International Council for the
Exploration of the Sea

C.M.1975/F:5
Demersal Fish (Northern) Committee

REPORT OF THE NORTH SEA ROUNDFISH WORKING GROUP

Charlottenlund, 10-14 March 1975

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Report of the North Sea Roundfish Working Group

Introduction

At the 1974 Council Meeting in Copenhagen it was resolved (C.Res.1974/2:24) that the North Sea Roundfish Working Group should meet at Charlottenlund from 10-14 March 1975 to:

a) assess TAC's for 1976 for North Sea cod, haddock and whiting;

b) revise mesh assessments for whiting;

c) re-assess the effect of NEAFC Recommendation 2 fisheries on these stocks.

The Working Group was also requested to consider regulatory measures for the cod, haddock and whiting stocks to the west of the British Isles, following an extraordinary meeting of NEAFC in Bergen, 13-15 January. The object is to provide assessments on which to base quota schemes for these stocks.

Participation

The following members participated:

R de Clerck	Belgium
N Daan	Netherlands
R Jones (Chairman)	U.K. (Scotland)
H Knudsen	Denmark
J Lahn-Johannessen	Norway
C T Macer	U.K. (England)
G Rauck	Fed. Rep. of Germany
C J Rørvik	Norway
P Sparre	Denmark
G Wagner	Fed. Rep. of Germany

Mr D de G Griffith, ICES Statistician, also attended the meeting.

Current trends in landings

The Working Group noted that landings for 1974 had not been supplied by all countries. This meant that a review of current trends on total landings could only be carried out using such data as had been provided.

Sub-area IV

Cod (Tables 1 and 2)

For cod, landings in 1974 appear likely to be lower than in 1973 continuing a decline that started in 1973. Nevertheless, current landings are still high relative to the long-term level for this species.

Haddock (Tables 3 and 4)

Landings in 1974 appear as though they will be about the same as in 1973.

Whiting (Tables 5 and 6)

Landings for 1974 will be higher than in 1973 and the general indications are that the stock is at a very high level relative to the long-term mean.

Sub-areas VI and VII

Landings of cod, haddock and whiting by all countries from fishing areas to the west of the British Isles are summarised in Tables 7-9.

From Sub-area VI the landings were primarily taken by the United Kingdom with Ireland and France contributing to a lesser extent.

In the Irish Sea (Division VIIa) the principal landings were primarily taken by France, Ireland and England.

In Divisions VIIb,c,d,e the landings were primarily taken by France and England.

Off the south coast of Ireland (Divisions VIIg-k) landings were taken by France. It was noted that high landings of whiting recorded in Divisions VIIg-k in 1972 and 1973 were really due to landings of Norway pout by the Netherlands.

Cod (Table 7)

Landings from all areas combined reached a maximum of 48 000 tons in 1967 and have since tended to decline.

Haddock (Table 8)

Landings from all areas reached a maximum of 58 000 tons in 1972 and have since declined. The provisional figures for 1974 suggest that the 1974 catch will be considerably lower than that of 1973.

Whiting (Table 9)

Landings from all areas reached a maximum of 53 000 tons in 1967 and have tended to decline since then.

General comment

A major reason for the large fluctuations that have occurred in cod, haddock and whiting landings in recent years has been the large variation in year class strengths. For each species, the peak landings that have been recorded during the last decade have been due to particularly good year classes.

In the North Sea, for example, for cod the high landings in 1972 were the consequence of two very good year classes in 1969 and 1970.

For haddock, the high landings in 1969 and 1970 were due to an exceptionally strong year class in 1967.

For whiting, high landings occurred in 1969 and 1970 due to the good year class in 1967. Since then the landings have been maintained at a relatively high level by other good year classes in 1971 and 1972.

Similar observations apply to those stocks to the west of the United Kingdom and Ireland for which the necessary data are available (i.e. VIa cod, haddock, whiting; VIIa cod, whiting; VIb haddock).

To a certain extent, therefore, the recent decline in many of the landings can be regarded as a consequence of poorer year classes.

Fishing effort

The Working Group noted that the North Sea gadoid stocks were so heterogeneous and fished by so many different gears that to measure total effort in units of any one gear might be misleading.

Instead, annual estimates of the instantaneous rate of fishing mortality (F) were estimated from the Virtual Population Analysis (Table 27).

Estimates for the years 1971-74 have not been tabulated since the method provides less reliable values for the most recent 3 or 4 years in the analysis.

North Sea

For cod, values of F tended to increase from 1963-69. It is believed that F has increased further since then, but the estimated values are less reliable. For haddock and whiting, values of F tended to decrease from 1959 yo 1964 and then increased until 1970. Fishing mortality on 0- and I-group whiting appears to have increased substantially in recent years (Table 29).

Division VIa

For cod the estimates are from 1966 to 1970 and there is no discernible trend. For haddock the value of F tended to decline from 1964 to 1970.

The values shown in Table 27 were obtained by weighting the values of F for each age by the numbers in the stock at that age.

Estimates of Total Allowable Catch

Estimates of TACs for 1976 have been made with the objective of limiting catch to a level that should prevent fishing effort from increasing above the level in 1973. Estimates for this purpose have been determined for all areas. The estimates are given below.

Table A. TACs for 1976 (in metric tons) for COD, HADDOCK and WHITING by Divisions and Sub-areas.

Divisions	Cod	Haddock	Whiting
VIa	12 000	13 500	14 000
VIb	1 500	3 250	500
VIIa,f	9 000	2 000	8 650
VIIb,c	2 000	1 400	1 900
VIId,e	3 500	500	5 000
VIIg-k	3 650	3 750	4 000
Sub-areas			
IV	210 000	155 000	160 000
VI	13 500	16 750	14 500
VII	18 150	7 650	19 550

The Group considered assessments of the TACs needed to reduce fishing effort to a level which in the long term would be expected to maximise yields per recruit. With reference to this, it was felt that a more appropriate objective would be to maximise total sustainable yields. In order to do this, however, a great deal more needs to be known about the stock/recruitment relationship and the possible effects on growth and natural mortality of changes in stock size. The

Group was not able, therefore, to estimate by how much effort ought to be changed or to what extent it ought to be possible to increase yields above their present levels. It was recommended that more research was needed on the biology of growth, natural mortality and stock and recruitment.

Notwithstanding this, the Group agreed that the cod, haddock and whiting stocks in Sub-areas IV, VI and VII were all being exploited at such a level that fishing effort should not be allowed to increase beyond its present level.

For the North Sea, TACs for 1976 were made as follows:

a) The numbers of fish surviving from 1973 until 1976 were calculated to determine their contribution to the landings in 1976.

b) The contribution to the 1976 catch of those year classes which had not played a significant part in the fishery until after 1973 was then calculated.

The two contributions a) and b) were then combined to provide an estimate of the TAC for 1976.

Regarding Division VIa, it was noted that there was a fairly good correlation between year class strengths in this fishing area and those in the North Sea (Figure 1). TACs for VIa were therefore calculated by taking the proportion

$$\frac{\text{VIa TAC}}{\text{VIa landings 1969-73}} = \frac{\text{North Sea TAC}}{\text{North Sea landings 1969-73}}$$

The Group noted that because the landing statistics for 1974 were incomplete, TACs for 1976 had to be predicted from 1973 data. This means that the results depend on 3-year predictions and to that extent must be regarded as less reliable than they would have been had the predictions each been for two years only.

The Group also noted the large extent to which the final values were dependent on estimates of year class strengths. Unlike some stocks, the gadoid stocks in Sub-areas IV, VI and VII are composed mainly of young fish (due to a relatively high rate of exploitation and a relatively young age at first capture), and are subject to relatively large fluctuations in year class strength. As a result, stock sizes (and hence landings) are subject to relatively large annual fluctuations. This makes TAC predictions potentially less reliable than for some other fishing areas. For example, it is now believed that cod and haddock TACs for 1975 were set at too high a level.

The Group noted that estimates of TAC for haddock depend to a large extent on the estimates of year class strength obtained using Scottish research vessels. For North Sea cod and whiting, estimates of year class strength are being provided by the International Young Herring Surveys. For example, the Group was able to benefit from estimates obtained during the 1974 Survey. It is expected that once a long enough series has been collected, this source of data should also be suitable for estimating haddock and whiting year class strength in the North Sea.

For fishing areas other than Sub-area IV and Division VIa there were insufficient data for estimating TACs by the same methods. As a first approximation it was decided to take the average of the last 5 years for each division and to adopt these as the recommended TACs for 1976. The Group regretted the lack of 1974 data for some countries.

Whiting mesh assessments

In a previous Report (Doc. C.M.1974/F:5) the Working Group had noted that one of the difficulties of making mesh assessment for North Sea demersal fish species was the difficulty of distributing potential gains (or losses) between different countries.

If there is an increase in mesh size the immediate effect is to "release" (i.e. fail to capture) a certain number of fish that would otherwise have been caught. Fish "released" in this sense may be recaptured by the country concerned or, depending on its movements and the distribution of fishing effort, may be recaptured by the vessels of some other nation.

This difficulty does not prevent estimates being made of the effect of mesh size changes on the North Sea fishery as a whole. It does make it difficult, however, to calculate long-term gains (or losses) for individual countries.

As a basis for further calculations, the Group reviewed what was known of the distribution of fishing effort and the movements of whiting within the North Sea. Using this information, estimates were made of the proportions of fish "released" by each country that were expected to be subsequently captured by other countries (Tables 26a and b).

Mesh assessments for all countries combined were then made using the method of Gulland (1961), which is an approximation of the Beverton and Holt model. Estimates of the gains or losses for each country separately were made using a modification of the Gulland method to take account of the information provided in Tables 26a and b.

Estimates were also made using a method developed by K P Andersen of the Danish Institute for Fisheries and Marine Research, based on the Beverton and Holt model.

A selection factor of 3.8 was adopted and the mesh sizes quoted refer to double synthetic twine. Values for mesh sizes in use by each country were taken from Table 28 of the previous Report (C.M.1974/F:5). Assumptions were made for two combinations of increases in mesh size:

1. assuming there was no change in the mesh size for Denmark, but that other countries increased their mesh sizes to either 80 mm or 90 mm;
2. assuming that all countries, including Denmark, increased their mesh sizes to either 80 mm or 90 mm.

A summary of the effects for all countries combined is given in Table B below.

Table B. Long-term effects (tons and percentages) on all countries of changes in mesh size.

Mesh size	Increased mesh size, including Denmark	Increased mesh size, excluding Denmark
80 mm	+ 50 000 to + 69 000 (+41% to +56%)	+ 3 000 (+2%)
90 mm	+ 27 000 to + 72 000 (+22% to + 59%)	- 6 000 to + 4 000 (-5% to + 3%)

Details for individual countries are summarised in Tables 29-32.

Effect of mesh increases (Denmark excluded) (Tables 29 and 30)

For all countries combined an increase in mesh size to 80 mm should increase landings by 2% or 3 000 tons. An increase in mesh size to 90 mm should cause landings to change by -5% to +3%, i.e. by -6 000 tons to +4 000 tons. Increases to both 80 mm and 90 mm would probably lead to losses for Scottish and Dutch vessels and gains for other countries. Since there was no change in the Danish

mesh size, the major benefit would go to Denmark. The results from the Gulland and the Andersen methods agreed well except for the values for Denmark. This is because Andersen allowed for the fact that if there was no change in the Danish mesh size, Danish vessels would catch fish "released" by other vessels before they were large enough to be captured by those vessels. Andersen's method therefore gives higher values for Denmark and correspondingly lower values for other countries. It was considered that of the two methods, the results obtained by the Andersen method were to be preferred in this instance.

Calculations for the Netherlands were made with reference to the quantities caught. For this reason, the values given for the Netherlands underestimate the expected gains in the landings.

Effect of mesh increases (Denmark included) (Tables 31 and 32)

For all countries an increase in mesh size to 80 mm would increase landings by 41% to 56%, or 50 000 to 69 000 tons. An increase to 90 mm should increase landings by 22% to 59%, or 27 000 to 72 000 tons. If all countries increased their mesh sizes to either 80 mm or 90 mm there would be gains for all countries except possibly Denmark.

Comparison of the results from the two methods gave reasonably good agreement except for the values for Denmark. This was because Andersen had assumed that after an increase in mesh size, the length composition of the Danish catch would tend to resemble that of other countries and contain a larger proportion of large whiting.

The Working Group had not had time to allow for this assumption as well as for the alternative assumption in the calculations they had done. It was felt, however, that the assumption was a reasonable one and, if adopted, would mean that the Andersen estimates for the Danish catches should be preferred.

The Group noted with concern that there are still some countries that do not provide length composition data. Assessments therefore had to be made using only length compositions for those countries which had supplied them. Therefore, the results obtained can only be regarded as approximate.

Distribution of fishing effort

Information on the distribution of fishing effort by statistical rectangles is available for the United Kingdom, the Netherlands and Denmark. Results for the United Kingdom and the Netherlands are summarised in Figures 2-10.

Fishing effort by Scottish vessels is largely confined to the northwestern part of the North Sea, mainly to the north of latitude 56°N and to the west of longitude 5°E.

English seiners largely fish south and east of a line drawn from Aberdeen in Scotland to Bergen in Norway. English trawl effort is largely confined to the same region but with the addition of a certain amount of effort to the north and west of the Orkney and Shetland Islands.

Dutch beam and otter trawlers are mainly confined to a region to the south and east of a line drawn from Newcastle in England to Esbjerg in Denmark. Dutch herring trawlers tend to be more widely distributed throughout the North Sea except in a region to the west of Denmark as far as longitude 5°E.

The Danish Recommendation 2 fisheries, and the Recommendation 4 roundfish fisheries, are distributed extensively over the entire North Sea.

The Norwegian Recommendation 2 fisheries are largely confined to Division IVa.

The effect of NEAFC Recommendation 2 fisheries

This assessment was confined to the effect of NEAFC Recommendation 2 fisheries on the North Sea Recommendation 4 fisheries for cod, haddock and whiting.

Tables 10-12 show the quantities of cod, haddock and whiting taken from Recommendation 2 fisheries in Sub-area IV, based on information sumbitted to NEAFC.

Length composition data of Recommendation 4 species from these fisheries were available only from Denmark (haddock and whiting) and Norway (haddock) (Tables 13 and 14).

For haddock and whiting estimates were made by considering the effect of an increase in mesh size in the Recommendation 2 fisheries to 80 mm.

Few cod are taken in the Recommendation 2 fisheries, and in the absence of length composition data, estimates for this species were made on the basis of landing statistics.

For whiting, an estimate was also made of the effect of the Recommendation 2 fisheries on recruitment of marketable-sized whiting using data compiled on the VPA.

For cod it is estimated that the Recommendation 2 fisheries reduce catches in the Recommendation 4 fisheries by 11% (Appendix I).

For haddock, the value obtained was just under 20% (Appendix I).

For whiting it was estimated that an increase in mesh size in the Recommendation 2 fisheries to 80 mm would increase the catch of marketable-sized whiting by 32 000 tons. This represents an increase in the landings of marketable-sized whiting of 26% (see Appendix I for computational details). The alternative method of calculation by allowing for the recruitment of marketable-sized whiting showed that the Recommendation 2 fisheries reduce the recruitment of marketable-sized whiting by about 25% (see Appendix I). For this species it was noted that more than 98% of the effect was due to one nation (Denmark).

Comments on the ICES ADP Working Group objectives

The Working Group considered the request from the ICES ADP Working Group for a more detailed set of instructions for combining and manipulating basic data. There was not time to prepare this information during the meeting, but it was decided to do this by correspondence.

Meantime, the Group draws the attention of the ICES ADP Working Group to pages 4-5 in a previous Report (Doc. C.M.1973/F:12) outlining the general requirements for roundfish assessments.

Recommendations

1. The North Sea Roundfish Working Group recommended that meetings for estimating TACs should be held as late as possible prior to the Liaison Committee meeting . This is to allow the maximum possible time for tabulating data for the previous year and for obtaining year class strength estimates for the International Young Herring Surveys (IYHS).

2. In view of the importance for estimating TACs of year class strength estimates, the Group recommended that:

   a) every attempt should be made to ensure the continuity of the Scottish pre-recruit surveys;

   b) the IYHS should continue to collect roundfish data from the North Sea.

3. The Working Group recommended that countries that do not at present collect cod, haddock and whiting length composition data should do so. If possible, age composition data should also be collected.

4. The Group recommended that in view of the importance of estimating the optimum yield rather than the optimum yield/recruit, more fundamental biological research should be done on recruitment, growth and natural mortality.

Reference

Gulland, J. A., 1961. The estimation of the effect on catches of changes in gear selectivity. J.Cons.int.Explor.Mer, 26(2):204-214.

Table 1 Nominal catch of Cod for Divisions IVa-IVc by country in metric tons, 1970-1974 (Bulletin Statistique)

Country	1970	1971	1972	1973	1974[1]
Belgium	8 076	19 334	21 133	11 741	8 359
Denmark	40 017	68 179	72 580	47 950	52 590
England	38 464	55 525	62 503	47 327	38 827
Faroe Islands	78	123	284	803	-[2]
France	16 058	24 254	23 507	14 373	5 579
German Dem.Rep.	3	18	122	343	132
Germany, F.R.	23 276	51 623	49 998	21 410	19 328
Iceland	0	1	-	-	-
Netherlands	25 212	46 614	47 634	25 758	22 771
Norway[3]	6 416	9 046	6 033	4 833	2 287
Scotland	30 079	37 229	55 190	48 844	45 336
Sweden[4]	8 925	9 062	8 769	8 074	8 252
Poland	219	178	189	1 551	4 750
USSR	32 147	5 153	774	2 497	-[2]
Total	228 970	326 339	348 716	235 504	208 211

1) preliminary
2) data lacking for 1974
3) Cod caught in Recommendation 2 fisheries included
4) including IIIa

Table 2 Nominal catch of Cod in the North Sea by Divisions in 1 000 metric tons according to Bulletin Statistique for 1967 - 1973

Year	IVa	IVb	IVc	Total
1967	89.9	134.3	25.6	249.8
1968	74.1	175.9	35.3	285.3
1969	55.8	122.2	21.2	199.2
1970	80.6	113.5	34.9	229.0
1971	68.1	190.0	68.2	326.3
1972	81.8	205.7	51.2	348.7
1973	70.3	135.2	30.0	235.5

For Sweden IIIa included with IVa.

For Norway, cod caught in IVa Recommendation 2 fisheries included.

Table 3 Nominal catch of Haddock for Divisions IVa-IVc by country in metric tons, 1970-1974 (Bulletin Statistique)

Country	1970	1971	1972	1973	1974[1]
Belgium	3 691	971	1 601	2 385	916
Denmark	158 276	31 043	34 858	13 118	42 729
England	19 500	16 648	20 827	15 586	10 395
Faroe Islands	-	-	5	1 198	-[2]
France	10 392	8 436	7 595	4 496	3 790
German Dem.Rep.	-	-	-	22	8
Germany F.R.	5 075	3 045	4 020	4 587	2 477
Iceland	0	1	-	-	-
Netherlands	8 278	6 914	5 188	3 185	2 839
Norway[3]	4 541	5 575	6 831	5 611	6 165
Scotland	112 952	121 539	96 197	88 132	74 973
Sweden[4]	8 704	5 857	5 305	4 550	2 959
Poland	-	-	38	2 553	3 001
USSR	344 000	62 398	36 467	49 356	-[2]
Total	675 409	262 427	218 932	195 779	150 252

1) preliminary

2) data lacking for 1974

3) Haddock caught in Recommendation 2 fisheries included

4) including IIIa

Table 4 Nominal catch of Haddock in the North Sea by Divisions in 1 000 metric tons according to Bulletin Statistique for 1967-1973

Year	IVa	IVb	IVc	Total
1967	122.5	44.8	0.1	167.4
1968	75.3	62.7	1.4	139.5
1969	271.9	361.8	5.4	639.2
1970	459.3	212.6	3.5	675.4
1971	201.6	58.2	2.6	262.4
1972	140.5	75.3	3.1	218.9
1973	131.5	62.3	2.0	195.8

For Sweden IIIa included with IVa.

For Norway, haddock caught in IVa Recommendation 2 fisheries included.

Table 5 Nominal catch of Whiting for Divisions IVa - IVc by country in metric tons, 1970-1974 (Bulletin Statistique)

Country	1970	1971	1972	1973	1974[1)]
Belgium	2 799	2 108	2 745	3 387	2 629
Denmark	102 698	55 618	50 109	73 928	100 888
England	3 398	4 158	3 789	4 592	4 914
Faroe Islands	-	-	-	1 453	-[2)]
France	25 842	15 863	19 171	22 219	16 802
German Dem.Rep.	-	-	-	5	-
Germany, F.R.	392	233	264	403	1 427
Netherlands	10 115	6 322	7 613	8 811	11 849
Norway[3)]	1 316	1 630	2 051	1 527	5 068
Scotland	21 080	26 755	23 846	20 756	22 220
Sweden[4)]	820	616	596	2 328	910
Poland	-	-	-	7	1 002
U.S.S.R.	14 319	541	613	3 522	-[2)]
Total	182 779	113 844	110 797	142 938	167 709

1) preliminary
2) data lacking for 1974
3) Whiting caught in Recommendation 2 fisheries included
4) including IIIa

Table 6 Nominal catch of Whiting in the North Sea by Divisions in 1 000 metric tons according to Bulletin Statistique for 1967 - 1973

Year	IVa	IVb	IVc	Total
1967	43.2	41.4	6.6	91.2
1968	51.7	76.9	16.3	144.9
1969	29.6	158.2	11.2	199.0
1970	33.5	126.0	23.3	182.8
1971	24.3	70.7	18.8	113.8
1972	34.3	66.7	9.8	110.8
1973	34.4	96.6	13.4	144.4

For Sweden IIIa included in IVa.

For Norway, whiting caught in Recommendation 2 fisheries included.

Table 7 Sub-areas VI and VII. Cod
Quantity (nominal catch in metric tons) landed by all countries (Bulletin Statistique)

Area \ Year	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974[2]
VIa	23 164	23 033	17 129	23 021	24 357	21 739	12 682	10 032	14 936	10 515	12 162
VIb	973	1 189	1 522	2 189	665	2 533	875	807	2 218	1 155	
VIIa	5 143	7 107	6 437	13 973	10 055	8 823	7 182	9 698	8 244	10 057	
VIIb,c	2 004	2 962	206	1 479	2 259	4 418	2 049	2 153	622	838	
VIId,e	978	2 857	1 064	3 267	4 113	3 856	2 553	5 425	3 537	2 071	8 018
VIIf	-*)	-*)	-*)	-*)	-*)	-*)	-*)	-*)	657	387	
VIIg-k	3 197	4 042	14 873[1]	4 410	3 843	4 412	3 318	3 648	2 481	4 400	
Total	35 459	41 190	41 231	48 339	45 292	45 781	28 659	31 763	32 695	29 423	20 180

*) included with VIIa
1) includes VIIa+f, VIIb+c for France
2) provisional data

Table 8 Sub-areas VI and VII. Haddock
Quantity (nominal catch in metric tons) landed by all countries (Bulletin Statistique)

Area \ Year	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974[2]
VIa	26 835	32 467	29 881	20 302	20 469	26 273	34 178	45 323	40 152	28 535	14 916
VIb	2 416	548	1 935	874	903	1 125	840	1 047	9 872	3 418	
VIIa	1 885	804	407	2 680	658	857	701	1 819	2 204	2 169	
VIIb,c	2 022	1 442	245	787	433	758	1 922	2 315	1 125	1 036	
VIId,e	337	257	37	111	88	811	421	164	390	345	1 775
VIIf	-*)	-*)	-*)	-*)	-*)	-*)	-*)	-*)	365	1 848	
VIIg-k	10 435	7 135	8 966[1]	3 765	2 547	2 966	2 887	2 954	3 765	6 210	
Total	43 930	42 653	41 471	28 519	25 098	32 790	40 949	53 622	57 873	43 561	16 691

*) included with VIIa 1) includes VIIa+f, VIIb+c for France 2) provisional data

Table 9 Sub-areas VI and VII. Whiting
Quantity (nominal catch in metric tons) landed by all countries (Bulletin Statistique)

Area \ Year	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974[2]
VIa	12 738	19 179	15 542	17 586	13 989	12 181	11 222	13 968	13 137	15 266	10 029
VIb	81	125	3 245	2 123	485	369	1 277	807	81	63	
VIIa	15 972	14 723	6 527	20 475	14 615	12 580	6 840	7 476	6 328	9 414	
VIIb,c	517	600	276	2 246	3 249	3 595	1 507	1 381	2 065	952	
VIId,e	5 138	2 866	1 307	5 554	6 640	5 066	4 825	4 193	4 882	5 644	9 559
VIIf	-*)	-*)	-*)	-*)	-*)	-*)	-*)	-*)	232	301	
VIIg-k	4 639	9 018	17 763[1]	4 848	5 187	5 580	2 538	3 972	3 200[3]	4 454[3]	
Total	39 085	46 511	44 660	52 832	44 165	39 371	28 209	31 797	29 925	36 094	19 588

*) included with VIIa

1) includes VIIa+f, VIIb+c for France

2) provisional data

3) Bulletin Statistique total for Netherlands includes 300 tons (1972) and 2000 tons (1973) of Norway Pout; not included in this Table.

Table 10 Nominal catches of Cod (metric tons) from Recommendation 2 fisheries in Sub-area IV (data taken from NEAFC reports)

Country	1970		1971		1972		1973		1974	
	legal-sized	under-sized	legal-sized	under-sized	legal-sized	under-sized	legal-sized	under-sized	legal-sized	under-sized
Denmark	20		8 332	3 601	8 213	1 076	5 189	1 313	2 376	
Germany,F.R.	1 202	3 140	4 125	970	555	54	?	?		1
Netherlands	6 731	-	8 199	-	?	-	?	-	?	-
Norway (IVa)	579	463	730	584	920	736	480	659	733	368
Poland	211	8	181	6	189	23	?	?	?	?
Total[1]	8 723	3 611	21 567	5 161	9 877	1 889	5 669	1 972	733	368

Table 11 Nominal catches of Haddock (metric tons) from Recommendation 2 fisheries in Sub-area IV (data taken from NEAFC reports)

Denmark	145	201	13 657	7 651	9 088	11 568	771	3 155	35 389	
Germany,F.R.	5 913	67	927	32	263	-	?	?	+	
Netherlands	7 003	-	6 341	-	?	-	?	-	?	-
Norway (IVa)	1 726	1 852	2 176	2 336	2 742	2 943	1 055	4 102	3 379	2 356
Poland	-	-	12	1	38	7	?	?	?	?
Total[1]	14 642	1 919	23 113	10 020	12 131	14 518	1 826	7 257	3 379	2 356

Table 12 Nominal catches of Whiting (metric tons) from Recommendation 2 fisheries in Sub-area IV (data taken from NEAFC reports)

Denmark	102	141	20 462	34 493	29 446	20 035	57 194	16 081	100 235	
Germany,F.R.	3 666	262	2 923	119	926	184	?	?	1 081	
Netherlands	2 020	-	1 193	-	?	-	?	-	?	-
Norway (IVa)	789	484	995	610	1 254	769	1 322	166	4 710	312
Poland	-	-	2	-	-	-	?	-	?	?
Total[1]	6 475	746	25 575	35 222	31 626	20 988	57 194	16 247	4 710	312

[1] Total of available data only

Table 13 North Sea Haddock

Annual numbers (thousands) at each length group

Country	Belgium	Denmark	England	Netherlands	Norway	Scotland
Period / Length groups	1973-74	1972-73	1970-73	1970-73	1973-74	1970-73
5-9		616			12 979	
10-14		83 393			75 415	
15-19		57 450			24 790	
20-24		57 090	22		5 447	15
25-29	92	13 961	4 263	268	4 882	26 602
30-34	1 344	2 296	13 031	3 978	3 132	101 939
35-39	918	43	12 753	4 893	1 243	75 698
40-44	347	44	5 644	1 656	470	28 533
45-49	194		2 006	400	8	8 947
50-54	253		738	102		2 264
55-59	14		245	39		678
60-64	7		97	17		312
65-69	14		34	8		
70-74	4		20	4		
75-79	3		6			
80-84			2			
Total	3 190	214 893	38 861	11 365	128 366	244 988

Table 14 North Sea Whiting

Annual numbers (thousands) landed at each length group

Length groups \ Period	Belgium	Denmark	England		Netherlands		Scotland	
	1973-74	1970-73	1970-73		1970-73		1970-73	
			trawl	seine	landings	catch*	trawl	seine
5- 9		106 000						
10-14		359 000				265		
15-19		355 000			28	6 380		
20-24		273 000	298	67	288	59 167	220	781
25-29	2 459	114 000	3 170	1 692	9 563	28 111	5 247	13 347
30-34	5 014	5 000	4 341	3 327	14 584	18 612	11 553	16 666
35-39	1 544		1 603	1 067	4 601	4 815	6 148	7 723
40-44	439		375	158	1 213	1 226	1 616	2 296
45-49	82		73	20	372	372	451	786
≥50	22		9	1	72	72	120	276
Total	9 560	1 212 000	9 869	6 332	30 696	119 020	25 355	41 875

*) including discards

Table 15 North Sea Whiting and Haddock. Revised and updated estimates of numbers (millions) discarded by the Dutch fleet. Estimates for other years remain unchanged. (See Working Group Report C.M.1974/F:5, Table 11)

Year / Age Group	Whiting		Haddock							
	1973	1974	1967	1968	1969	1970	1971	1972	1973	1974
0										
1	147.6	31.8	53.1	333.0	21.2	1.9	17.4	22.3	1.9	53.8
2	9.9	18.8	0.1	1.3	58.8	2.4	0.06	1.0	0.7	0.09
3	3.4	3.9	0.02	0.03	0.4	5.8	0.08	0.04	0.1	0.2
4	0.2	0.5	-	-	0.02	0.03	0.1	-	-	-

Table 16 Northern North Sea Cod (Division IVa)
All countries. Numbers landed (in millions)

Year / Age Group	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974[1)]
1	1.6	0.9	7.0	6.3	7.3	1.8	0.2	3.0	10.4	2.1	5.8	3.1
2	25.0	10.0	9.4	21.2	32.3	18.5	14.4	9.7	25.5	48.8	17.8	14.0
3	3.0	12.0	7.5	6.7	14.5	11.4	10.8	11.2	2.4	10.9	19.4	4.7
4	1.3	2.1	4.5	3.7	2.7	3.0	7.1	4.9	2.8	1.2	3.0	4.9
5	0.6	0.8	1.0	1.9	1.8	0.7	2.3	2.5	1.3	1.2	0.4	1.1
6	0.3	0.3	0.5	0.5	0.8	0.4	0.5	0.7	0.6	0.5	0.3	0.2
7	0.06	0.09	0.18	0.3	0.2	0.2	0.3	0.14	0.2	0.2	0.2	0.15
8	0.06	0.03	0.13	0.2	0.15	0.09	0.08	0.12	0.06	0.08	0.13	0.08
9		0.3			0.06	0.02	0.04	0.07	0.03	0.03		0.03
10			0.04	0.05	0.03	0.01	0.04	0.04	0.03	0.03		0.02
11							0.04	0.02				
Total	31.9	26.5	30.3	40.9	59.8	36.1	35.8	32.4	43.3	65.0	47.0	28.3

1) provisional data

Table 17 Southern North Sea Cod. (Division IVb,c).
All countries. Numbers landed (in millions)

Age Group \ Year	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974[1)]
1	17.1	46.4	32.7	74.7	59.4	8.2	4.9	44.3	50.8	4.2	26.3	3.8
2	12.8	13.7	57.7	50.7	50.1	61.4	8.6	17.7	123.3	146.6	12.7	43.0
3	3.2	4.1	6.1	21.9	12.5	25.4	20.7	5.2	12.0	32.7	32.9	4.5
4	1.8	1.4	1.7	2.9	6.7	8.2	7.9	7.3	3.1	3.9	10.1	9.3
5	1.8	0.7	0.7	0.9	0.9	4.9	2.9	4.3	4.7	1.2	1.5	3.2
6	1.1	1.3	0.3	0.7	1.0	0.9	2.3	1.3	1.8	2.3	0.7	0.7
7	-	0.3	0.3	0.2	0.4	0.4	0.4	0.9	0.5	1.2	0.8	0.3
8	0.4	0.07	0.13	0.2	0.2	0.2	0.3	0.09	0.3	0.5	0.4	0.3
9	-	0.06	0.01	0.08	0.09	0.14	0.13	0.15	0.15	0.3	0.03	0.3
10	-	-	0.03	0.02	0.01	0.09	0.02	0.10	0.05	0.08	0.04	0.06
11	-	-	-	0.03	-	0.02	0.07	0.03	0.05	-	0.06	0.04
12	-	-	-	-	0.01	-	-	0.02	0.03	-	0.05	0.02
13	-	-	-	-	-	-	-	-	-	-	-	-
Total	38.2	68.0	99.7	152.3	131.3	109.9	48.2	81.4	196.8	193.0	85.6	65.5

1) provisional data

Table 18 North Sea Haddock. All countries. Numbers landed (in millions) including Dutch discards.

Year / Age Group	1967	1968	1969	1970	1971	1972	1973	1974[1]
0	1.0	1.0	1.0	1.0	1.0	161.9	41.8	1.0
1	102.0	376.0	96.5	6.3	48.3	194.6	21.6	80.1
2	25.4	190.0	1 728.5	119.1	22.7	216.6	253.7	58.0
3	3.3	26.7	181.8	1 501.1	37.5	26.5	235.2	242.6
4	6.7	2.3	26.8	34.6	372.3	19.5	8.6	51.8
5	194.8	2.2	5.2	0.6	11.4	142.9	5.9	1.4
6	4.8	66.1	2.3	0.5	0.7	3.2	1.5	1.1
7	0.5	0.6	42.5	0.2	0.2	0.1	0.04	10.4
8	0.3	0.1	5.1	2.6	1.8	0.4	0.01	0.2
9	0.04	0.01	0.01	0.02	0.8	0.01	0.01	0.01
10+	0.01	0.01	0.01	0.01	0.2	0.02	0.02	0.01
Total	338.85	665.02	2089.72	1 666.03	496.9	765.73	563.38	446.62

[1] provisional data

Table 19 North Sea Whiting All countries. Numbers landed (in millions) including Dutch discards.

0	149.7	88.0	1 079.4	1 032.8	937.9	432.9	133.0	(10)
1	147.6	476.4	323.0	479.3	275.5	685.1	797.8	749.1
2	78.6	250.6	509.6	28.2	46.4	171.8	361.8	759.6
3	72.9	76.6	105.7	352.2	12.8	36.3	87.4	187.3
4	20.7	45.2	27.2	40.9	111.5	7.5	14.7	29.1
5	58.7	7.6	11.1	10.6	12.4	55.7	3.7	4.1
6	7.5	32.1	1.8	4.2	2.3	6.6	19.1	0.7
7	1.0	3.0	7.7	0.7	0.8	0.9	2.5	4.9
8+	0.2	0.2	0.9	2.2	0.8	0.7	0.6	0.4
Total	536.9	979.7	2 066.4	1 951.1	1400.4	1397.5	1 420.6	1 735.2

Table 20 Cod. West Coast VIa
England and Scotland only. Numbers landed (in thousands)

Year / Age Group	1966	1967	1968	1969	1970	1971	1972	1973
1	74	92	205	78	82	240	168	91
2	1 018	912	791	914	243	634	1 726	300
3	410	1 296	1 717	899	843	375	814	757
4	417	128	1 195	1 407	408	509	368	308
5	255	127	103	578	318	158	309	86
6	21	94	112	96	119	133	69	96
7	15	19	66	78	21	49	55	25
8+	2	11	17	49	35	26	22	28

Table 21 Haddock. West Coast VIa
England and Scotland only. Numbers landed(in thousands)

Age \ Year	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
1	4	3	139	220	4 172	-	-	1 508	205	1 785
2	19 450	1 957	444	1 215	9 242	57 288	177	3 727	16 992	4 244
3	12 155	87 418	599	219	1 446	6 618	75 783	8 916	1 538	14 441
4	494	3 308	46 459	166	233	991	2 779	111 465	1 843	202
5	269	140	1 670	23 786	584	279	124	472	41 271	643
6	1 408	113	44	233	11 613	301	70	38	468	23 591
7	549	94	30	8	659	3 801	108	2	20	96
8+	248	16	58	16	55	199	459	125	60	88

Table 22 Whiting. West Coast VIa
England and Scotland only. Numbers landed (in thousands)

1	537	1 386	878	466	4 177	1 595	16	1 160	8 132	9 777
2	6 841	1 122	7 369	3 963	10 613	16 862	781	5 192	6 105	20 146
3	3 198	23 060	831	5 428	6 257	4 597	19 289	2 814	3 327	3 032
4	374	1 955	23 180	293	1 564	1 263	2 399	25 273	1 109	892
5	118	230	1 275	14 621	113	523	493	1 281	11 922	234
6	44	91	155	655	2 010	48	151	253	638	2 064
7	16	4	20	448	105	647	1 025	49	48	142
8+	3	2	7	9	10	87	235	68	71	18

Table 23 Revised estimates of year class strength

Year class	COD					HADDOCK			WHITING		
	IVc	IVb,c	IVb,c	IVa	IV	IV	IV	IV	IVa	IV	IV
	CPUE[1]	IYHS[2]	VPA[3]	VPA[3]	VPA[3]	CPUE[4]	IYHS[2]	VPA[3]	CPUE[4]	IYHS[2]	VPA[3]
1958						1 130		368	120		370
1959						350		234	220		575
1960						310		152	350		414
1961						1 560		638	390		916
1962			62	42	104	12 000		3 202	2 170		1 562
1963			203	34	237	20		70	80		387
1964			156	74	230	80		115	540		645
1965			231	92	323	90		148	290		630
1966	214	38	219	66	284	3 060		766	400		809
1967	7	5	42	50	92	20 000		6 295	1 380		2 217
1968	51	5	64	21	84	1 100	67	383	60		433
1969	322	75	299	65	363	970	41	102	160		683
1970	388	72	337	123	458	3 000	2 480	877	160		763
1971	5	3	33	38	73	2 600	891	1 175	240	218	1 743
1972		50	119	40	163	460	192	221	730	1 146	2 885
1973		14	(23)	(71)	(55)	1 600	926	(486)	480	352	(2 083)
1974		(92)				(4 000)	(1 058)		(500)	(992)	

[1] Number of 2 years old cod per 10 hours fishing by Dutch beam trawlers in the Southern Bight.

[2] Average number per hour fishing during the International Young Herring Surveys.

[3] Millions of fish at age 1 (M = 0.2).

[4] Number of 1 year old fish per 10 hours fishing by Scottish research vessels (in "old Explorer" units).

Figures in brackets are provisional.

Table 24 Comparison of haddock year class strengths, North Sea and Scottish west coast grounds. Numbers of 1+ haddock caught per 10 hours fishing by Scottish research vessels.

Year class	North Sea[1]	North Coast of Scotland		North Minch		Outer Hebrides		South Minch		South of Lat. 56°N		Clyde		Rockall	
		S[2]	A[2]	S	A	S	A	S	A	S	A	S	A	S	A
1958	1 132	53		3	50	0	30			0					
1959	347		0		23		0				0				
1960	311	10	120	68	26	12	230			0	28				
1961	1 560	2 550	5 490	1 080	970	27	130			0	22				
1962	12 000	7 307	7 130	108	2 663	10	1 123	6	110	26	80	1 380	0		
1963	20		0		8.1		10		1.7		0				
1964	82	13	12	3.5	5.0	2.2	1.2	2.9	12	0	0				
1965	95	675		8		0		15							
1966	3 060	420		17		0		0						0	16
1967	20 000		3 400		4 700		3 800		526		2 725			30	139
1968	1 100	No West Coast Survey in 1969												7 000	14 000
1969	970		23[3]		0[3]		38[3]		0[3]		0[3]			11[3]	
1970	3 000		654		65		20		0						
1971	2 600		1 599		153		16		4		80		0		
1972	460		2 227		81				0		20				
1973	1 600		2 412		132				34				0		
1974	4 000														

[1] North Sea catches in "Old Explorer" units. Catches for all other regions in "New Explorer" units.

[2] S -Spring cruises, A - Autumn cruises.

[3] Numbers of small fish under-represented since the mesh used was larger than in previous west coast surveys.

Table 25 Scottish West Coast Whiting - estimated year class strength

Numbers of 1+ whiting caught per 10 hours fishing by Scottish research vessels (1) during autumn surveys

Year class	North Coast N.& S. Minch	Firth of Clyde
1963	92	-[2]
1964	266	110
1965	375	-[2]
1966	-[2]	-[2]
1967	1 858	2 660
1968	-[2]	-[2]
1969	100	-[2]
1970	107	846
1971	1 400	395
1972	1 619	155
1973	158	140

1) all hauls by "New Explorer" units

2) data not available

Table 26 Whiting

Showing proportional allocation of fish "released" by each country

a) Calculated weighting Netherlands catch to include discards

From \ To	Table of Proportions					
	Scot-land	England	Nether-lands	Belgium	Denmark	Total
Scotland	0.44	0.01	0.05	-	0.50	1.00
England	0.13	0.07	0.24	0.04	0.53	1.00
Netherlands	0.04	0.09	0.37	0.06	0.44	1.00
Belgium	-	0.10	0.40	0.07	0.43	1.00
Denmark	0.23	0.04	0.18	0.03	0.52	1.00

b) Calculated weighting Netherlands catch to exclude discards

From \ To	Table of Proportions					
	Scot-land	England	Nether-lands	Belgium	Denmark	Total
Scotland	0.45	0.01	0.02	-	0.52	1.00
England	0.15	0.08	0.11	0.05	0.61	1.00
Netherlands	0.04	0.12	0.18	0.08	0.58	1.00
Belgium	-	0.13	0.20	0.09	0.58	1.00
Denmark	0.25	0.05	0.08	0.03	0.59	1.00

Tabel 27 Average[1] values of F from VPA

Area	M	Species	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	(2) 1971	(2) 1972	(2) 1973
IVa	0.2						0.40	0.69	0.63	0.75	0.92	0.56	0.83	1.01	(0.75)	(0.99)	(1.07)
IVb,c	0.2	COD					0.47	0.40	0.41	0.58	0.45	Q.68	0.59	0.51	(0.70)	(0.88)	(0.91)
IVa+b,c	0.2	M = 0.2					0.44	0.56	0.52	0.63	0.60	0.64	0.66	0.68	(0.72)	(0.92)	(0.98)
VIa	0.2									0.51	0.38	0.58	0.90	0.58	(0.55)	(0.80)	(0.49)
IV	0.2		0.89	0.69	0.73	0.53	0.35	0.30	0.38	0.68	0.68	0.54	0.58	1.11	(0.95)	(0.76)	(0.67)
	0.3	HADDOCK	0.78	0.61	0.63	0.45	0.30	0.24	0.32	0.60	0.60	0.49	0.51	1.01	(0.87)	(0.68)	(0.62)
VIa	0.2							0.99	0.52	0.55	0.57	0.68	0.61	0.19	(0.48)	(0.33)	(0.43)
	0.3							0.82	0.41	0.39	0.38	0.41	0.39	0.16	(0.42)	(0.30)	(0.43)
IV	0.2		0.92	0.64	0.72	0.69	0.65	0.30	0.48	0.82	0.57	0.82	0.57	0.87	(0.62)	(0.76)	(0.73)
	0.3	WHITING	0.83	0.56	0.64	0.61	0.56	0.25	0.42	0.72	0.50	0.72	0.50	0.72	(0.55)	(0.69)	(0.68)
VIa	0.2							0.41	0.36	0.67	1.29	0.95	0.59	0.37	(0.85)	(1.31)	(0.85)
	0.3							0.35	0.31	0.60	1.15	0.84	0.51	0.32	(0.77)	(1.20)	(0.75)

[1] averages calculated from F at each age weighted by numbers in the stock for 2-years and older fish.

[2] values for 1971-1973 are less reliable

Table 28. Average values of F from VPA of cod, haddock and whiting by age groups for periods before 1969 and after.

Species and area	Period	Age group								
		0	1	2	3	4	5	6	7	8
Cod IVa	1963-1968		0.07	0.56	0.68	0.61	0.59	0.55	0.48	0.65
M=0.2	1969-1973		0.08	0.85	0.92	0.89	0.91	0.81	0.78	0.90
IVb,c	1963-1968		0.32	0.68	0.52	0.45	0.37	0.52	0.35	0.61
	1969-1973		0.18	0.82	0.77	0.64	0.61	0.66	0.58	0.51
IV	1963-1968		0.24	0.64	0.59	0.51	0.46	0.54	0.41	0.55
	1969-1973		0.14	0.83	0.84	0.72	0.71	0.71	0.66	0.61
VIa	1966-1968		0.03	0.22	0.45	0.52	0.41	0.44		
	1969-1973		0.05	0.29	0.52	0.80	0.85	0.77		
Haddock IV	1959-1968	0.00	0.22	0.38	0.58	0.64	0.79	1.02	0.99	
M=0.2	1969-1973	0.01	0.15	0.52	1.09	1.44	1.24	0.93	0.82	
M=0.3	1959-1968	0.00	0.18	0.32	0.50	0.56	0.70	0.93	0.92	
	1969-1973	0.01	0.13	0.46	1.00	1.34	1.14	0.84	0.76	
VIa	1964-1968		0.01	0.22	0.42	0.45	0.56	0.82		
M=0.2	1969-1973		0.01	0.34	0.80	0.58	0.30	0.20		
M=0.3	1964-1968		0.00	0.16	0.32	0.35	0.43	0.65		
	1969-1973		0.01	0.30	0.71	0.47	0.23	0.16		
Whiting IV	1959-1968	0.09	0.30	0.49	0.81	1.05	1.12			
M=0.2	1969-1973	0.45	0.89	0.58	0.79	0.85	0.99			
M=0.3	1959-1968	0.07	0.25	0.42	0.72	0.95	1.02			
	1969-1973	0.39	0.80	0.52	0.72	0.78	0.90			
VIa	1964-1968		0.05	0.34	0.63	0.49	0.63	1.00		
M=0.2	1969-1973		0.09	0.38	0.70	0.87	0.97	0.87		
M=0.3	1964-1968		0.03	0.29	0.54	0.43	0.58	0.90		
	1969-1973		0.08	0.32	0.61	0.78	0.87	0.79		

Table 29. Estimates of long-term gains and losses (thousands of tons) of North Sea whiting if Denmark retains present mesh size and other countries change to 80 mm mesh.

Country	Average landings 1970-73	Immediate loss		Gulland method		Andersen method	
		wt.	%	wt.	%	wt.	%
Belgium	3.1	0.5	16	+1.0	+32	+1.6	+52
Denmark	83.2	0	0	+6.3	+ 8	+5.5	+ 7
England	5.1	0	0	+2.4	+47	+2.1	+41
Netherlands	21.0[a)]	11.4	54	-9.0	-43	-7.2	-34
Scotland	26.8	4.2	16	-6.4	-24	+1.8	+ 7

a) estimated actual catch including discards.

Table 30. Estimates of long-term gains and losses (thousands of tons) of North Sea whiting if Denmark retains present mesh size and other countries change to 90 mm mesh.

Country	Average landings 1970-73	Immediate loss		Gulland method		Andersen method	
		wt.	%	wt.	%	wt.	%
Belgium	3.1	1.5	48	+0.4	+13	+1.2	+39
Denmark	83.2	0	0	+7.3	+ 9	+9.4	+11
England	5.1	2.2	43	+0.4	+ 8	+1.5	+29
Netherlands	21.0[a)]	15.5	74	-11.7	-56	-8.2	-39
Scotland	26.8	12.1	45	-5.4	+20	0	0

a) estimated actual catch including discards.

Table 31. Estimates of long-term gains and losses (thousands of tons) of North Sea whiting if all countries adopt 80 mm mesh.

Country	Average landings 1970-73	Immediate loss		Gulland method		Andersen method	
		wt.	%	wt.	%	wt.	%
Belgium	3.1	0.5	16	+ 6.3	+203	+ 5.5	+177
Denmark	83.2	72.8	88	- 1.7	- 2	+31.9	+ 38
England	5.1	0	0	+ 9.3	+182	+ 8.1	+159
Netherlands	21.0[a)]	11.4	54	+11.6	+ 55	+ 3.6	+ 17
Scotland	26.8	4.2	16	+45.5	+170	+28.1	+105

a) estimated actual catch including discards.

Table 32. Estimates of long-term gains and losses (thousands of tons) of North Sea whiting if all countries adopt 90 mm mesh.

Country	Average landings 1970-73	Immediate loss		Gulland method		Andersen method	
		wt.	%	wt.	%	wt.	%
Belgium	3.1	1.5		+ 4.3	+139	+ 5.4	+174
Denmark	83.2	79.2		-17.9	- 22	+30.0	+ 36
England	5.1	2.2		+ 5.8	+114	+ 8.1	+159
Netherlands	21.0 a)	15.5		+ 6.7	+ 32	+ 3.4	+ 16
Scotland	26.8	12.1		+28.2	+105	+28.7	+107

a) estimated actual catch including discards.

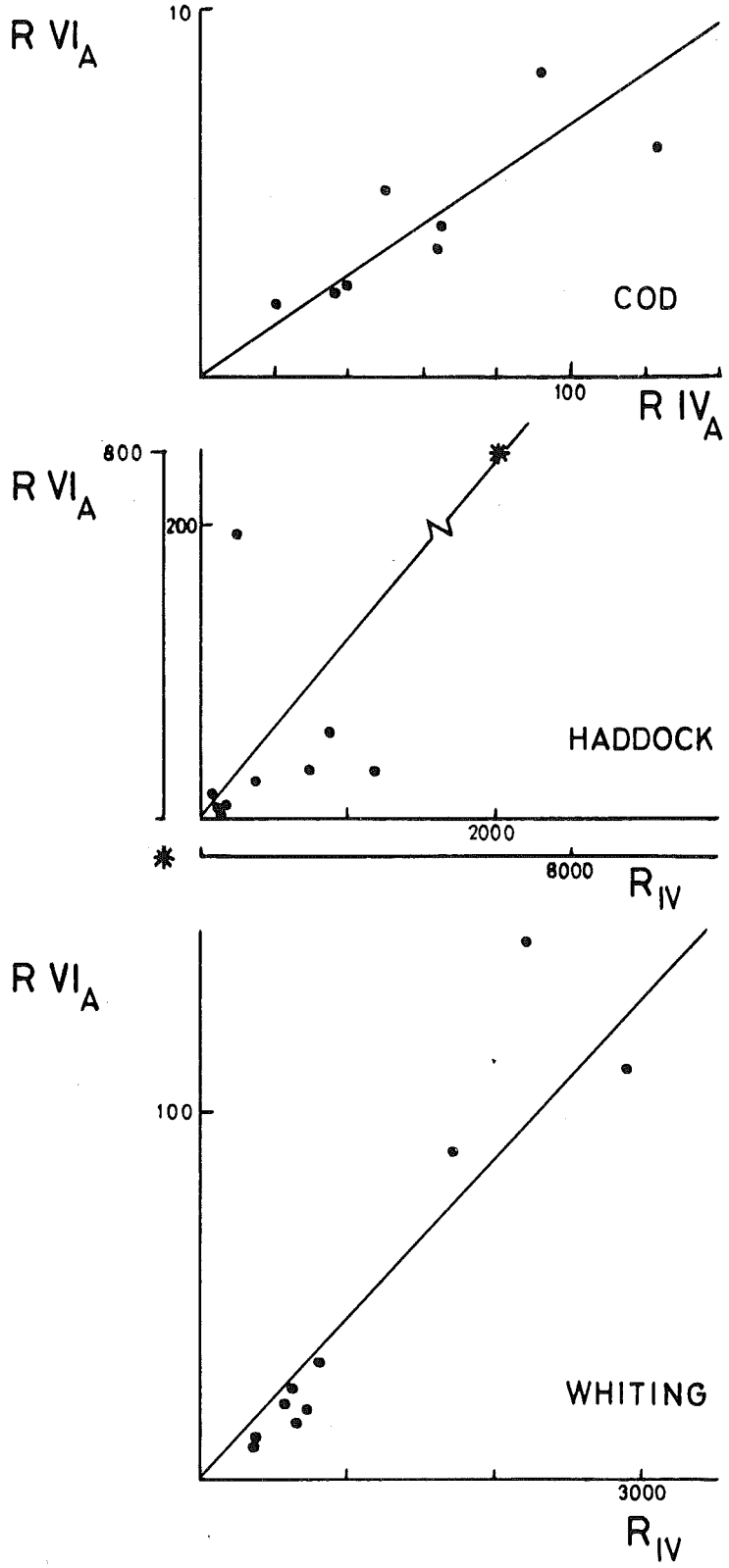

Figure 1. Relationship between numbers of 1 year old recruits, estimates from VPA, of cod, haddock and whiting west of Scotland (VIa) and in the North Sea (IV).

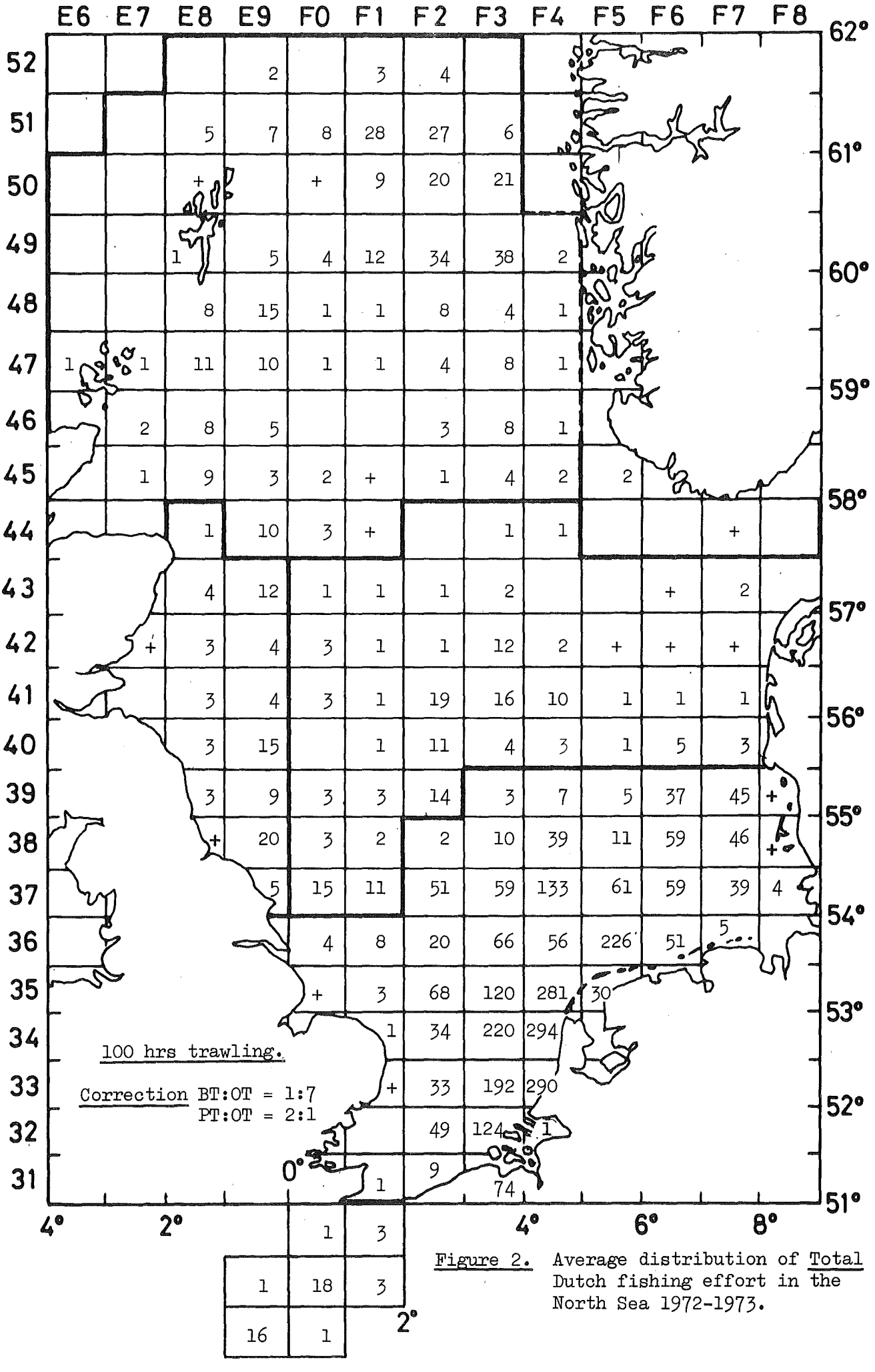

Figure 2. Average distribution of Total Dutch fishing effort in the North Sea 1972-1973.

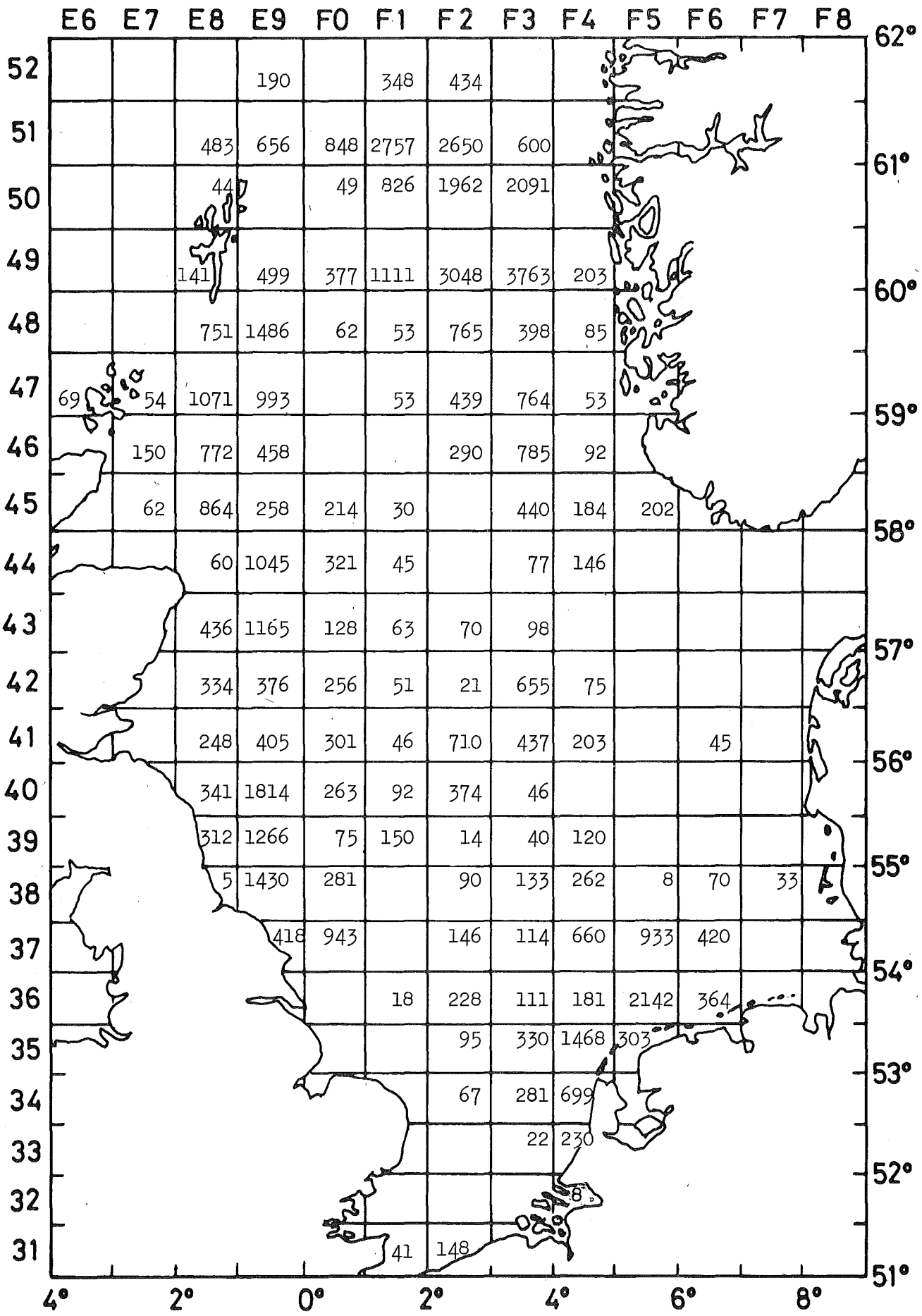

Figure 3. Average annual distribution of Dutch herring trawl effort (hrs. fishing) in the North Sea (1972, 1973).

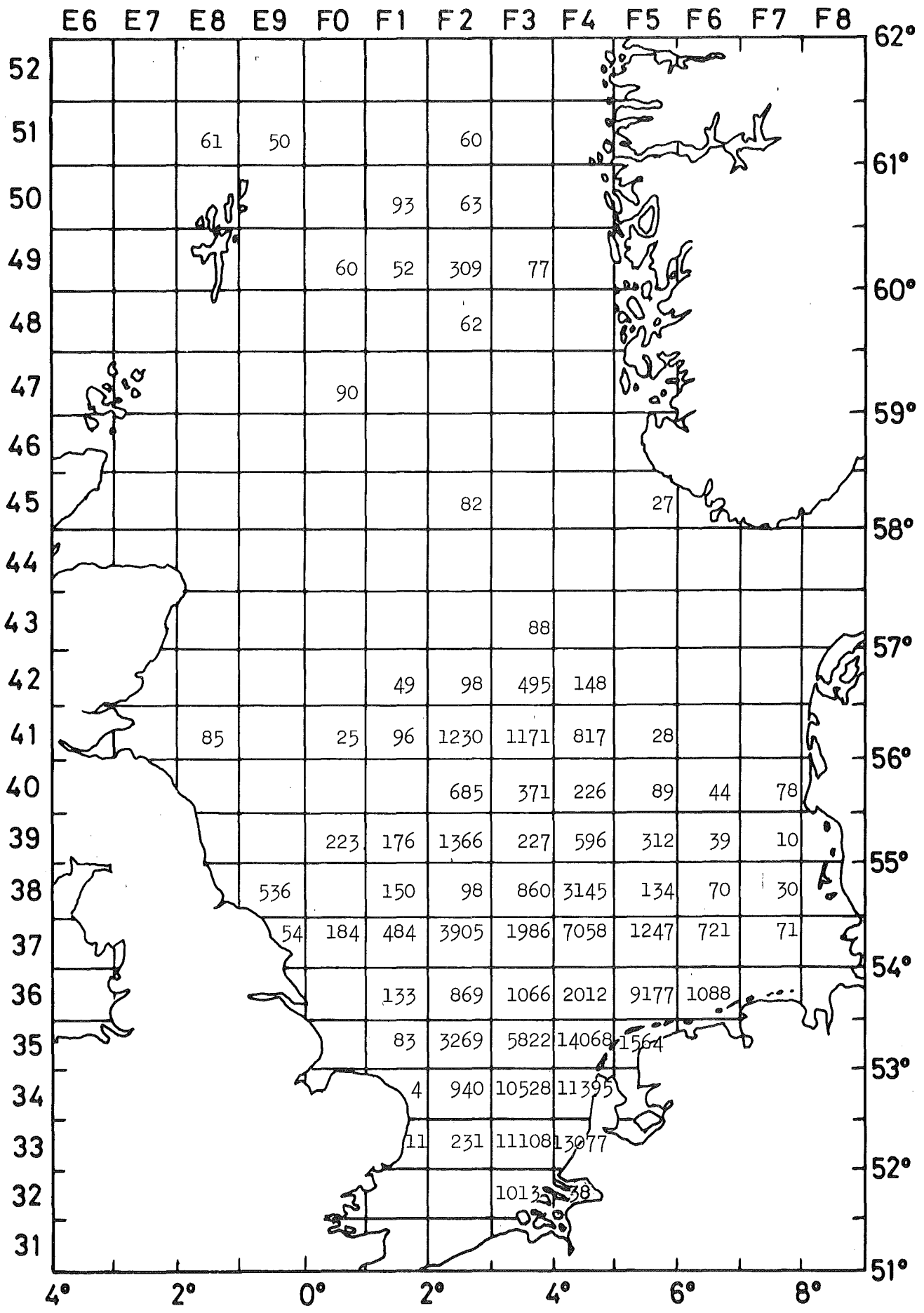

Figure 4. Average annual distribution of Dutch otter trawl effort (hrs. fishing) in the North Sea (1972, 1973).

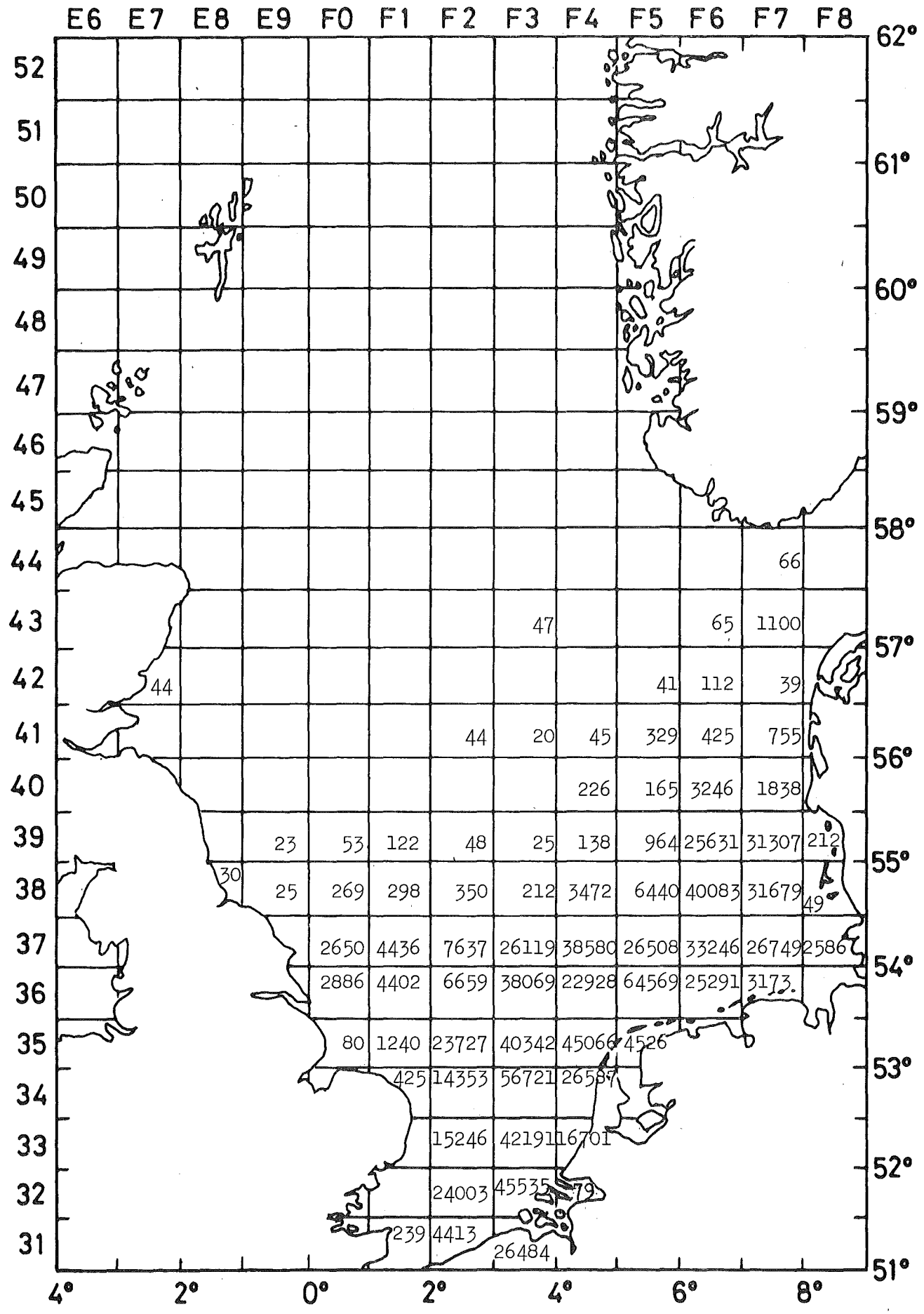

Figure 5. Average annual distribution of Dutch beam trawl effort (hrs. fishing) in the North Sea (1972, 1973).

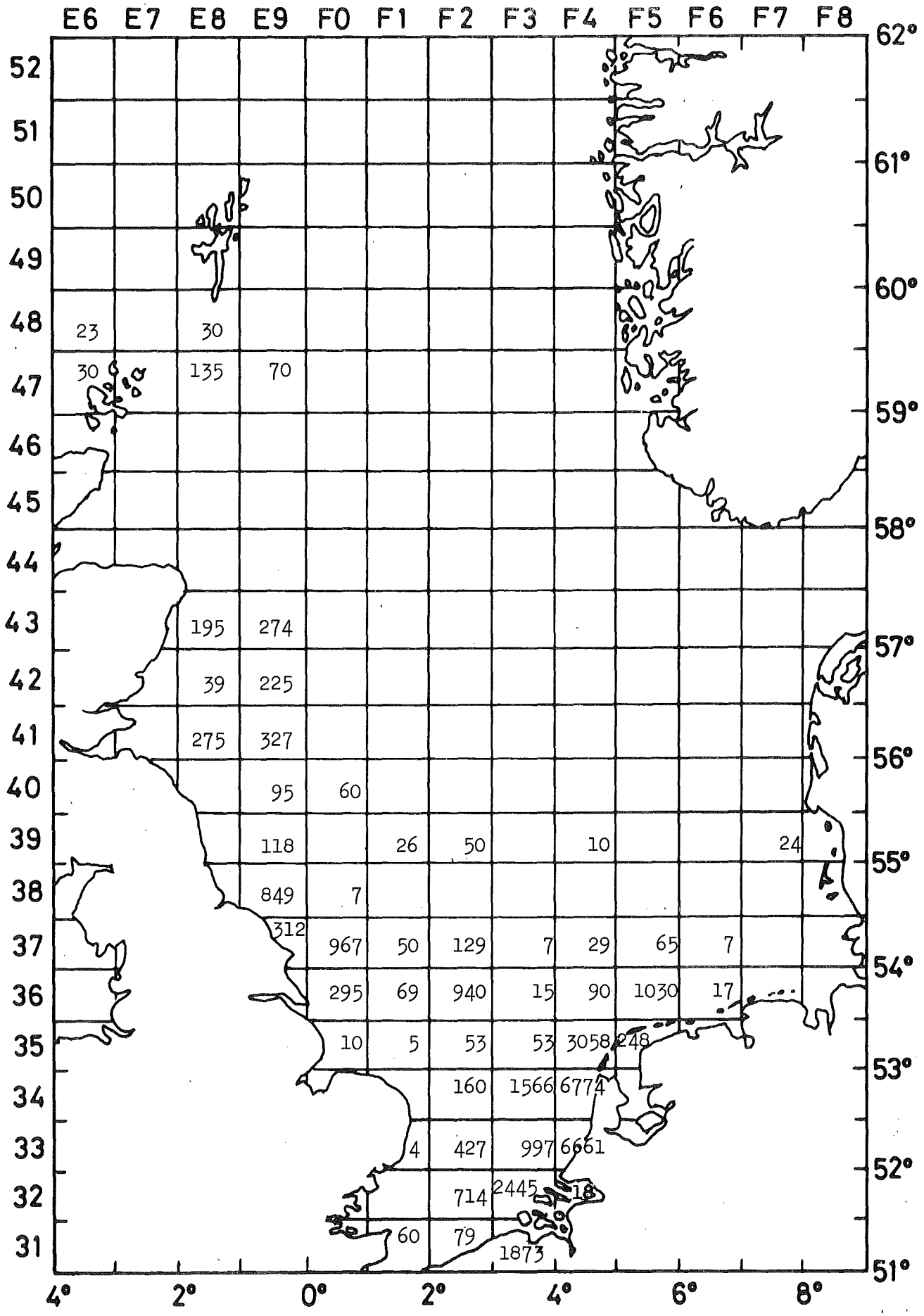

Figure 6. Average annual distribution of Dutch pair trawl effort (hrs. fishing) in the North Sea (1972, 1973).

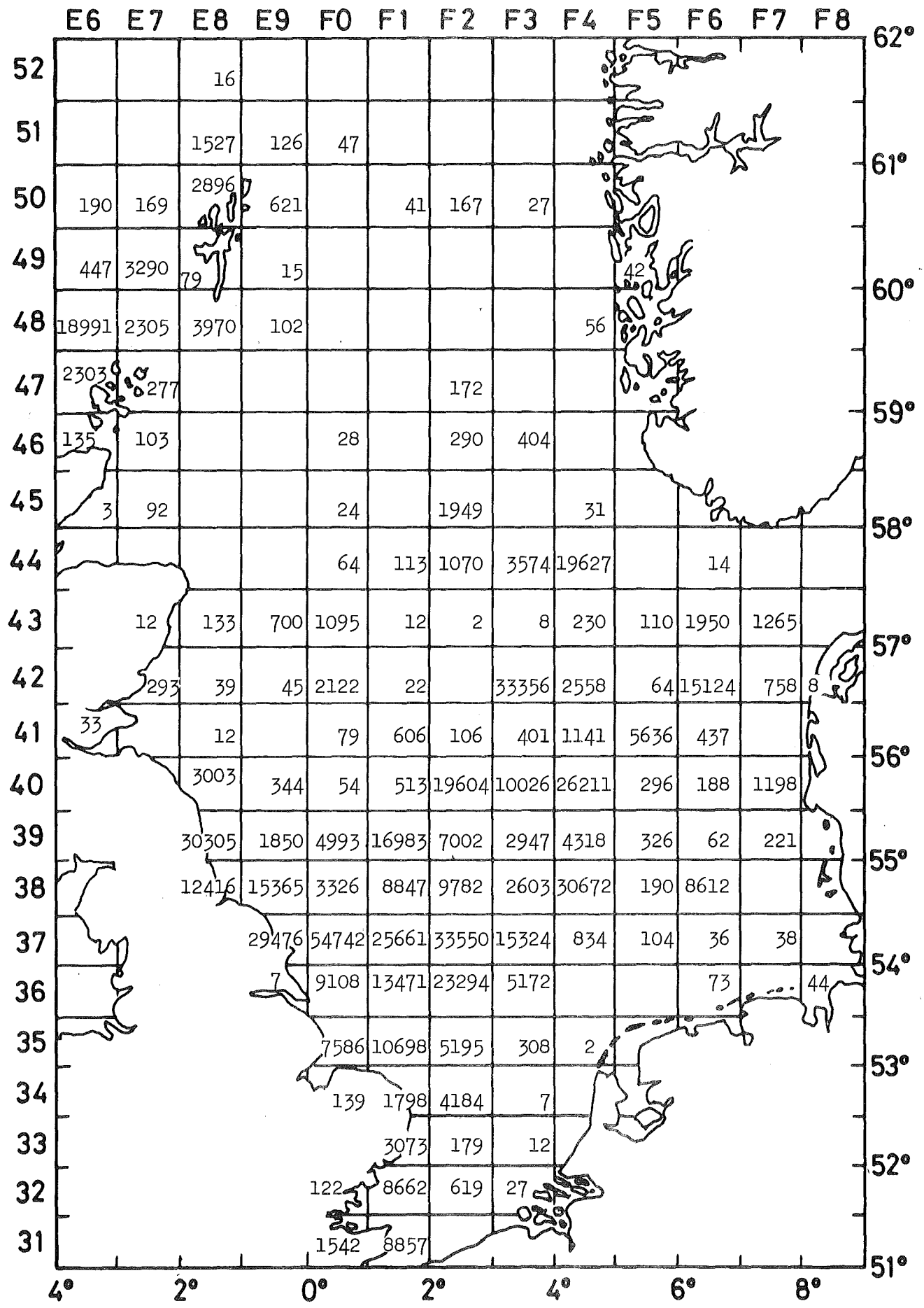

Figure 7. U.K. (England & Wales), trawl. Total hours fishing per year in each statistical rectangle; average of years 1969-1972.

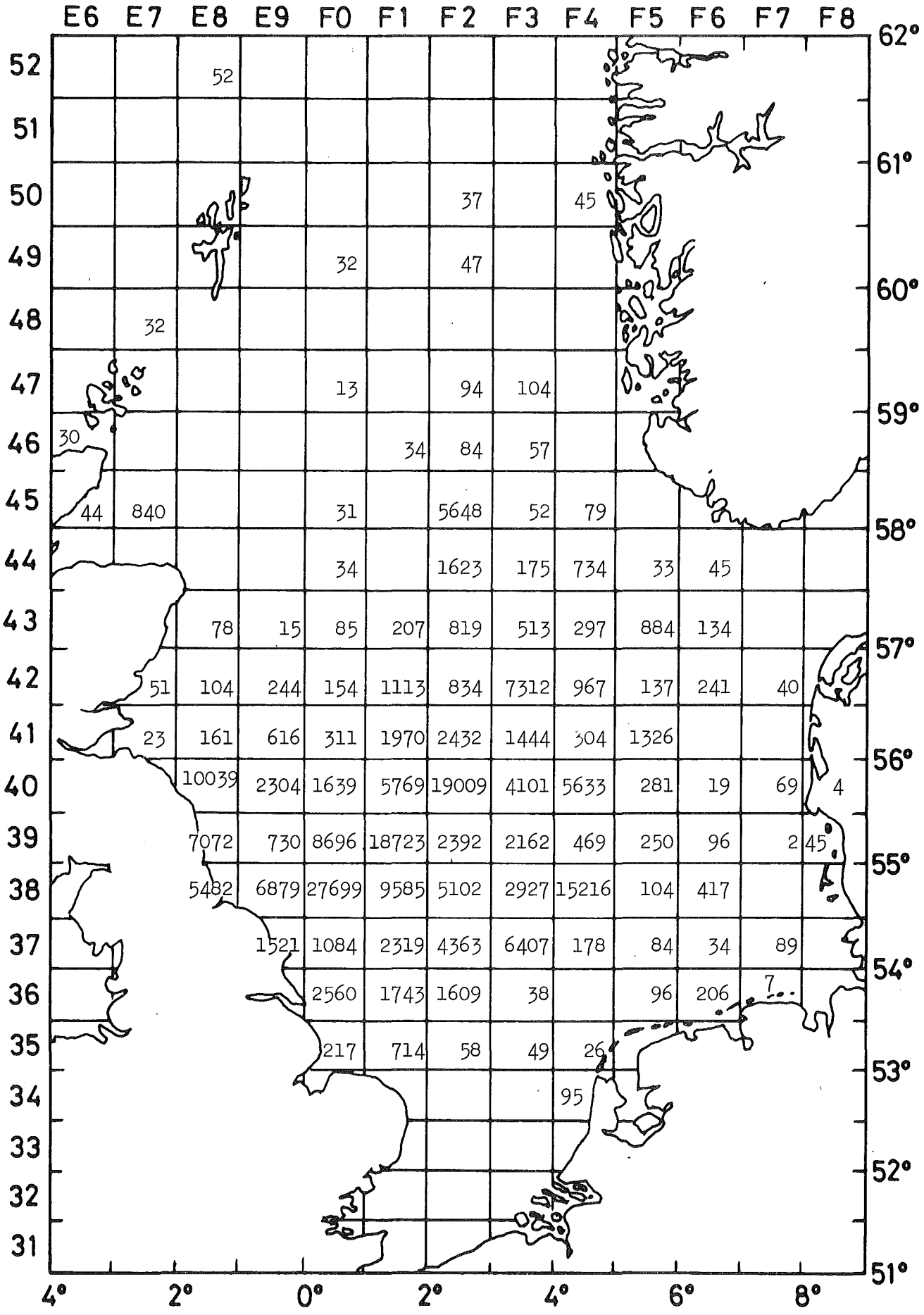

Figure 8. U.K. (England & Wales), seine. Total hours fishing per year in each statistical rectangle; average of years 1969-1972.

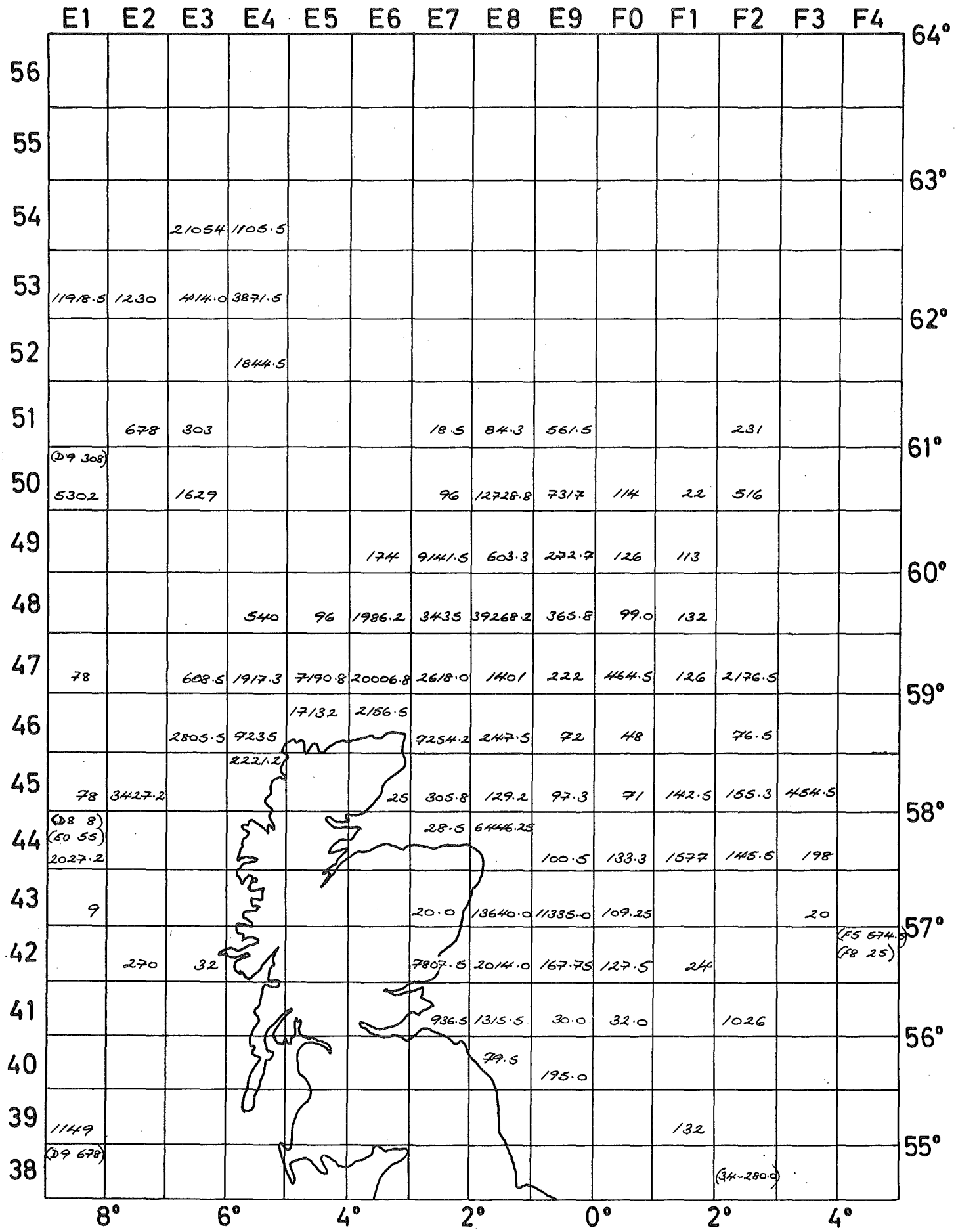

Figure 9. Average total hours fishing by British motor trawlers at all Scottish ports, 1969-1972.

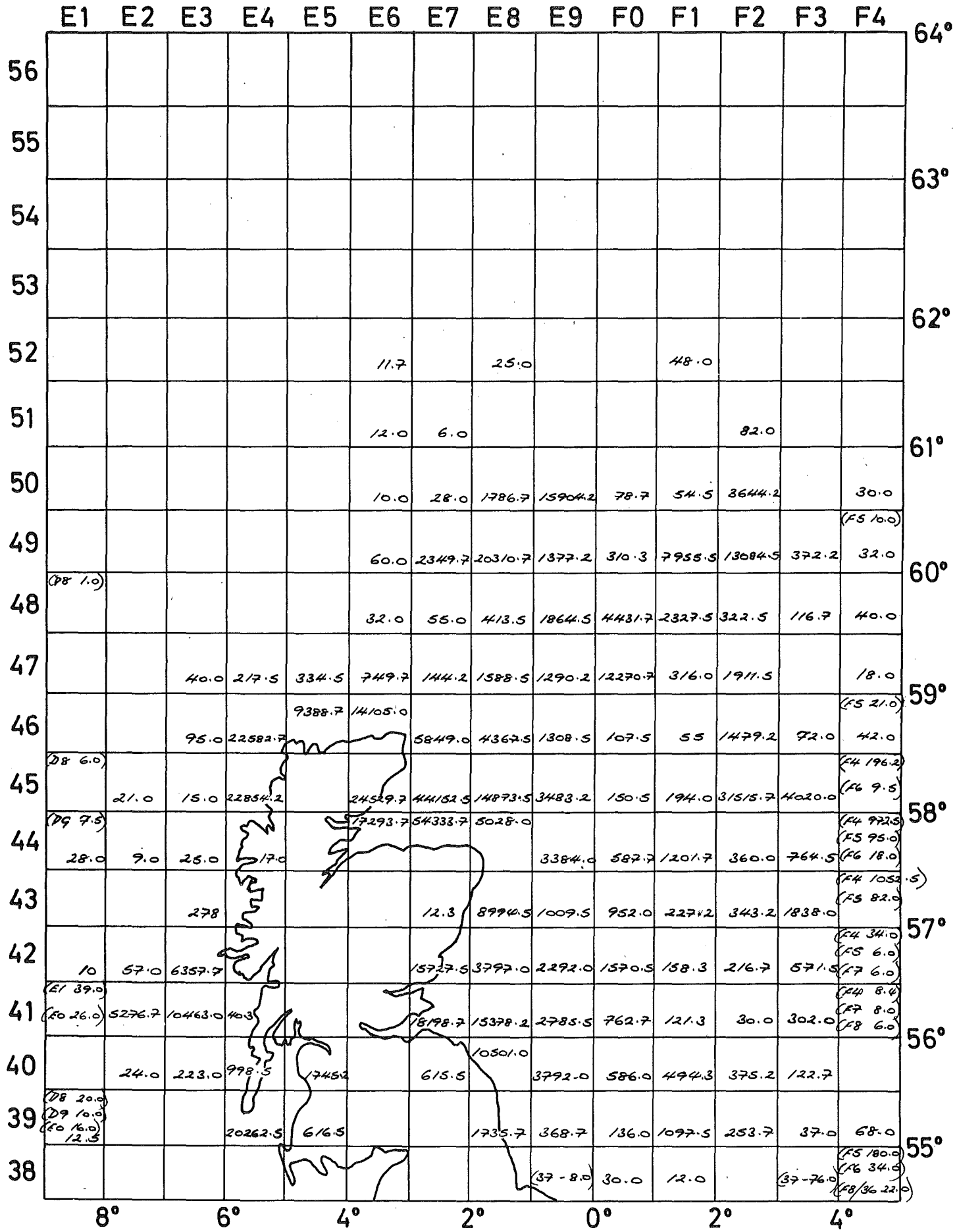

Figure 10. Average total hours fishing by British seiners at all Scottish ports, 1969-72.

APPENDIX I

Effect of Recommendation 2 fisheries on the catch of cod

The average undersized catch in Recommendation 2 fisheries in 1970-72 was 3 600 tons (Table 10) compared with total landings of 263 600 tons (1.4%) (Table 2).

The average weight of cod in the Recommendation 4 fisheries was 1.29 kg, which corresponds to an average age of ± 2.5 years.

In the absence of any real data on length compositions in the Recommendation 2 fisheries, it has been assumed that the average length was 22 cm, corresponding to a weight of 0.1 kg, which should be reached at 1 year old.

Thus in the absence of Recommendation 2 fisheries an additional 36 million would survive up to the average age in the catch of which after 1.5 years at a natural mortality of 0.2, 27 million would recruit to the fishery. With a rate of exploitation of 0.8 this would add an additional 22 million or 28 000 tons to the total catch, which is an increase of about 11%.

Effect on haddock and whiting of an increase in mesh size to 80 mm in the Recommendation 2 fisheries

Whiting

Average landings of undersized whiting, 1970-73:

Denmark: 52 000 tons (based on length compositions in Table 14)

Other countries: 648 tons (from data in Table 12, 1972-73).

Denmark thus takes 98% - 99% of the undersized whiting in the Recommendation 2 fisheries. An estimate for Denmark is therefore equivalent to an estimate for 98% - 99% of the total.

For Denmark, an increase in mesh size to 80 mm would lead to an immediate loss to Denmark of 73 000 tons, and a net gain to all countries combined (including Denmark) of 32 000 tons. This represents an increase of 26% on the average landings of 123 000 tons from 1971-1973.

Haddock

Similar calculations for haddock using length composition data from Denmark and Norway lead to immediate losses of 25 000 tons for Denmark and 3 690 tons for Norway. The net long-term gain to all countries was 40 000 tons. This is rather less than 20% of the landings by all countries depending on the period over which total landings are averaged.

APPENDIX II

Notes on Tables

Length compositions

Length composition data for each species and for those countries which have supplied them have been summarised and tabulated in Tables 13 and 14. The numbers have been raised to represent numbers landed per year.

There have been minor differences in the methods used by different countries to raise their data to total numbers landed. As a check on the results, the numbers have been converted to total weights to confirm that these agree reasonably well with the landings reported in "Bulletin Statistique". This was done by multiplying the number in each length group by the average weight of each length group and summing the products. In addition to the numbers landed, estimates of the numbers discarded at sea have been made by the Netherlands.

Age compositions (Tables 16-22)

Numbers landed at each age have been determined by applying suitable age/length keys to the length composition data.

For all three species in 1974, provisional estimates for each country were made using part-annual data.

Cod

Pre-1973 data: as in 1974 Roundfish Working Group Report (Doc. C.M.1974/F:5, Appendix 1).

1973: France (Divisions VIb,c) - Netherlands age compositions for area "south" raised by weight. German Democratic Republic (1972-) - as Faroes in the 1974 Working Group Report.

Other countries: as in the 1974 Working Group Report.

Netherlands: age compositions from 1963 onwards were revised as follows: the catch for different gears and areas given in the "Statistical News Letters" were combined and re-adjusted to agree with "Bulletin Statistique" total nominal catches in proportion to the recorded weights.

Other countries: as in previous Report.

Haddock

Netherlands: as under cod, but only from 1967 onwards.

Other countries: as in 1974 Working Group Report.

Whiting

Netherlands: as under cod, but for 1973 and 1974 only.

Other countries: as in 1974 Working Group Report.