD DEVIATION																		
STANDARD ERROR																		
COMMENTS																		

TABLE XVI

NORTH SEA INTERNATIONAL O-GROUP GADOID SURVEY

COUNTRY..... SCOTLAND..... VESSEL..... CLUPEA..... YEAR..... 1979..... SPECIES..... SANDOEEL (SHEET 1)

ICES RECTANGLE	44E6	44E7	45E7	45E6	46E6	47E6	47E5	46E5	46E4	47E4	47E3	46E3	45E3	45E4	44E4	44E3	45E3		47E3	46E4	
SURVEY NUMBER																					
DATE	5.6.79	5.6.79	5.6.79	5.6.79	6.6.79	6.6.79	6.6.79	6.6.79	7.6.79	7.6.79	7.6.79	7.6.79	8.6.79	8.6.79	8.6.79	8.6.79	11.6.79		12.6.79	12.6.79	
HAUL	C79/63	C79/64	C79/65	C79/66	C79/67	C79/68	C79/69	C79/70	C79/71	C79/72	C79/73	C79/74	C79/75	C79/76	C79/77	C79/78	C79/79	C79/79	C79/83	C79/84	
LENGTH IN 0.5cm GROUPS	0.5																				
	1.0																				
	1.5																				
	2.0		2																		
	2.5																				
	3.0					56		2		9											
	3.5		2			120		4	14	45	4	1	13			1		20			1
	4.0		2	10		144		8	77	52	14	1	18	16		4	8	20			21
	4.5		1	17		112		5	35	48	22	3	2	348		2	8	100		1	49
	5.0			27		48		1	42	30	6	2	1	275	278	2	8	130			49
	5.5			120		16	77/16									2	8	130			50
	6.0			166					21	2				31	155	2	13	80			27
	6.5			40			77/							5	550/16.0		5	70			26
	7.0						17								370/16.5		2	60	450		23
	7.5			3											93/17				15.5		5
	8.0			10											43/17.5				424		
	8.5			126		131									93/18.0				16.0		
	9.0	1		223		427	77			3									30/16.5		
	9.5	12		83		526	155		7	3									200/17.0		
	10.0	37		46		707	232		35	8									50/17.5		
10.5	20		17	2	773	696		48	18									40/18.0			
11.0	4		23		329	394		210	26									70/18.5			
11.5					82	3091		259	78									40/19.0			
12.0					33	2705		224	107					93				30/19.5		1	
12.5			1/18			1236		196	96					741							
13.0						1314		140	34					2608							
13.5						698		21	8					5049			10				
14.0						155		28	3					6297			50				
14.5						232		7						3890			60				
15.0						77		7						1574			270				
NUMBER PER HOUR	74	7	912	2	3504	14761	20	11435	570	46	8	34	675	22505	11	44		2930	1	253	
MEAN LENGTH	10.34	3.61	7.48	10.75	9.41	9.42	4.23	11.05	9.64	4.58	4.81	4.12	4.10	13.83	4.75	5.31		14.17	4.75	5.17	
STANDARD DEVIATION																					
STANDARD ERROR																					
Σfx	747.0	23.5	7046.0	21.0	32094.0	135272.0	79.5	15501.5	5353.0	199.0	36.5	131.5	3205.5	30553.5	49.5	222.5		40791.0	4.5	1243.5	
Σfx^2	7553.0	84.75	57522.5	220.5	311082.0	1446623.5	321.25	177843.75	58206.5	868.5	169.25	512.75	15295.75	416953.25	227.25	1147.75		627743.5	20.25	6394.25	
COMMENTS																					

TABLE XVII

NORTH SEA INTERNATIONAL 0-GROUP GADOID SURVEY

COUNTRY	NETHERLANDS																				
VESSEL	TRIDENS																				
YEAR	1979																				
SPECIES	SANDGELS (SHEET 1)																				
ICE'S RECTANGLE SURVEY NUMBER	40F4	40F5	41F4	41F3	40F6	41F6	41F7	40F7	42F7	42F6	42F5	42F4	42E9	42E8	41E8	43E9	44F0	46F0	46F1	45F1	
DATE	19.6	19.6	19.6	19.6	20.6	20.6	20.6	20.6	21.6	21.6	21.6	21.6	22.6	22.6	22.6	25.6	25.6	25.6	25.6	25.6	26.6
HAUL	1	2	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	21	22	
LENGTH IN 0.5 CM GROUPS	0.5																				
	1.0																				
	1.5																				
	2.0					17															
	2.5					30	4	1								2					
	3.0		2			17	5					3									
	3.5		26	4	6	17	4	2			8	4	1		1	1					
	4.0	128	34	6	9	6	5	4	5		16	12			12		12	16	16	1	
	4.5	128	3	30	16		2	13		4	136	84			6			20	44	32	
	5.0	224		48	11			2		6	88	12						28	44	192	
	5.5	384		22	4					12	24	12						20	4	240	
	6.0	832		16						2	32				40	24	170	8	16	272	
	6.5	704		2	1		cm	cm						152	56	935	8	8	112		
	7.0	64					12	1	12					112	32	2465	20	8	48		
	7.5						13	2	13	20											
	8.0						14	1	14	8				16	8					16	2
	8.5						15	1	15	20				8	32						
	9.0						16	3	16	40										16	1
	9.5						17	4	17	16										96	4
	10.0						18	3	18	20								1		32	6
10.5						19	1	19	8				1						16	2	
11.0						20	1	20	4												
11.5						21	2	21	4												
12.0						22	1	22	4							cm					
12.5						23		23							19	i					
13.0						24		24	4												
13.5																					
14.0																					
14.5																					
15.0																					
NUMBER PER HOUR	2464	65	128	47	87	40	170	5	24	30.4	12.4	5	329	176	19	6549	125	140	1088	16	
MEAN LENGTH																					
STANDARD DEVIATION																					
STANDARD ERROR																					
COMMENTS																					

TABLE XVII ctd

NORTH SEA INTERNATIONAL 0-GROUP GADOID SURVEY

COUNTRY: NETHERLANDS VESSEL: TRIDENS YEAR: 1979 SPECIES: SANDEELS (SHEET 2)

ICES RECTANGLE SURVEY NUMBER DATE HAUL	45F2	46F2	44F3	44F2	44F1	43FO	43F1	43F2	43F3	42F3	41FS	41F6	40F6	40F7	41F7	42F7	42FS	42F4	41F4	40F4
	266 23	266 24	276 27	276 28	276 29	286 30	286 31	286 32	286 33	286 34	296 35	296 36	296 37	296 38	27 39	27 40	27 42	27 43	37 44	37 45
0.5																				
1.0																				
1.5											2									
2.0											22									
2.5										1	12	1	2	1						6
3.0										5	4									
3.5										6	11	6	3	2						
4.0									1	9	4	1	1	1					12	
4.5								2			11	1	1	1					24	6
5.0											3		1	1		8		4	26	26
5.5	640	12	1	2	32			1		1	2	1	1		24		4	2	14	
6.0	640	12	11	1	224	64						1			56		2		8	
6.5	1280	4	14	6	672	416											2		16	
7.0	1280		6	2	512	320					1				112					6
7.5	256		3		256	256									280	32				
8.0	256				192	160									560	32				
8.5					128	92									1400					
9.0															1232					
9.5			1												224					
10.0															19	3				
10.5															20	2				
11.0															21	2				
11.5															cm					
12.0															14	6				
12.5															15					
13.0															16	6				
13.5															17	1				
14.0																				
14.5																				
15.0																				
NUMBER PER HOUR	4352	140	36	11	2272	1821	25	3	1	22	72	11	18	6	382	160	15	23	64	84
MEAN LENGTH																				
STANDARD DEVIATION																				
STANDARD ERROR																				
COMMENTS																				

TABLE XVII ctd

NORTH SEA INTERNATIONAL 0-GROUP GADOID SURVEY

COUNTRY NETHERLANDS

VESSEL TRIDENS

YEAR 1979

SPECIES SANDGELS (SHEET 3)

ICES RECTANGLE		40FS	39FS	38FS															
SURVEY NUMBER																			
DATE		3-7	3-7	3-7															
HAUL		46	47	48															
LENGTH IN 0.5 CM GROUPS	0.5																		
	1.0																		
	1.5		8	5															
	2.0	4	38	12															
	2.5			2															
	3.0		2																
	3.5	1	5																
	4.0	3	2	1															
	4.5	2																	
	5.0	1	1																
	5.5	1	2																
	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		12	58	20															
MEAN LENGTH																			
STANDARD DEVIATION																			
STANDARD ERROR																			
COMMENTS																			

TABLE XVIII

NORTH SEA INTERNATIONAL O-GROUP GADOID SURVEY

COUNTRY NORWAYVESSEL JOHAN HJORTYEAR 1979SPECIES SANDLELL (SHEET 1)

ICES RECTANGLE SURVEY NUMBER		51F3	51F2	49F2	48E8	48E9	48F0	48F1	48F3	47F2	47F1	47F0	47E9	46E7	46E8	46E9	46F0	46F1	46F2	46F3	45F3	
DATE		13.6	13.6	15.6	16.6	16.6	16.6	16.6	17.6	18.6	18.6	18.6	18.6	19.6	19.6	19.6	19.6	20.6	20.6	20.6	21.6	
HAUL		1	2	10	14	15	16	17	19	21	22	23	24	25	26	27	28	29	30	31	32	
LENGTH IN 0-5 cm GROUPS	0-5				76																	
	1-0				253																	
	1-5				505																	
	2-0				505																	
	2-5				657																	
	3-0		3	3	480																	
	3-5				354										35							
	4-0		2		152				10	2	30	7	5	19	35							93
	4-5				76				98		182	30	8	22	50	8	3	56	19	74	1	
	5-0				177			1728	157		365	26	14	11	40	6	111		96	7		
	5-5				51	80		2160	157		106	8	8	25	20	2	9	111		96	7	93
	6-0				25	320		1026	59		76			22			3	56		89	5	
	6-5				25	320		270						22		2	2	11	37	89	6	278
	7-0				25	220		162				1	1	8	5	1	2	33	93	52	2	93
	7-5				25	60		54						6	20	12	1	44	111	30		463
	8-0				51	20								3	140	14	2			30		185
	8-5				25										70	10	1		93	52	1	463
	9-0														30	3			279	119	1	1111
	9-5															1			706	96	1	2407
	10-0																1		204	7		1111
	10-5															24						185
11-0															120							
11-5															88							
12-0															128	1						
12-5															144	2						
13-0															160	3						
13-5															48							
14-0															80							
14-5															64	1						
15-0															24							
NUMBER PER HOUR		?	5	3	3462	1020	5400	491	2	759	73	37	116	445	16	37	433	1542	830	31	6482	
MEAN LENGTH																						
STANDARD DEVIATION															8							
STANDARD ERROR															8							
Σfx															8							
Σfx^2															8							
COMMENTS		Entangl ed in the meshes			Start on 10.5 cm!																	

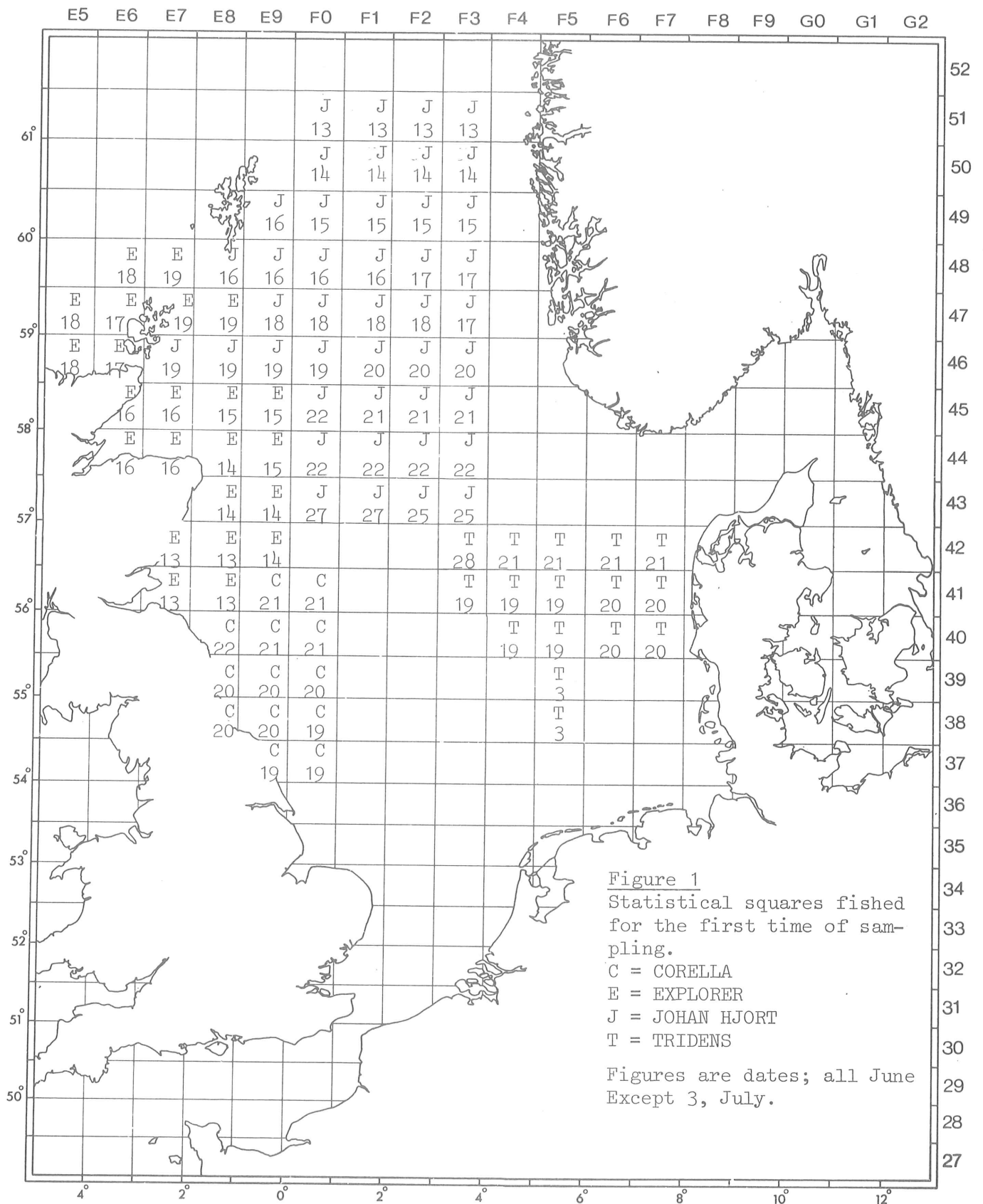
COUNTRY NORWAY

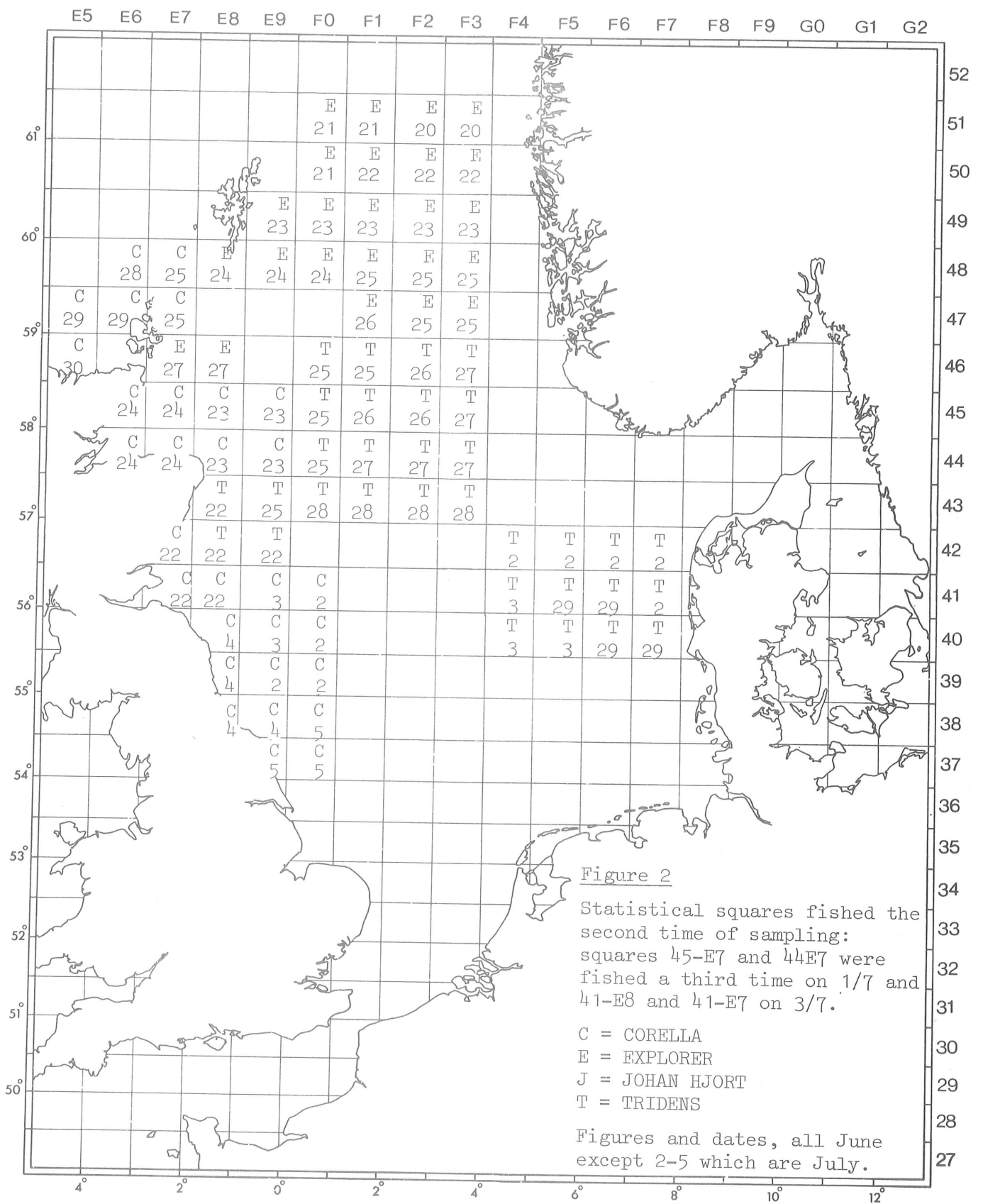
VESSEL JOHAN HJORT

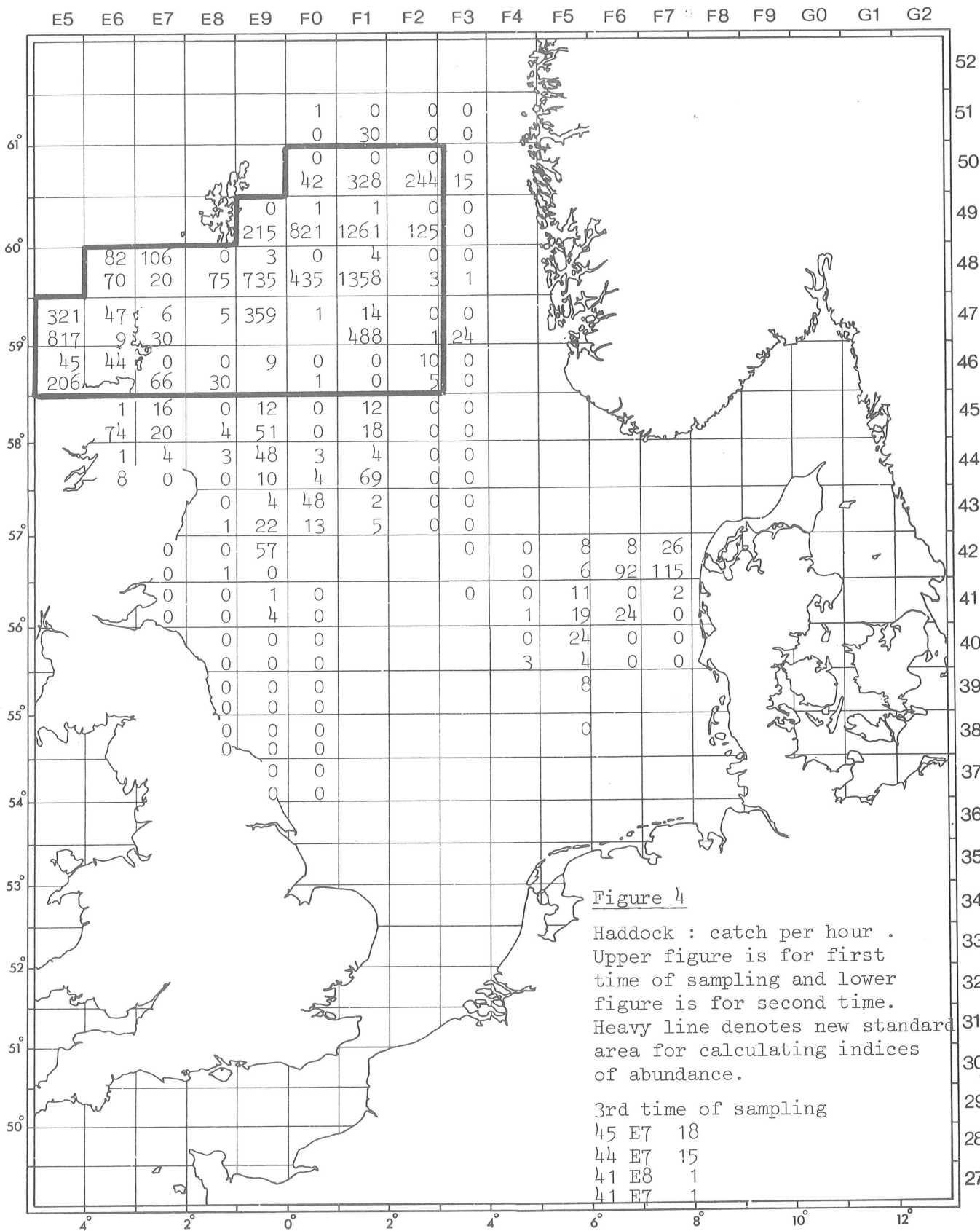
YEAR 1979

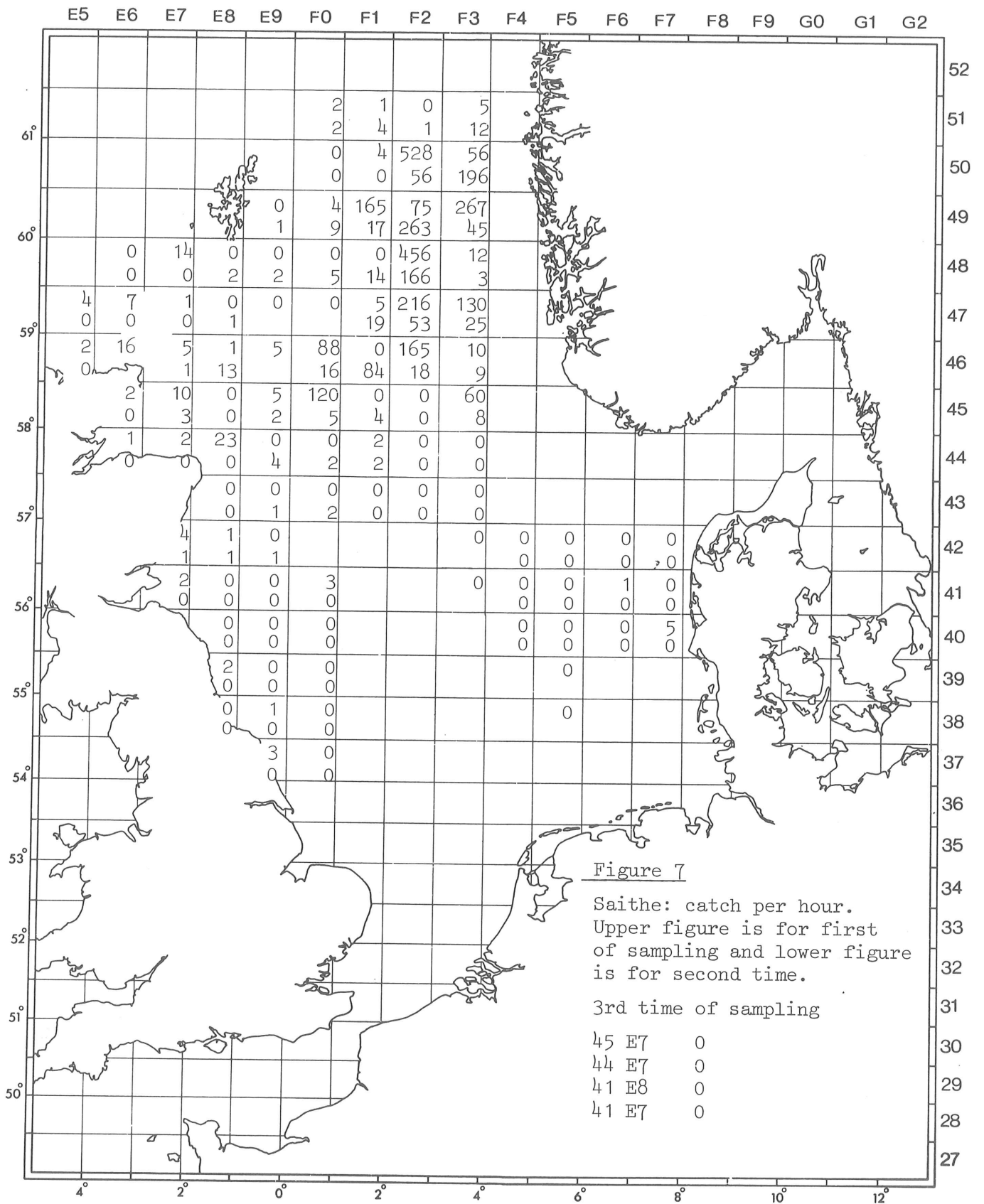
SPECIES SANDEEL (SHEET 2)

ICES RECTANGLE SURVEY NUMBER		45F2	45FO	44FO	44F1	44F2	44F3	43F3	43F2	43FO	43F1								
DATE		21.6	22.6	22.6	22.6	22.6	22.6	25.6	25.6	27.6	27.6								
HAUL		33	35	36	37	38	39	40	41	42	43								
LENGTH IN 0.5cm GROUPS	0.5																		
	1.0																		
	1.5																		
	2.0																		
	2.5																		
	3.0			4				2											
	3.5		28	4				5	1										
	4.0		14	16	24	8	4	2	1										
	4.5		209	48	114	56	2					3							
	5.0	17	223	52	227	60	2		1			20							
	5.5	50	209	52	81	32						14							
	6.0	83	28	16	114	32	2				56	11							
	6.5	117		8	81	8	1				240	8							
	7.0	83			32						216	8							
	7.5	17			16	4					88	1							
	8.0	50									16	2							
	8.5	183									8	2							
	9.0	117																	
	9.5	50																	
	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		767	711	200	689	200	14	9	4	624	69								
MEAN LENGTH																			
STANDARD DEVIATION																			
STANDARD ERROR																			
$\sum fx$																			
$\sum fx^2$																			
COMMENTS																			









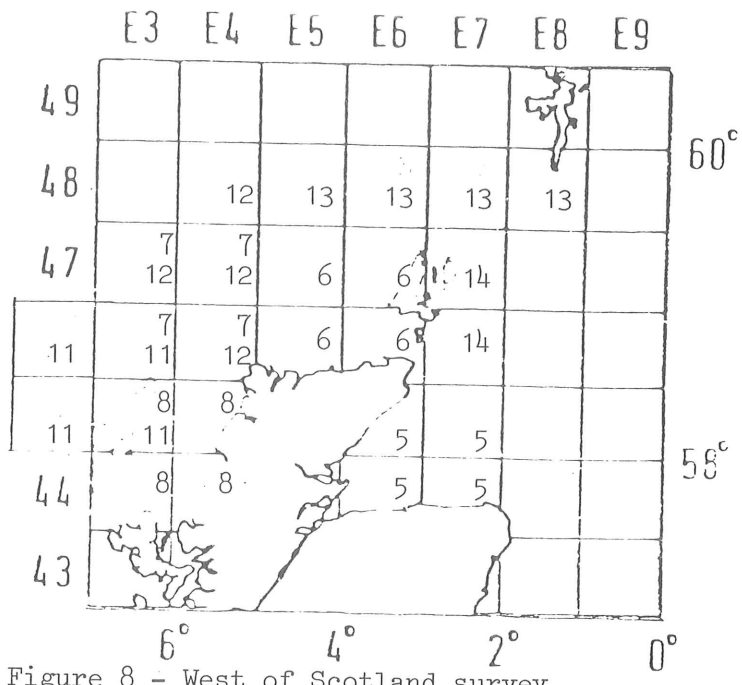


Figure 8 - West of Scotland survey
Dates when squares were fished.

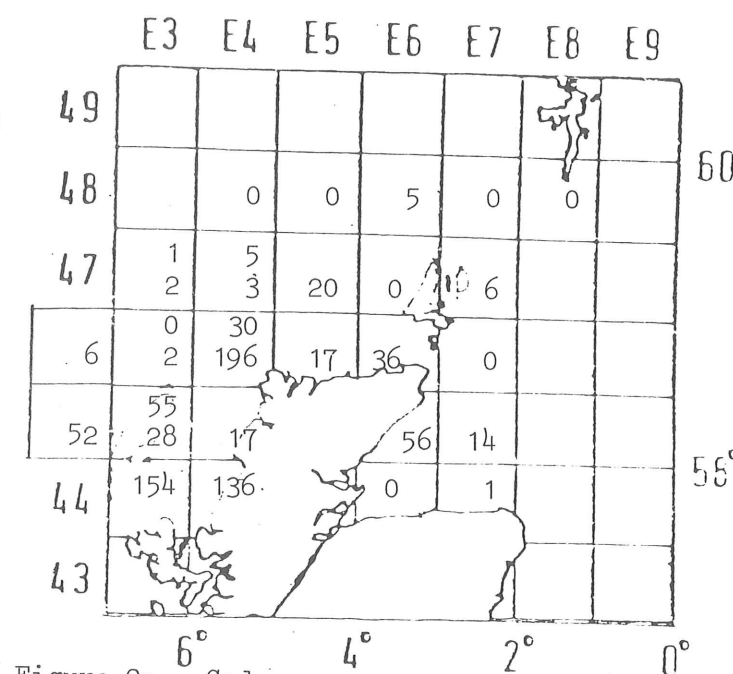


Figure 9a - Cod

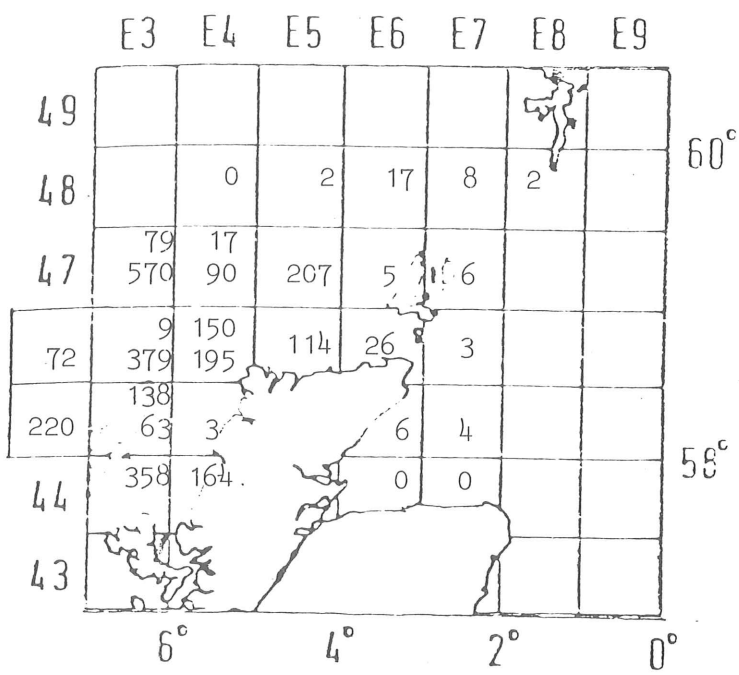


Figure 9b - Haddock

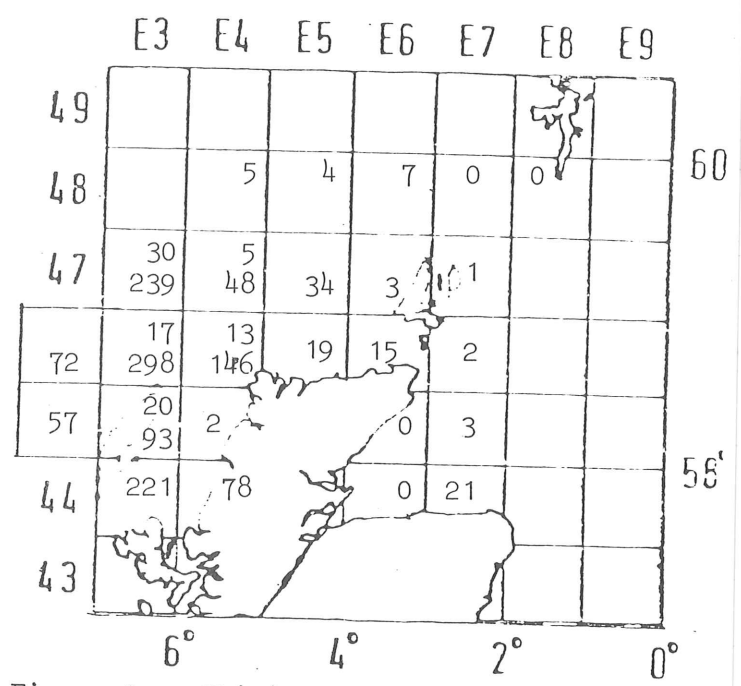


Figure 9c - Whiting

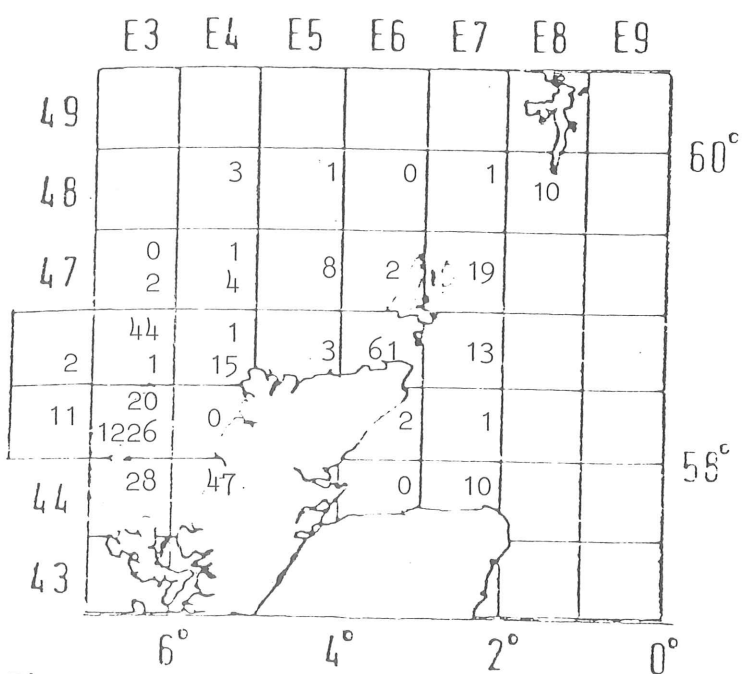


Figure 9d - Norway Pout

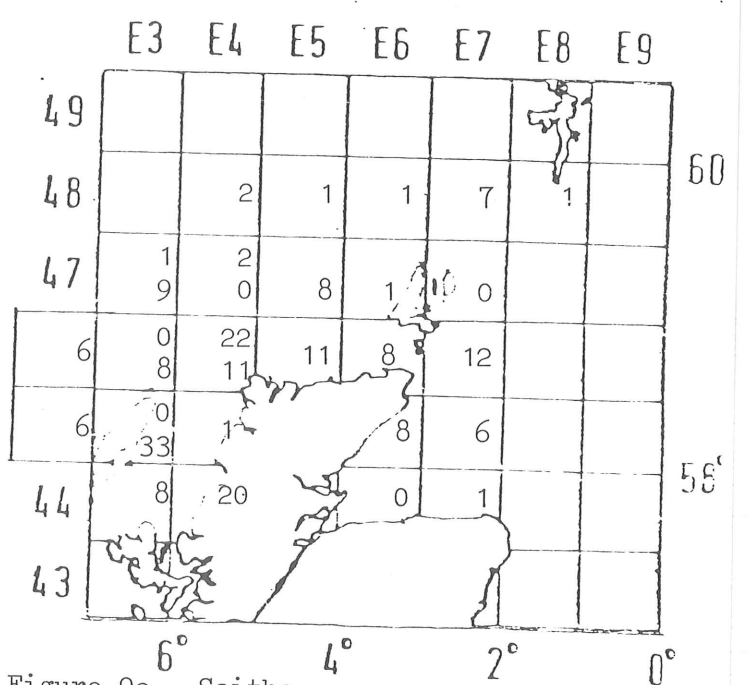


Figure 9e - Saithe

Figure 9 - Numbers of 0-group roundfish per hour fishing during the west of Scotland survey.