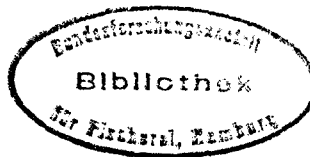


Demersal Fish Committee

ICES CM 1997/G:3

Ref.: Assess



**REPORT OF THE
STUDY GROUP ON BEAM TRAWL SURVEYS**

By Correspondence

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International Council for the Exploration of the Sea

Conseil International pour l'Exploration de la Mer

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1 Introduction

The need to monitor the demersal populations that are targeted by the beam trawl fisheries in the North Sea and western waters of the UK, led to the introduction of fisheries independent surveys using beam trawls. The study group on beam trawl surveys comprises participants from several countries (Belgium, Germany, Netherlands and UK) that conduct beam trawl surveys in these waters. In 1996 no beam trawl surveys were carried out by Germany.

1.1 Terms of reference

At the 1996 Annual Science Conference it was resolved that the Study Group on Beam Trawl Surveys (Chairman: Dr A. D. Rijnsdorp, Netherlands) will work by correspondence in 1997 to:

- a) carry out a detailed evaluation of the data series, evaluate survey design and propose modifications if necessary;
- b) prepare an international database in the format specified in Tables 2.2 and 2.3 in ICES CM 1996/G:2;

The Study Group will report to ACFM and to the Demersal Fish Committee at the 1997 Annual Science Conference.

1.2 Participants by correspondence

Ulrich Damm	Germany
Gerjan Piet	Netherlands
Adriaan Rijnsdorp	Netherlands
Stuart Rogers	England
Willy VanHee	Belgium

2 Survey design

2.1 Survey details

The beam trawl surveys cover an area comprising the southern and eastern North Sea, the English Channel (VIId and e), the Bristol Channel (VIIf&g) and the Irish Sea (VIIa). The survey gear deployed differs between areas due to the differences in the ability of the vessels to deploy beam trawls and due to differences in the nature of the sea bed. Despite the gear differences, survey procedures are standardised. The survey details, including the number of hauls and survey dates in 1996, are given in Table 2.1. The number of hauls by rectangle in 1996 and total for the period 1990–1996 are shown in Figure 2.1.

The sampling stations are stratified according to ICES rectangles and depth zone. In general the station grid sampled comprises fixed stations, except in the Netherlands survey where the stations are evenly spread out over the rectangle taking account of the untrawlable areas.

Otolith samples are taken by sub-area. In the UK surveys the position of the sampled fish is recorded but in the North Sea surveys pooled samples are taken from the hauls over otolith sampling areas. The sampling sub-areass are shown in Figure 2.2.

2.2 Sampling procedures

A detailed account on the sampling procedures used is given in Anon (1990, 1993). All surveys sample both fish and benthos. Fish species are sorted out and the number by size class (cm-below) is recorded. Large catches are subsampled. From the invertebrate benthic fauna, the main, generally larger species are sampled and their abundance is recorded. The summary of epibenthic species given in Anon (1994) is extended in Table 2.2.

2.2.1 Sampling for age and sex

Otoliths are collected from length stratified samples. During all surveys otoliths are collected for the 3 target species sole, plaice and dab. For other species otoliths are collected under various national research projects. The otolith sampling areas are shown in Anon (1996). The results for the other species will be dealt with in separate reports.

2.3 Data analysis

The catch rates are converted to the standard 8m beam trawl by multiplying the observed catch rates by the ratio of the beam trawl widths (8m beam trawl width used) and raising to a 1 hour tow duration. Catch rates were averaged by rectangle, and rectangle averages were averaged for the sub-areass distinguished (Figure 2.2).

Survey indices for plaice and sole were calculated as the catch rate averaged over the mean catch rate by rectangle for a standard set of rectangles. The index areas are shown in (Figure 2.3).

2.4 Evaluation of survey design

2.4.1 Area classification

In order to improve the comparability of the results with for example the IBTS (GOV) surveys, it was decided in 1996 to change the area classification and to adopt the generally used Roundfish Areas for sub-dividing the North Sea and to use the Management areas (ICES Divisions) for the other areas (Anon 1996). The map of sub-areass used is given in Figure 2.2.

2.4.2 Sampling for age and sex

The otolith sampling procedures are not fully consistent with the stratification of sampling stations by ICES rectangle and depth band. Substantial differences in the ALK may occur within the otolith sampling areas employed, especially between stations in the coastal zone and offshore areas. This issue needs careful consideration in the near future to assess the possible bias in previous survey indices and to devise an improved sampling stratification of otolith sampling. The above considerations, nevertheless, highlight the need to record the

sampling position of each otolith at a resolution of at least 30 mile. In practice this can easily be accomplished by collecting otolith samples by ICES rectangle.

2.4.3 Benthos sampling

Benthos was collected in a variety of ways by the participants of the different countries and therefore is standardisation of the sampling procedures necessary. The benthos data of the Netherlands beam trawl surveys are currently being analysed. The taxonomic groups that were distinguished are shown in Table 2.2. Results of the analysis will be presented in next year's report.

3 International Beam Trawl Survey Database (BTSDB)

At present, individual participants enter their survey data using software developed nationally, and transfer catch rate data of a standard group of target and non-target species by haul to the chairman of the Study Group to produce the annual progress report. Except for sole, plaice and dab, for which the catch rates by haul are provided by age group, the data transfer does not include size or age information.

In order to allow for a more general use of the collected data, the participants agree with the objective to collate the data in a joint database of which the participants will get a copy on request. The Study Group held the opinion that an efficient procedure towards the development of a joint database would be to first set up a common database in SAS including the basic trawl list and length frequency information. This could be achieved in the current year. At a later stage this database can be transferred to ICES.

In order to achieve this several steps have to be taken:

- a) specification of the database format
- b) quality control
- c) exchange of data
- d) database management
- e) data transfer to ICES

3.1 Database format

The Beam Trawl Survey Database comprises three record types: 1) Trawl list data, 2) Length Frequency data and 3) Age-length-maturity data. The data collected for age-length and maturity will be included in the database in the near future. The data included in the Trawl list and Length-frequency files are specified in Anon (1996).

3.2 Database management

The Working Group agreed that chairman of the Study Group on Beam Trawl Surveys will be responsible for the database management. Individual participants are responsible for providing high quality data following the specifications in Anon (1996) and which have been checked for typing errors, duplicate observations etc. Data can be exchanged using ASCII files.

Changes in the survey procedures should be recorded as these occur and be reported in the annual progress report.

3.3 Extension of the database

The Study Group has to prepare the exchange of age-length-maturity data to include in the BTS database. Finally, the Beam Trawl Surveys covered by the present Study Group are only a part of those conducted in the ICES area. Extensive beam trawl surveys are carried out by the UK, Netherlands, Germany and France to estimate the year class strength of flatfish in the coastal waters in the North Sea and Divisions VIId, e, fg, a and VIII. At present these surveys are analysed for recruitment estimates of sole and plaice which are provided by national representatives to ICES Assessment Working Groups. In our view it would be an important, though major enterprise, to extend the Beam Trawl Survey Database to include the beamtrawl surveys in coastal waters.

4 Results

4.1 Results of the survey in 1996

The results of the 1996 surveys are presented for the various fish species in Tables 4.1.1 to 4.1.9 and Figure 4.1.1 to 4.1.26. The results of the 1996 surveys for two benthic species, edible crab (*Cancer pagurus*) and razor clam (*Ensis ensis*), are presented in Tables 4.1.10 and 4.1.11 and Figure 4.1.27.

4.2 Survey indices of sole and plaice

Year class strength indices for sole and plaice are given for the various management areas in Tables 4.2.1 and 4.2.2. Each survey index is calculated as the arithmetic mean abundance over a standard number of rectangles.

North Sea (IVb,c)
Eastern Channel (VIId)
Western Channel (VIIe)
Bristol Channel (VIIf&g)
Irish Sea (VIIa)

4.3 Community analysis

Two parameters are calculated per rectangle for the demersal fish community: the total number of species (Figure 4.4.1) and the Shannon-Wiener index of diversity (Figure 4.4.2.). Because the total number of species depends on the haul effort, the total number of hauls per rectangle are indicated in Figure 4.4.1 as well.

5 References

- Anon, 1990. Report of the Study Group on beam trawl surveys in the North Sea and Eastern Channel. ICES C.M. 1990/G:59.
- Anon, 1992. Manual for the International Bottom Trawl Surveys. Revision IV. 13-17 January 1992, Copenhagen. Addendum to C.M. 1992/H:3.
- Anon, 1994. Report of the Study Group on beam trawl surveys in 1993. ICES C.M. 1994/G:5.
- Anon, 1996. Report of the Study Group on beam trawl surveys. ICES C.M. 1996/G:2.

Table 2.1 Survey details.

Country:	Belgium	Netherlands	Germany	UK	UK	UK
Survey area:	IVbc west	IVbc east	IVb east	VIIId	VIIe	VIIa,f&g
Number of hauls	54	133	0	76	58	121
Dates:	21/8-28/8	13/8-11/9		2/8-11/8	3/10-10/10	25/8-13/9
Ship:	Belgica	Isis/Tridens	Solea	Corystes	Carhelmar	Corystes
Beam trawl length:	4-m	8-m	7-m	4-m	4-m	4-m
Number of beams fished:	1	2	2	1	2	1
Trawl duration (min):	30	30	30	30	30	30
Cod-end mesh (mm):	40	40	44	40	40	40
Number of ticklers	0	8	5	0	0	0
Attachment:	b	a	a	b	b	b
Stations	fixed	pr	pr	fixed	fixed	fixed
Year survey started:	1986	1985	1991	1988	1984	1988
Benthos sampling since:	1985	1985	1992	1991	-	1992

Attachment: a - none, b - chain mat & flip-up rope;

Table 2.2 (Epi)benthos species recorded on the Beam Trawl Survey of the Netherlands since 1985.

Annelida

<i>Aphrodita aculeata</i>	Sea mouse
<i>Arenicola marina</i>	
<i>Lanice conchilega</i>	Sand mason
<i>Nephtys spec.</i>	
<i>Pectinaria koreni</i>	

Arthropoda

<i>Calianassa spec.</i>	
<i>Cancer pagurus</i>	Edible crab
<i>Carcinus maenas</i>	Shore crab
<i>Corystes cassivelaunus</i>	Masked crab
<i>Crangon crangon</i>	
<i>Homarus gammarus</i>	Common lobster
<i>Hyas araneus</i>	
<i>Liocarcinus holsatus</i>	Swimming crab
<i>Liocarcinus puber</i>	Velvet swimming crab
<i>Macropodia rostrata</i>	Long legged spider crab
<i>Nephrops norvegicus</i>	Norway lobster
<i>Pagurus bernhardus</i>	Hermit crab
<i>Porcellana spec.</i>	
<i>Upogebia deltaura</i>	

Echinodermata

<i>Asterias rubens</i>	Common starfish
<i>Astropecten irregularis</i>	
<i>Crossaster papposus</i>	
Echinidae	Sea urchins
<i>Echinocardium cordatum</i>	Sea potato
<i>Henricia oculata</i>	
<i>Holothurioidea indet.</i>	
<i>Luidia sarsi</i>	
<i>Marthasterias glacialis</i>	
<i>Ophiotrix fragilis</i>	
Ophiura	Brittle star species
<i>Psammechinus miliaris</i>	

Scyphozoa

<i>Aurelia aurita</i>
<i>Rhizostoma pulmo</i>
Scyphozoa indet.

Mollusca

<i>Acanthocardia echinata</i>	Prickly cockle
<i>Alloteuthis subulata</i>	
<i>Angulus spec.</i>	
<i>Aporrhais pespelecani</i>	
<i>Arctica islandica</i>	Quahog
<i>Buccinum undatum</i>	Whelk
Cephalopoda	
<i>Cerastoderma edule</i>	Common edible cockle
<i>Chamelea gallina</i>	Striped venus
<i>Donax vittatus</i>	Banded wedge-shell
<i>Ensis ensis</i>	Razor clam
<i>Epitonium (Clathrus)</i>	
Gastropoda indet.	
<i>Littorina spec.</i>	
<i>Lunatia</i>	Necklace shell
<i>Macoma balthica</i>	
<i>Mactra stultorum</i>	Rayed trough shell
<i>Modiolus modiolus</i>	
<i>Mya arenaria</i>	Sand gaper
<i>Mya truncata</i>	
<i>Mytilus edulis</i>	Mussel
<i>Neptunea antiqua</i>	Buckie, Red Whelk
<i>Opisthobranchia indet.</i>	
<i>Ostrea edulis</i>	
<i>Pecten maximus</i>	Saint James shell
Pelecypoda	
<i>Petricola pholadiformis</i>	
<i>Spisula</i>	Trough shell
<i>Spisula solida</i>	Thick trough shell
<i>Tellina tenuis</i>	
<i>Turritella communis</i>	Tower shell
<i>Venerupis spec.</i>	

Coelenterate

Actiniaria	Beadler anemone
<i>Alcyonium digitatum</i>	
Ascidacea	
Bryozoa	
<i>Metridium senile</i>	
Tunicata indet.	

Table 4.1.1 Abundance of fish species in Sub-area RFA4.

	1990	1991	1992	1993	1994	1995	1996
AMERICAN PLAICE							53.3
ANGLERFISH (MONK)							1.4
BRILL				4	1	2	0.5
COD				10	2	6	5.6
COMMON DRAGONET				2		4	21.1
DAB				222	15	90	467.1
EUROPEAN PLAICE				10	8	21	29.4
GREY GURNARD					2	8	0.1
HADDOCK						3	35.4
LEMON SOLE				14	10	9	29.9
LESSER SPOTTED DOGFISH					3	2	
LESSER WEEVER FISH						10	100.5
POGGE (ARMED BULLHEAD)				136	16	33	17.8
RED GURNARD						5	
SCALD FISH						14	87.9
SOLE (DOVER SOLE)				28	21	44	10.1
SOLENETTE						7	69.3
TUB GURNARD				2			
TURBOT						1	
WHITING				6	13	7	42.4
WHITING POUT (BIB)				2	3	7	1.6

Table 4.1.2 Abundance of fish species in Sub-area RFA5

	1990	1991	1992	1993	1994	1995	1996
ANGLERFISH (MONK)			0.1				
BRILL	1	1.7	0.2	0.8	0.8	1	1.1
COD	1.7	5.1	2.8	0.6	1	1.8	3.1
COMMON DRAGONET	23.7	36	10.2	112.1	73.5	124.4	84.2
DAB	77.1	93.1	318.3	22.7	16	27.9	246.9
EUROPEAN PLAICE	20.6	28.6	29.8	12.1	19.8	26.2	62.0
FLOUNDER (EUROPEAN)			2.3	0.2	0.1	10.3	9.6
GREY GURNARD	18.9	40	27.1	9.5	6.9	6.3	23.3
LEMON SOLE	8.3	35.4	3.2	11.8	18.1	29.1	34.4
LESSER SPOTTED DOGFISH	10.3	3.1	3.6	8.6	4.7	4.2	6.8
LESSER WEEVER FISH	89.7	119.4	69.3	64.2	57.5	116.1	181.3
POGGE (ARMED BULLHEAD)	0.9	9.1	9.4	55.2	147.7	112.3	124.9
POOR COD	161.1	106.9	18.8	14.1	27.2	23.5	19.9
RED GURNARD	0.3	3.4	1	0.5	0.3	6.3	0.9
RED MULLET			0.2		0.1	0.2	0.3
SCALD FISH	28.9	14.3	77.4	20.1	11.8	23.8	19.1
SOLE (DOVER SOLE)	78.1	38.4	26	66.4	58.5	65.1	124.9
SOLENETTE	16	9.1	124.6	18.9	8.1	51.1	76.9
TUB GURNARD	1.4	0.3	1.4	2.8	1.1	0.7	0.7
TURBOT			0.6	0.2	0.1	0.1	0.2
WHITING	14	20.3	22	29.6	10.9	32.6	61.8
WHITING POUT (BIB)	20.6	46.3	8.1	14.5	65.7	82.4	15.5

Table 4.1.3 Abundance of fish species in Sub-area RFA6.

	1990	1991	1992	1993	1994	1995	1996
AMERICAN PLAICE (LR DAB)	2.7	2.1	1	0.7	1.5	2.5	3.4
ANGLERFISH (MONK)	.	.	0	0.1	0.1	0	0
BRILL	1.8	1.1	3	2.3	1.3	1.3	0.6
COD	4.4	10.5	2.4	1.2	12.6	11.6	10.8
COMMON DRAGONET	153.2	59.1	138	128.8	126.1	130.2	17.7
DAB	1925.8	1150.3	1161.5	1127	878.6	3016.8	1801.6
EUROPEAN PLAICE	509.7	656.6	571.3	623.2	551	533.5	927.1
FLOUNDER (EUROPEAN)	10.1	14.8	4.8	8.6	4.7	12.7	11.1
GREY GURNARD	23.9	24.9	30.4	34.1	55.8	46.8	44.2
HADDOCK	.	.	.	0	.	0.5	0
JOHN DORY	.	.	.	.	0	.	0
LEMON SOLE	2	1.8	0.5	2	9.8	8.7	8.7
LESSER SPOTTED DOGFISH	0	0.1	0.1	.	0.1	0	.
LESSER WEEVER FISH	29.3	28	34.1	62.3	56.8	60.2	29.4
POGGE (ARMED BULLHEAD)	44.6	60.2	59	42.7	147.4	164.4	70.5
POOR COD	2.7	0.7	0.7	0.7	1	4.4	2.7
RED GURNARD	.	0.5	0.5	0.6	0.2	0.3	0.1
RED MULLET	0.1	1.1	1.2	0.2	4.2	1.6	0.1
SCALD FISH	93.5	72.3	73.3	185.7	82.3	68.2	19.2
SOLE (DOVER SOLE)	86.8	51.1	128	69.6	42.7	48.6	21.4
SOLENETTE	82	78.7	143.1	183.7	154.3	123.3	37.1
THICKBACK SOLE	0	.	.	.	.	0.1	.
TUB GURNARD	7.7	5.7	12.5	11.8	9.3	6.4	5.5
TURBOT	4.9	3.5	3.2	3.3	2.7	2.8	2.8
WHITING	362.7	71.4	81.1	77.4	98.6	137.6	50.2
WHITING POUT (BIB)	26.2	1.5	3	2.6	2.4	19.7	1.0

Table 4.1.4 Abundance of fish species in Sub-area RFA7.

	1990	1991	1992	1993	1994	1995	1996
AMERICAN PLAICE (LR DAB)	26.7	27.7		72.7	34.6	30.7	183.7
ANGLERFISH (MONK)	.	0.1	.		1	0.4	2.8
BRILL	.	.		1.3	0.3	0.4	0.3
COD	1.1	4.9		2	16.2	10	100.6
COMMON DRAGONET	62	52.7		70.3		2.1	5.7
DAB	2798.6	1530.6		3381.7	286.8	433.4	1645.5
EUROPEAN PLAICE	870.6	692		286.3	115.6	235.7	200.2
FLOUNDER (EUROPEAN)	7.1	3.4		1.4	0.1		5.7
GREY GURNARD	110	86.3		90.7	63.7	119.5	83.8
HADDOCK	.	.	.		3.9	34.9	3.0
LEMON SOLE	8	3.4		1.4		2.6	9.8
LESSER WEEVER FISH	.	.		5.4	0.6	0.1	
POGGE (ARMED BULLHEAD)	35.4	52		84.4	7.6	15.6	27.2
POOR COD	.	.	.		0.2		
RED GURNARD	.	.	.		0.1		
SCALD FISH	4.9	17.9		20.6	5.1	7.8	
SOLE (DOVER SOLE)	16	11.4		9	4.7	4.4	4.0
SOLENETTE	4.6	3.1		24	6.6	14.9	2.2
TUB GURNARD	3.4			2.3	0.8	0.2	5.0
TURBOT	1.9	0.9		0.7	0.8	0.7	0.8
WHITING	659.1	152.3		89	27.8	31	10.8
WHITING POUT (BIB)	0.4		.	.	.		

Table 4.1.5 Abundance of fish species in Sub-area VIIa.

	1990	1991	1992	1993	1994	1995	1996
AMERICAN PLAICE (LR DAB)	14.6	0.2	1.3	1.5	4.1	8.6	3.9
ANGLERFISH (MONK)	0.8	1.8	2.7	4.3	3.1	2.8	2.7
BRILL	2.3	2.4	2	2	0.9	1	1.8
COD	35.6	10.8	5.3	23	15.1	8.5	7.9
COMMON DRAGONET	189.4	153	209.1	196.8	174.8	136.3	133.0
DAB	573.8	357.8	214.2	380.8	548.7	487.1	429.5
EUROPEAN PLAICE	317	145.5	187.7	297.9	273.3	275.8	257.2
FLOUNDER (EUROPEAN)	3.6	1	1.8	1.2	0.8	0.5	0.5
GREY GURNARD	66.3	48.6	114.6	89.9	80.7	43.8	47.0
HADDOCK	1.8	.	0.8	0.6	11.5	1.7	8.1
JOHN DORY	0.2	0.4	0.4	0.4	0.1	0.2	0.1
LEMON SOLE	4.6	2	3.6	13.1	10.9	12.7	9.1
LESSER SPOTTED DOGFISH	21	19.8	31.7	22.8	19.4	18.7	20.7
LESSER WEEVER FISH	13.6	25.1	44.2	44.9	55.5	52.8	19.9
POGGE (ARMED BULLHEAD)	81.4	37.6	47	65.3	57	52.3	48.4
POOR COD	245.7	84.6	119.6	218.9	124.2	153.4	108.9
RED GURNARD	1.4	6.1	3.6	4	5.6	2.9	5.6
RED MULLET	.	0.2	0.1	0	.	0.6	
SCALD FISH	24.4	38.3	34.8	39.9	47.1	33.6	47.8
SOLE (DOVER SOLE)	185.5	179	159	76	65.5	59.8	80.8
SOLENETTE	138.2	255.5	128.4	209.5	196.1	252.1	174.1
THICKBACK SOLE	11.7	20.9	49.6	30.2	24.3	22	26.8
TUB GURNARD	7.6	6.9	15.2	8.2	7.3	7.5	9.4
TURBOT	0.2	0.5	0.5	0.2	0.3	0.3	0.4
WHITING	73	45.9	85.2	97.6	83.2	173.1	85.2
WHITING POUT (BIB)	39.4	27.5	27.7	7.4	1.7	11.1	3.6

Table 4.1.6 Abundance of fish species in Sub-area VIId.

	1990	1991	1992	1993	1994	1995	1996
ANGLERFISH (MONK)	0.1	.	.	0.1	0.1	.	0.2
BRILL	2.3	0.9	0.8	0.9	1.3	1.7	1.5
COD	.	.	0.4	0.2	0.2	0.2	0.3
COMMON DRAGONET	117.3	212.7	300.3	245.3	304.9	126.5	226.6
DAB	49.2	81.7	96.6	34.7	132.2	69.7	52.6
EUROPEAN PLAICE	51.3	59.9	60.5	41.9	36.2	32	62.6
FLOUNDER (EUROPEAN)	0.8	5.3	2.1	1.7	2.2	2.4	16.9
GREY GURNARD	0.9	1	0.4	0.2	0.4	0.1	0.1
JOHN DORY	.	0.6	0.5	0.4	0.6	0.1	0.1
LEMON SOLE	7.8	3.5	2.9	7	11.1	13.2	8.9
LESSER SPOTTED DOGFISH	3.4	5.2	8.6	11.6	6.6	6.7	6.0
LESSER WEEVER FISH	8.8	5.3	6.4	8.5	11	5.3	11.4
POGGE (ARMED BULLHEAD)	13.8	24.9	24.9	29.9	43.9	36	28.6
POOR COD	171.9	83.2	70.3	59	98.9	100	77.5
RED GURNARD	8.3	8.1	8.1	8.4	12.3	9.7	13.5
RED MULLET	0.7	.	0.2	0.6	.	0.1	0.3
SCALD FISH	7	18.6	15.5	16.9	10.4	6.1	9.2
SOLE (DOVER SOLE)	28.3	46.9	31.5	42.1	33.6	28.1	29.9
SOLENETTE	104.8	163	138.1	180.8	180.2	79.2	161.8
THICKBACK SOLE	2.3	4.1	5	6.8	7.2	6.4	9.3
TUB GURNARD	3.9	2.3	5	5.9	4	3.4	2.2
TURBOT	0.8	0.5	0.6	0.2	0.5	0.8	0.4
WHITING	0.5	0.8	1.9	0.5	1.8	4.3	0.3
WHITING POUT (BIB)	221.8	39.2	59.5	38.6	62.4	47.2	71.2

Table 4.1.7 Abundance of fish species in Sub-area VIIe.

	1990	1991	1992	1993	1994	1995	1996
ANGLERFISH (MONK)	1.1	0.9	0.7	2.6	0.9	2	1.3
BRILL	0.3	0.6	0.6	0.4	0.4	0.3	0.5
COD	.	.	0.1	.	0	.	.
COMMON DRAGONET	39.2	8.2	74.3	37	87.6	60.4	122.9
DAB	17.5	12.9	13.4	13.1	32.3	21.5	19.8
EUROPEAN PLAICE	18.6	12	14.6	9.6	9.5	9.2	15.7
FLOUNDER (EUROPEAN)	.	.	.	0	.	0.1	0.3
GREY GURNARD	5.5	3.5	3.6	4.8	9.9	3.1	6.8
HADDOCK	.	.	.	.	.	0	.
JOHN DORY	0.1	0.9	1.2	2.2	1	0.1	0
LEMON SOLE	2	2.3	0.7	0.7	0.9	1.3	1.2
LESSER SPOTTED DOGFISH	9.9	9	13.9	18.3	11	14.9	13.7
LESSER WEEVER FISH	0.1	.	0.6	0.1	5.5	1.8	5.0
POGGE (ARMED BULLHEAD)	13.2	0.7	4.5	3.3	7.2	4.2	6.5
POOR COD	71.2	12.7	116.5	46.2	102.2	45.9	105.7
RED GURNARD	35.5	10.5	30.2	34.7	51.4	31.3	26.3
RED MULLET	1.1	0.6	0.8	1.6	1	1.7	1.9
SCALD FISH	6	2.5	12.7	9.4	23.9	15.5	25.6
SOLE (DOVER SOLE)	9.5	17.7	22.2	13.4	10.6	9.2	12.1
SOLENETTE	12.3	0.9	46	45.3	114.7	74.4	91.9
THICKBACK SOLE	31.5	6.2	58.5	23.7	44.9	25.6	59.8
TUB GURNARD	0.6	0.4	1.5	0.8	0.3	0.6	0.8
TURBOT	0.1	0.1	0	0.1	0.1	0.1	0.1
WHITING	0.7	12.9	5.2	13	2.1	3.5	4.3
WHITING POUT (BIB)	13.3	9	11.3	7.6	4.5	1.9	5.5

Table 4.1.8 Abundance of fish species in Sub-area VIIf.

	1990	1991	1992	1993	1994	1995	1996
ANGLERFISH (MONK)	0.6	2.8	10.8	6.2	4.8	3.2	2.3
BRILL	2.1	2.5	1.6	1.5	1.9	2.6	1.6
COD	0.6	0.8	1.5	0.3	0.8	1	0.5
COMMON DRAGONET	19.8	40.4	75.9	52.4	119.2	50.9	86.4
DAB	66.7	77.9	152.8	117.8	167.4	84.8	104.9
EUROPEAN PLAICE	100	121.9	101.3	33.8	36.7	42.5	71.9
FLOUNDER (EUROPEAN)	1.3	1.1	1	0.4	1.6	1.6	1.1
GREY GURNARD	15.4	52.2	85.2	63.1	45.1	25.6	23.0
HADDOCK	.	.	.	.	0.1	.	0.1
JOHN DORY	0.8	2.1	0.5	3	1.1	0.7	0.4
LEMON SOLE	1.7	1.8	3.3	4.7	9.1	6.3	12.0
LESSER SPOTTED DOGFISH	72.4	86.5	100.7	48.9	40.1	32.8	34.1
LESSER WEEVER FISH	0.2	2.8	1.1	3	3.2	3.4	3.4
POGGE (ARMED BULLHEAD)	0.4	1.9	3.2	7.9	3.3	3.9	4.7
POOR COD	321.8	293.7	334.9	298.3	112.8	116.4	121.5
RED GURNARD	1.5	5.1	1.1	7.4	10.4	6.9	9.5
RED MULLET	2.1	0.1	.	0.1	0.2	0.1	1.1
SCALD FISH	0.4	1.8	1.3	1	3	3.5	4.0
SOLE (DOVER SOLE)	118.5	136.8	130.2	81.1	110.1	54.8	59.0
SOLENETTE	113	280.5	153	138	246.9	119.6	111.1
THICKBACK SOLE	7.6	26.9	31.2	27.4	23.6	23.1	22.5
TUB GURNARD	9.7	7.4	12.6	2.8	8.6	6.8	6.2
TURBOT	1.3	2.3	1.2	1.3	1.9	2.4	1.4
WHITING	85.1	87.3	122.8	163.6	53.1	56.1	91.5
WHITING POUT (BIB)	255	100.3	29.2	13.5	5.4	7.6	15.5

Table 4.1.9 Abundance of fish species in Sub-area VIIg.

	1990	1991	1992	1993	1994	1995	1996
AMERICAN PLAICE (LR DAB)	.	.	.	33.6	87.1	60.3	42.3
ANGLERFISH (MONK)	.	.	.	19.6	26	20.3	9.4
BRILL	8	.	4	0.8	0.3	.	.
COD	.	.	.	1.6	0.9	0.9	0.6
COMMON DRAGONET	.	4	4	76	97.1	64.9	41.7
DAB	.	4	.	112.8	65.4	54.5	43.4
EUROPEAN PLAICE	.	12	4	10.4	7.4	8.9	11.4
GREY GURNARD	.	32	4	92.8	99.1	52.3	38.3
HADDOCK	.	.	.	27.2	44	16.9	20.3
JOHN DORY	.	.	.	0.4	0.3	.	0.3
LEMON SOLE	.	.	.	19.6	18.9	16.9	12.6
LESSER SPOTTED DOGFISH	.	.	8	15.6	13.7	18.8	14.6
LESSER WEEVER FISH	.	4	.	.	0.3	.	0.9
POGGE (ARMED BULLHEAD)	.	.	.	29.2	9.7	12.6	5.1
POOR COD	12	468	180	188.8	68	55.7	52.3
RED GURNARD	.	.	.	4	1.7	0.3	0.3
SCALD FISH	.	.	.	79.8	44	44.3	44.0
SOLE (DOVER SOLE)	12	60	16	20	12.6	12	8.0
SOLENETTE	.	.	4	73.7	44.4	41.2	9.1
THICKBACK SOLE	.	8	.	78.4	68.3	69.5	47.4
TUB GURNARD	.	4	.	.	.	.	0.3
TURBOT	4	.	4	0.8	.	0.3	.
WHITING	20	108	40	64.4	18.9	36	28.6
WHITING POUT (BIB)	.	12	4	.	0.9	.	.

Table 4.1.10 Abundance of edible crab (*Cancer pagurus*) by Sub-area.

Sub-areass	1990	1991	1992	1993	1994	1995	1996
4				10.0	2.0	6.0	5.6
5			0.2	27.2	16.2	59.6	31.6
6			0.0	0.1	0.2	0.1	
7							
VIIa	9.4	9.2	13.1	7.4	9.3	5.4	4.4
VIIId	3.9	2.5	4.3	2.7	2.9	5.2	3.9
VIIe	1.1	2.2	2.4	0.9	1.0	1.6	0.9
VIIIf	1.1	4.0	3.2	6.0	1.8	3.6	2.5
VIIg	4.0	4.0	12.0	1.6	1.7	2.2	1.4

Table 4.1.11 Abundance of razor clam (*Ensis ensis*) by Sub-area

Sub-areass	1990	1991	1992	1993	1994	1995	1996
4				4.0	4.0	4.0	20.1
5	6.7	5.1	2.6	6.1	3.9	5.8	9.8
6	0.1	0.2	0.2	0.1	0.2	0.2	0.1
7	13.7	2.0		0.6	5.3	2.1	8.0
VIIa	11.2	29.8	21.0	15.0	13.2	15.7	17.1
VIIId	5.1	4.6	5.7	5.7	6.0	3.3	4.7
VIIe	2.4	2.2	1.8	1.5	1.4	2.5	3.5
VIIIf	12.2	19.4	25.0	8.5	11.3	17.0	13.9
VIIg	20.0	4.0	8.0	1.6	3.4	8.3	6.9

Table 4.2.1: Catch rate of sole from Netherlands and UK surveys
in the North Sea and VII d,a,e,f&g

Netherlands (N.hr⁻¹/8m trawl) North Sea

Age	0	1	2	3	4	5	6	7	8	9	10+
1985	0.00	2.37	6.02	3.96	1.61	0.59	0.22	0.02	0.02	0.00	0.01
1986	0.00	5.93	4.88	1.55	1.04	0.46	0.23	0.11	0.00	0.00	0.13
1987	0.09	6.10	9.84	2.50	0.77	0.55	0.19	0.15	0.06	0.01	0.03
1988	0.00	70.61	11.14	3.06	0.80	0.16	0.16	0.09	0.06	0.02	0.05
1989	0.91	8.02	60.49	3.20	4.09	0.53	0.19	0.14	0.03	0.02	0.04
1990	0.09	18.99	19.40	19.49	0.95	0.69	0.23	0.08	0.07	0.01	0.02
1991	0.95	3.33	17.37	4.60	9.12	0.26	0.48	0.13	0.04	0.01	0.04
1992	0.21	67.82	24.40	9.13	2.48	3.44	0.11	0.17	0.04	0.03	0.06
1993	0.03	4.95	24.50	2.65	3.93	1.67	3.27	0.03	0.09	0.04	0.04
1994	0.82	6.54	5.08	14.91	0.55	1.94	0.10	0.72	0.02	0.04	0.03
1995	0.66	25.81	6.34	8.25	7.39	0.36	0.95	0.18	0.92	0.03	0.12
1996	0.16	3.03	5.06	1.17	1.43	2.24	0.28	0.39	0.09	0.25	0.04

United Kingdom (N.hr⁻¹/8m trawl) Eastern Channel (VII d)

Age	0	1	2	3	4	5	6	7	8	9	10+
1988	0.0	8.2	14.2	9.9	0.8	1.3	0.6	0.1	0.1	0.2	0.2
1989	0.0	2.6	15.4	3.4	1.7	0.6	0.2	0.2	0.0	0.0	0.7
1990	0.0	12.1	3.7	3.7	0.7	0.8	0.2	0.1	0.2	0.0	0.1
1991	0.0	8.9	22.8	2.2	2.3	0.3	0.5	0.1	0.2	0.1	0.1
1992	0.0	1.4	12.0	10.0	0.7	1.1	0.3	0.5	0.1	0.2	0.6
1993	0.0	0.5	17.5	8.4	7.0	0.8	1.0	0.3	0.2	0.0	0.4
1994	0.0	4.8	3.2	8.3	3.3	3.3	0.2	0.6	0.1	0.3	0.3
1995	0.0	5.2	16.9	2.1	3.8	2.2	2.4	0.2	0.3	0.2	0.2
1996	0	3.5	7.3	3.8	0.7	1.3	0.9	1.1	0.1	0.5	0.4

United Kingdom (N.hr⁻¹/8m trawl) Western Channel (VII e)

Age	0	1	2	3	4	5	6	7	8	9	10+
1989	0.0	0.2	2.5	4.9	4.3	1.5	1.6	0.7	0.3	0.3	0.4
1990	0.0	0.6	1.7	3.1	1.3	1.0	0.3	0.6	0.1	0.2	0.5
1991	0.0	0.3	7.9	2.9	2.1	1.0	0.8	0.3	0.7	0.2	0.7
1992	0.0	0.2	5.8	11.6	1.5	1.3	0.5	0.3	0.2	0.4	0.5
1993	0.0	0.3	2.7	5.4	5.4	1.0	0.5	0.3	0.2	0.1	0.7
1994	0.0	0.1	1.7	3.3	2.4	1.4	0.2	0.3	0.0	0.1	0.3
1995	0.1	1.1	1.5	1.9	1.7	1.0	1.3	0.2	0.2	0.2	0.5
1996	0	1.9	4.7	2.4	1	1.3	0.7	0.6	0.1	0	0.4

United Kingdom (N.hr⁻¹/8m trawl) Bristol Channel (VII f&g)

Age	0	1	2	3	4	5	6	7	8	9	10+
1988	2.2	6.7	26.6	3.7	1.8	0.9	0.0	0.0	0.0	0.0	0.4
1989	18.6	19.7	27.0	18.7	2.2	2.4	1.2	0.4	0.1	0.1	0.0
1990	6.9	30.8	18.2	6.2	1.9	1.0	3.4	0.5	0.0	0.0	0.5
1991	4.0	16.9	40.6	8.8	2.9	4.3	0.4	0.0	0.1	0.3	0.3
1992	0.3	30.7	18.9	12.1	3.0	2.1	1.5	0.1	0.5	0.2	1.0
1993	0.0	7.4	13.0	4.5	6.4	2.6	0.7	0.1	0.1	0.2	0.2
1994	0.1	9.7	4.7	5.9	3.8	2.5	1.0	0.1	0.1	0.7	0.1
1995	2.0	3.4	11.7	5.0	1.8	0.6	2.3	0.5	0.0	0.4	0.3
1996	0.3	7.9	11	3.4	2.4	0.8	0.4	0.2	0.3	0.2	0.6

United Kingdom (N.hr⁻¹/8m trawl) Irish Sea (VII a)

Age	0	1	2	3	4	5	6	7	8	9	10+
1988	0.2	8.8	24.3	23.3	43.8	8.6	4.6	0.1	0.0	0.0	0.0
1989	2.0	15.8	25.9	22.1	9.9	25.0	4.9	1.8	0.0	0.0	0.2
1990	0.9	122.7	53.8	12.1	4.0	9.5	15.2	2.6	1.4	0.6	0.1
1991	0.3	13.2	105.2	17.0	2.8	1.1	2.1	8.4	2.3	0.2	0.3
1992	0.1	14.9	26.2	53.9	14.3	6.2	1.2	0.5	7.9	1.7	0.8
1993	0.0	3.6	13.3	7.0	11.3	2.7	1.0	0.4	0.7	1.9	0.9
1994	0.0	1.7	17.9	10.0	4.3	6.5	2.4	0.7	0.5	0.2	1.6
1995	1.8	13.2	8.8	11.2	4.8	2.2	2.9	0.6	0.3	0.1	1.2
1996	0.2	46.2	8.3	2.5	5.8	3.3	1.7	2.1	0.6	0.2	0.7

Table 4.2.2: Catch rate of plaice from Netherlands and UK surveys
in the North Sea and VII d,a,e,f&g

Netherlands (N.hr⁻¹/8m trawl) North Sea

Age	0	1	2	3	4	5	6	7	8	9	10+
1985	44.76	105.67	185.89	39.49	13.33	1.50	1.02	0.52	0.16	0.19	0.45
1986	14.56	634.26	125.85	50.38	10.18	4.69	0.91	0.48	0.25	0.07	0.24
1987	39.04	207.67	707.45	32.12	9.46	2.67	1.54	0.33	0.18	0.10	0.25
1988	86.69	541.24	151.10	207.99	6.78	3.05	0.74	0.57	0.13	0.14	0.26
1989	73.25	397.99	337.87	56.08	51.10	7.89	1.13	0.42	0.25	0.07	0.32
1990	15.36	123.15	122.13	67.36	22.32	10.20	1.13	0.28	0.23	0.07	0.12
1991	6.12	187.16	125.54	30.11	21.64	5.36	4.58	0.59	0.17	0.08	0.21
1992	15.34	179.56	117.20	20.62	6.10	4.97	2.88	1.41	0.39	0.04	0.09
1993	49.66	124.92	164.11	36.89	7.26	1.77	1.54	0.51	0.47	0.15	0.13
1994	154.82	152.75	65.20	32.24	10.33	2.08	0.62	0.66	1.34	0.33	0.06
1995	97.37	238.17	48.23	14.29	6.19	2.25	0.87	0.38	1.12	0.27	0.15
1996	193.97	213.46	193.10	23.85	5.73	3.34	0.85	0.11	0.24	0.18	0.27

United Kingdom (N.hr⁻¹/8m trawl) Eastern Channel (VIId)

Age	0	1	2	3	4	5	6	7	8	9	10+
1988	0.0	26.5	31.3	43.8	7.0	4.6	1.5	0.8	0.7	0.6	1.2
1989	0.0	2.3	12.1	16.6	19.9	3.3	1.5	1.3	0.5	0.3	1.7
1990	0.6	5.2	4.9	5.8	6.7	7.5	1.8	0.7	1.0	0.8	0.4
1991	0.0	11.7	9.1	7.0	5.3	5.4	3.2	1.2	1.0	0.1	1.2
1992	0.0	16.5	12.5	4.2	4.2	5.6	4.9	3.4	0.7	0.5	0.7
1993	0.1	3.2	13.4	5.0	1.7	1.9	1.6	2.0	2.8	0.4	0.6
1994	1.2	8.3	7.5	9.2	5.6	2.0	0.8	0.9	1.8	1.2	0.8
1995	0.0	11.3	4.1	3.0	3.7	1.5	0.6	0.6	1.3	0.8	0.8
1996	0	13.2	11.9	1.3	0.7	1.3	0.9	0.4	0.3	0.4	2.8

United Kingdom (N.hr⁻¹/8m trawl) Western Channel (VIIf)

Age	0	1	2	3	4	5	6	7	8	9	10+
1989	0.0	0.8	2.2	10.6	7.5	1.4	0.2	0.3	0.2	0.1	0.3
1990	0.0	0.8	1.1	7.0	3.4	2.4	0.0	0.2	0.1	0.1	0.3
1991	0.0	0.6	0.8	1.4	2.7	2.1	1.6	0.7	0.1	0.0	0.3
1992	0.0	4.3	1.0	1.4	0.5	1.3	0.7	0.5	0.1	0.2	0.2
1993	0.0	0.7	2.4	3.3	1.1	0.5	1.2	0.7	0.6	0.0	0.1
1994	0.0	0.8	0.8	3.6	1.2	0.4	0.2	0.5	0.6	0.3	0.0
1995	0.3	2.1	1.7	1.9	2.1	0.5	0.2	0.3	0.2	0.1	0.2
1996	5.4	2.3	3.9	1.3	0.8	0.9	0.2	0	0.1	0.3	0.4

United Kingdom (N.hr⁻¹/8m trawl) Bristol Channel (VIIf&g)

Age	0	1	2	3	4	5	6	7	8	9	10+
1988	0.4	10.9	26.2	7.5	0.0	0.7	0.7	0.0	0.0	0.2	0.0
1989	0.5	15.1	26.5	7.4	2.1	0.8	0.0	0.1	0.0	0.0	0.0
1990	0.9	11.4	15.8	6.4	2.5	0.4	0.0	0.0	0.3	0.0	0.3
1991	0.1	43.2	1.8	3.6	1.4	0.5	0.3	0.0	0.3	0.0	0.0
1992	0.2	28.4	18.5	0.8	0.4	1.2	0.3	0.3	0.0	0.0	0.1
1993	0.1	3.9	13.1	2.9	0.7	0.3	0.8	0.2	0.0	0.0	0.0
1994	3.3	5.1	4.3	3.4	1.0	0.0	0.0	0.2	0.1	0.0	0.4
1995	0.1	7.5	7.0	3.0	0.4	0.5	0.3	0.0	0.0	0.1	0.2
1996	0.4	12	21.8	5.3	1.6	0.8	0	0.1	0	0	0.1

United Kingdom (N.hr⁻¹/8m trawl) Irish Sea (VIIa)

Age	0	1	2	3	4	5	6	7	8	9	10+
1988	2.9	72.6	145.3	30.8	1.2	6.8	1.2	0.5	0.0	0.1	0.8
1989	5.9	41.3	67.6	64.8	11.3	1.4	3.4	0.3	0.0	0.0	0.1
1990	63.4	146.9	36.7	19.9	9.1	4.8	4.1	0.2	0.1	0.9	0.3
1991	6.7	60.4	59.8	8.1	4.4	0.1	0.9	1.8	0.1	0.0	0.4
1992	4.8	50.7	96.1	38.0	2.0	2.1	1.5	1.6	0.1	0.0	2.0
1993	9.3	168.5	155.4	38.7	13.0	2.0	1.9	1.0	0.4	0.4	0.6
1994	14.6	207.0	124.6	81.4	17.5	5.6	1.4	1.4	0.6	0.2	0.6
1995	17.8	249.7	101.0	38.8	32.2	2.9	1.5	0.6	0.4	0.4	0.3
1996	6.3	144	69.3	20.4	9.1	7.1	2.3	1	0.1	0.4	0.5

Figure 2.1 Total number of hauls per rectangle for 1996 and 1990–1996.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

Total number of hauls in 1996 (above) and total for 1990–96 (below)

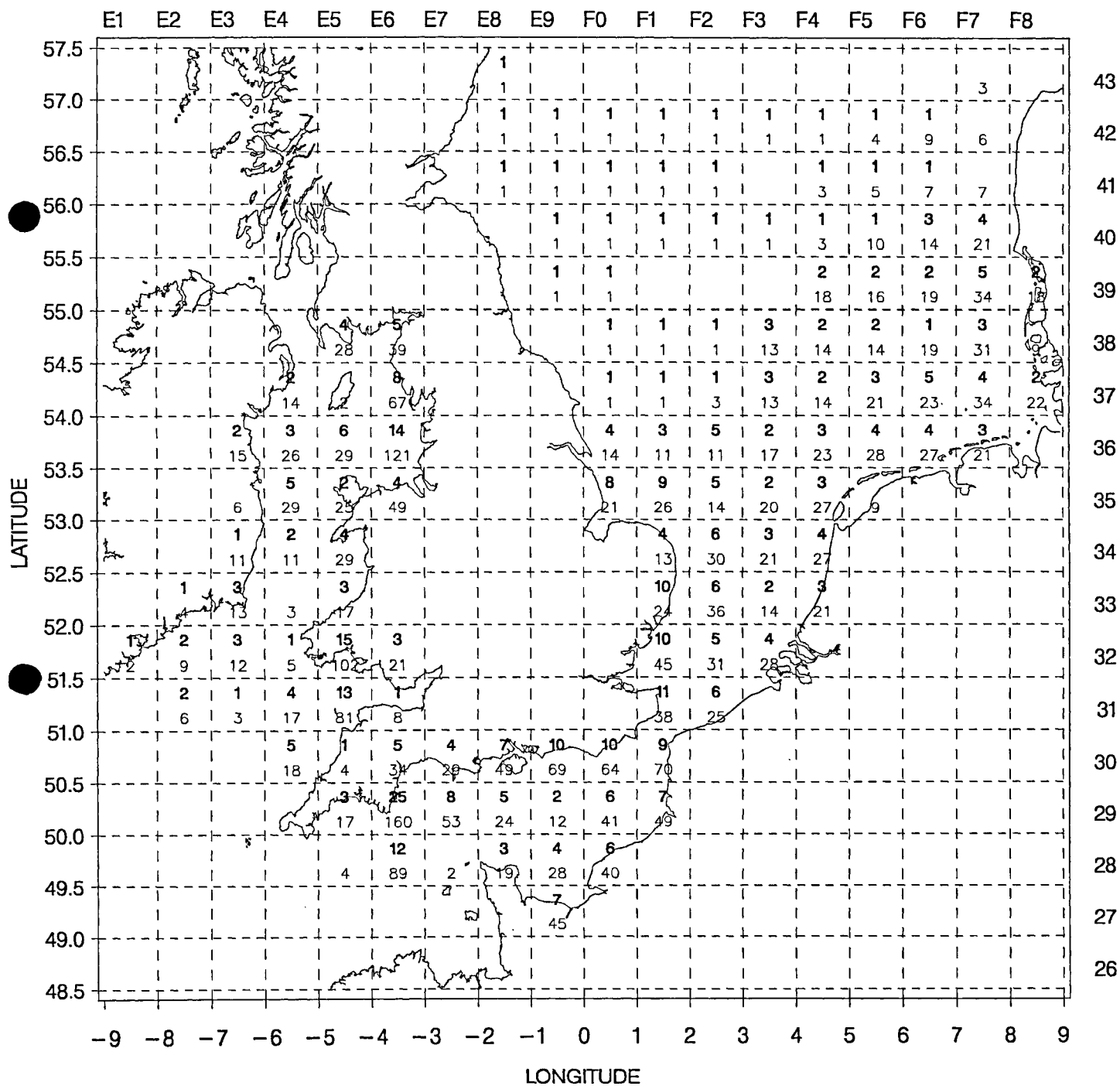


Figure 2.2 Sub-areas for beam trawl surveys. Area classification is according to round-fish areas for North Sea and Management areas (ICES Divisions).

Sub-area codes

Beam trawl survey sub-areas: 1996

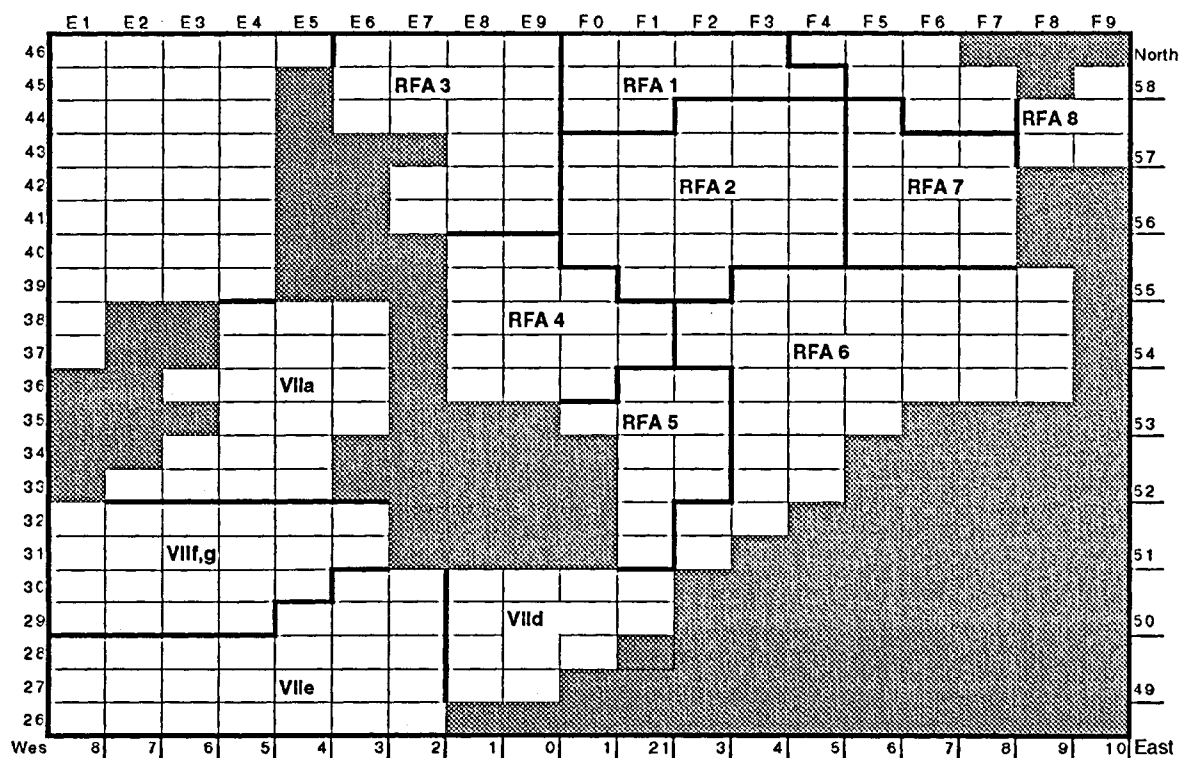


Figure 2.3 Index areas for which the survey indices for plaice and sole were calculated.

Index area codes

Survey Indices plaice and sole

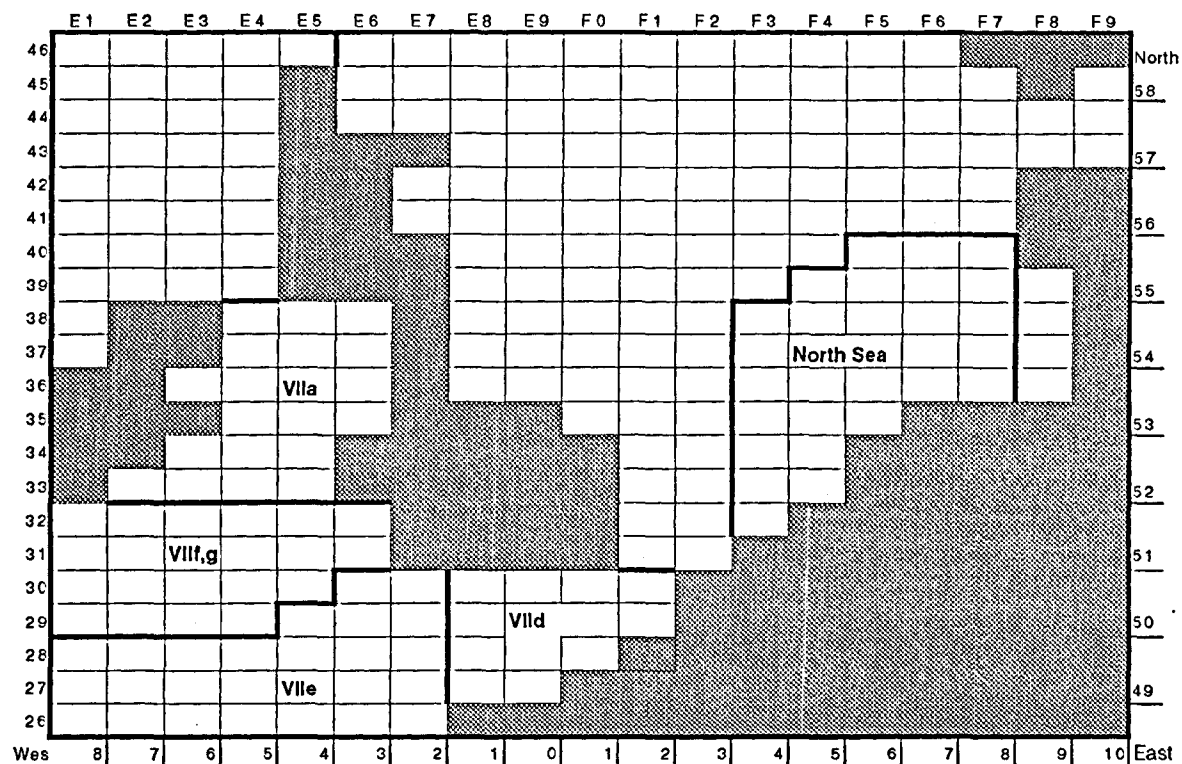


Figure 4.1.1 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

DAB

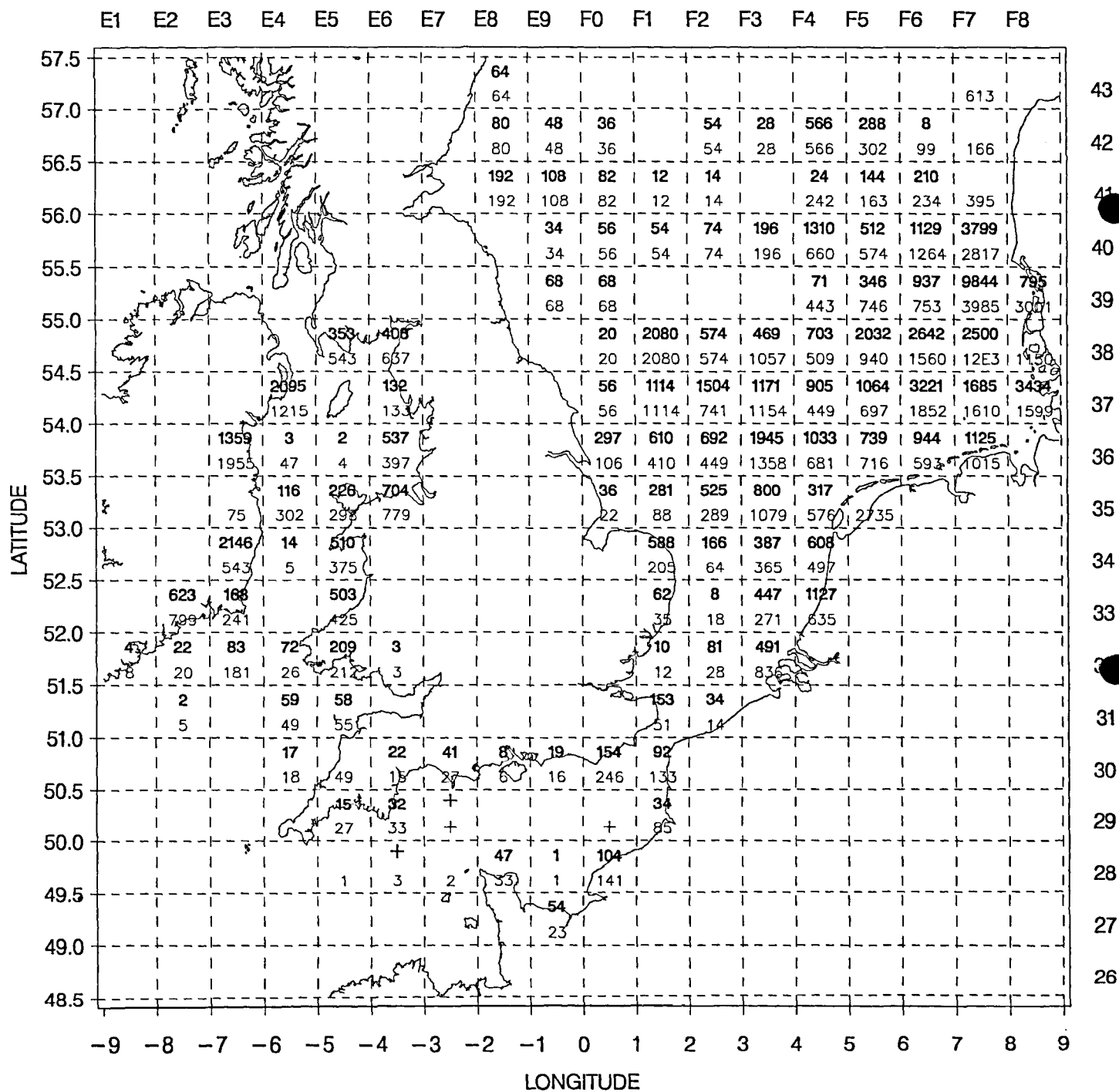


Figure 4.1.2 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

SOLE

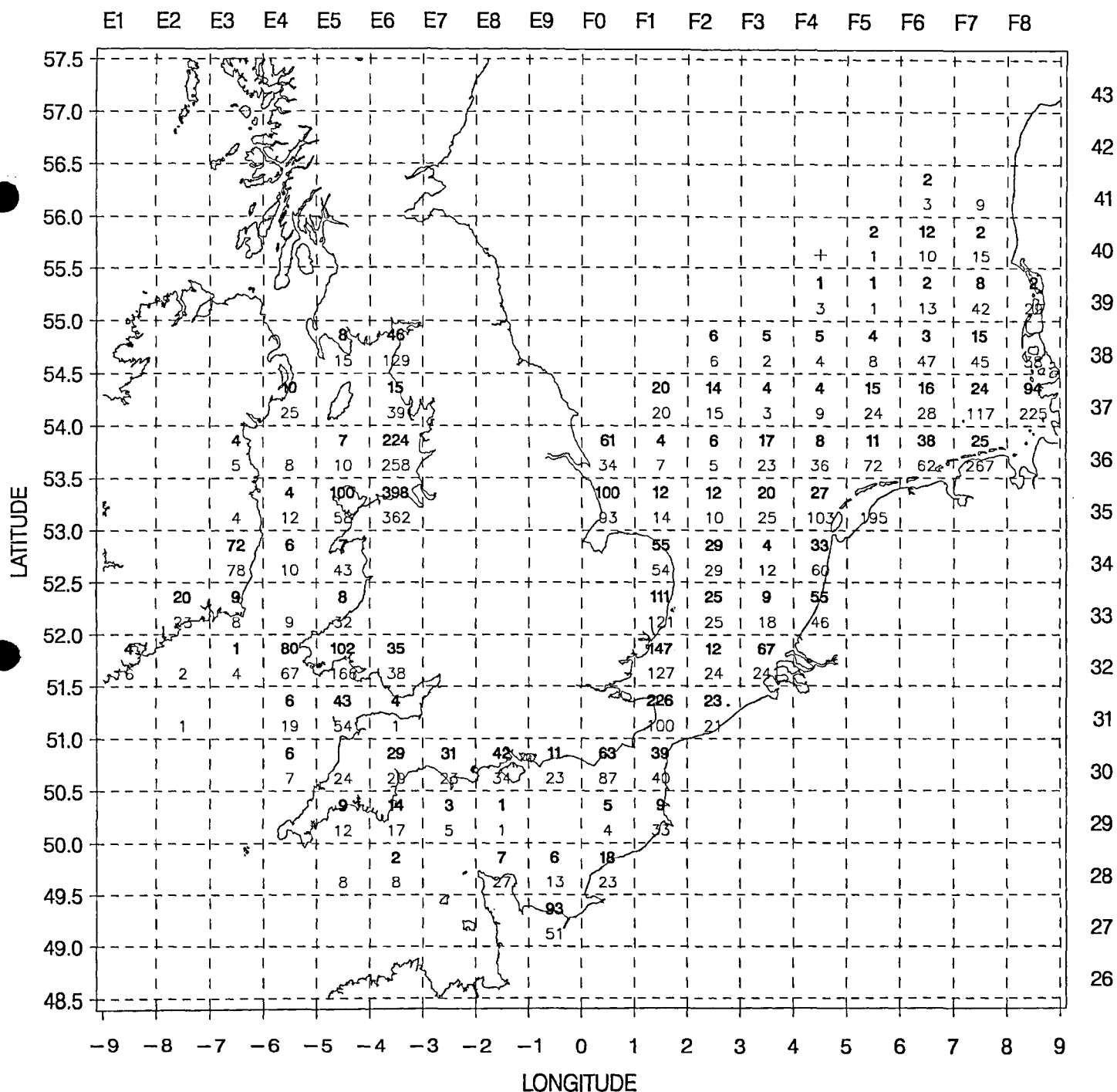


Figure 4.1.3 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

PLAICE

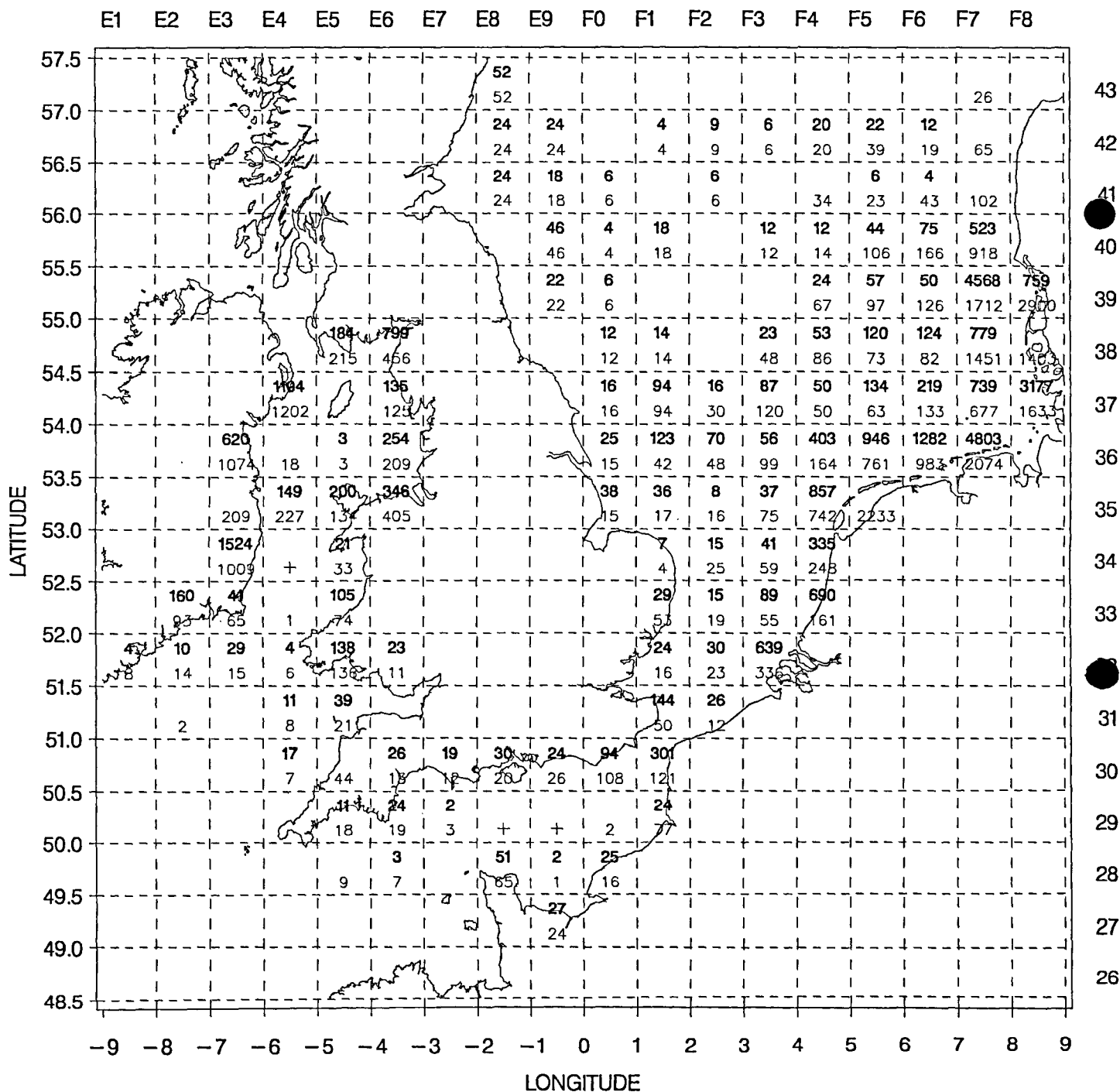


Figure 4.1.4 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

TURBOT

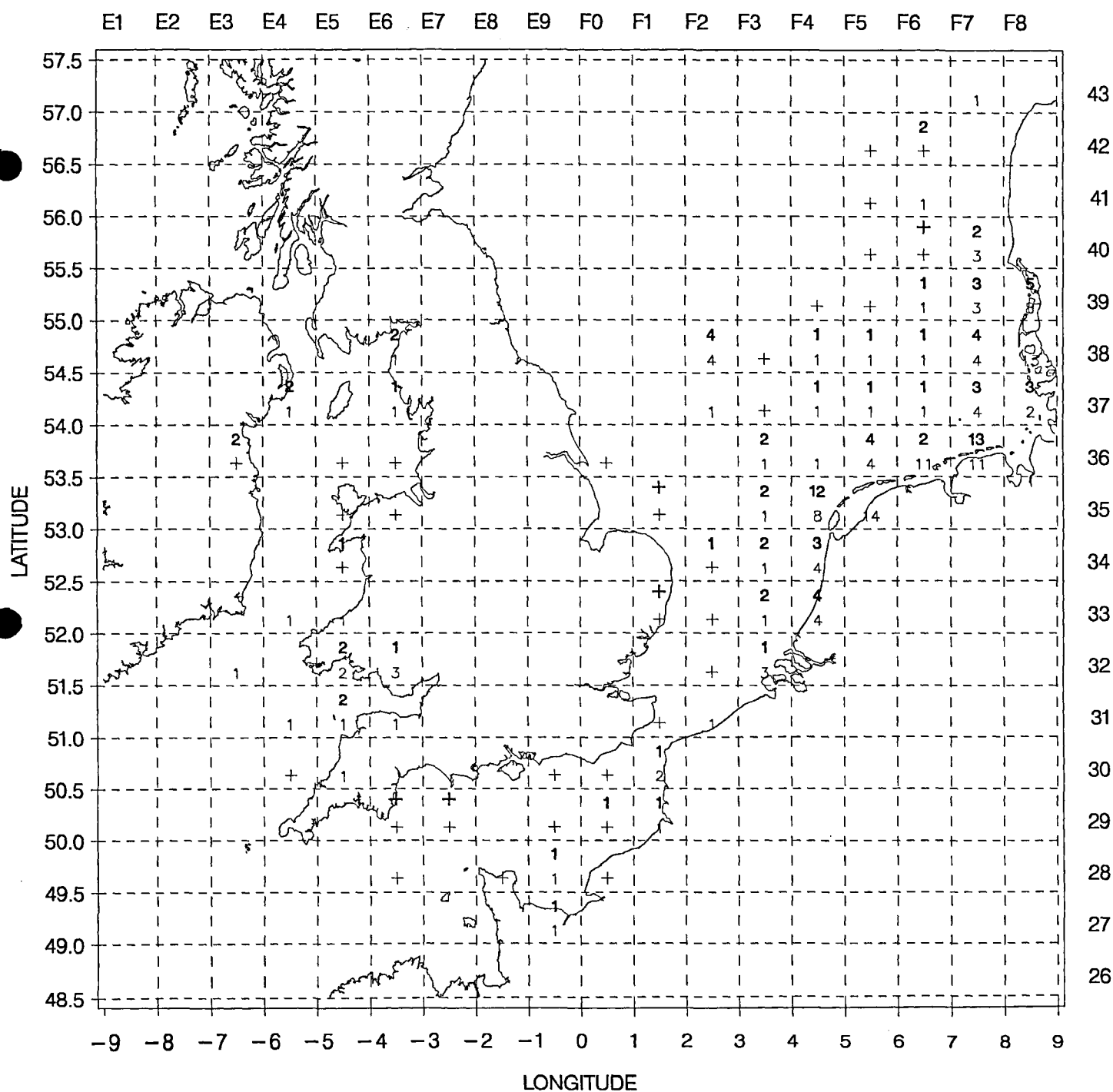


Figure 4.1.5 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

BRILL

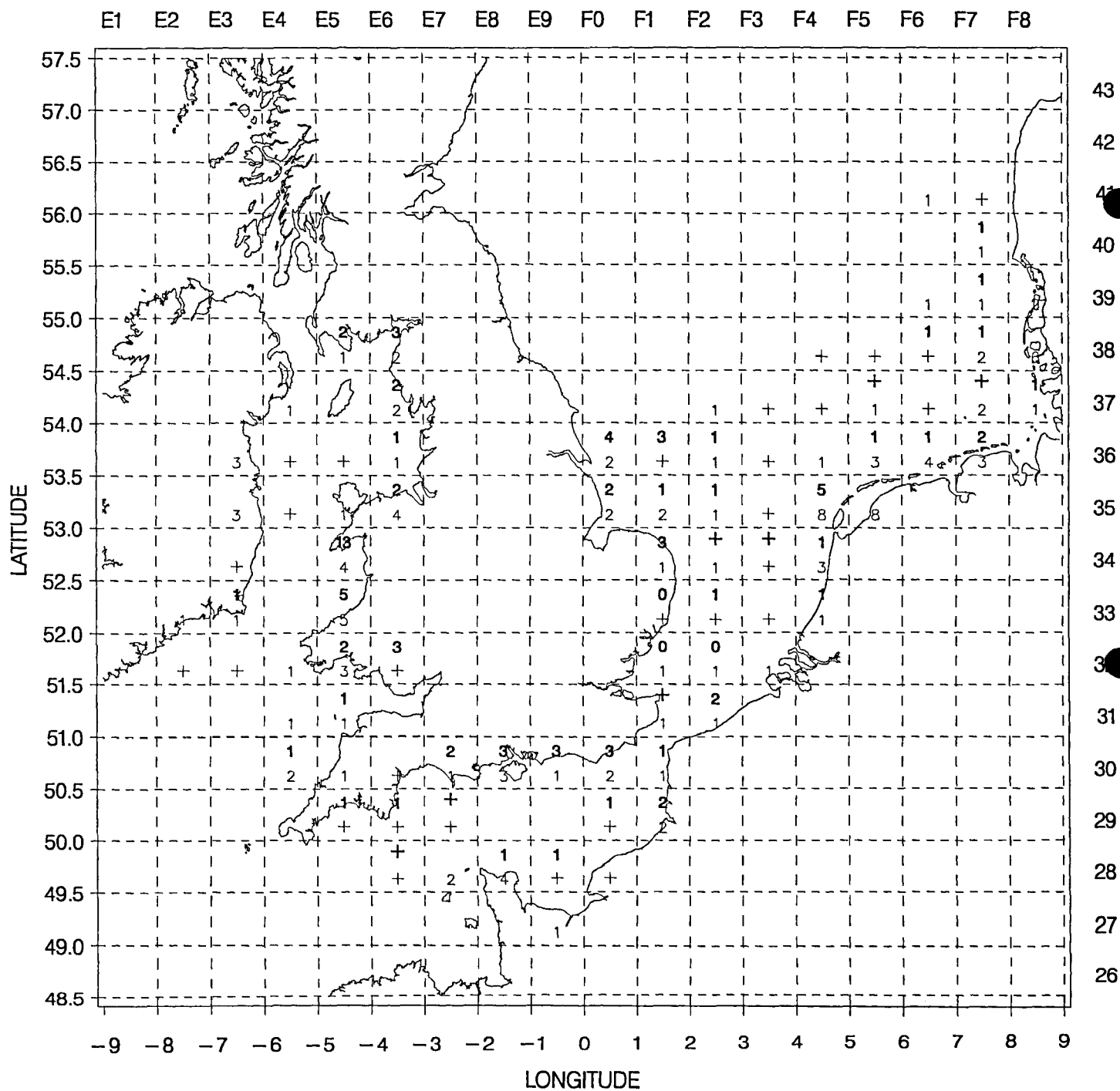


Figure 4.1.6 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

SCALDFISH

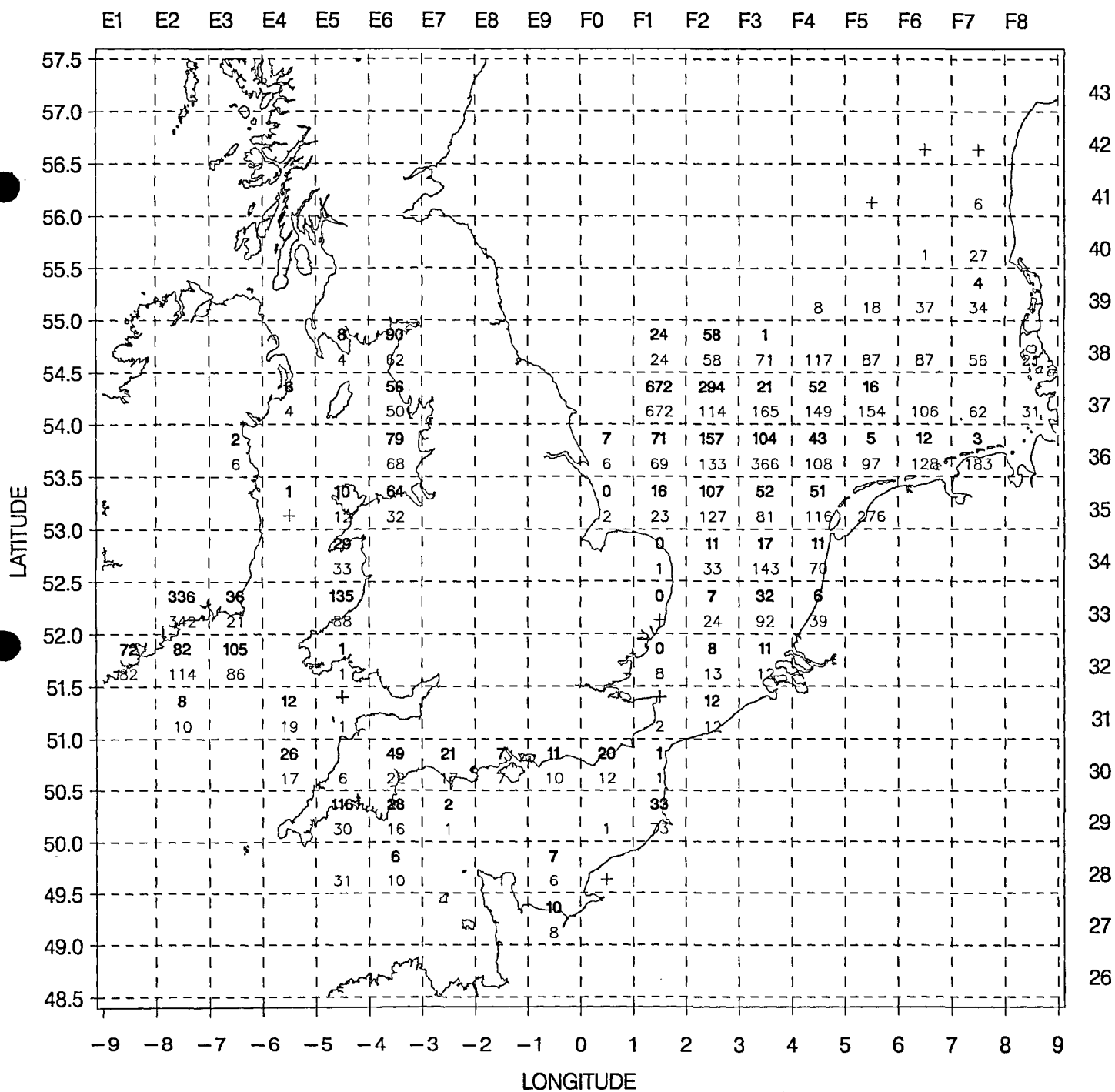


Figure 4.1.7 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

LEMON SOLE

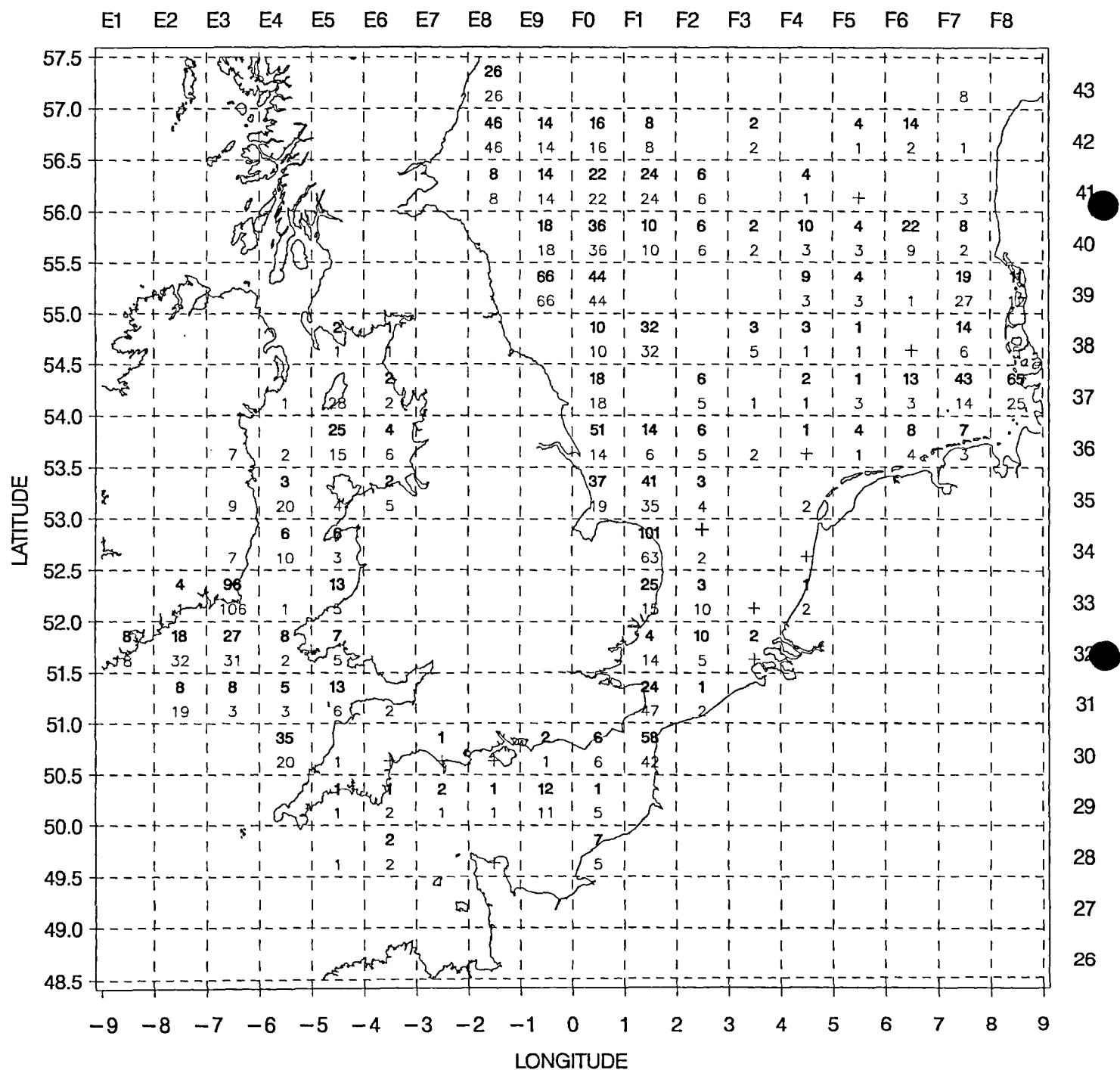


Figure 4.1.8 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

AMERICAN PLAICE (LONG ROUGH DAB)

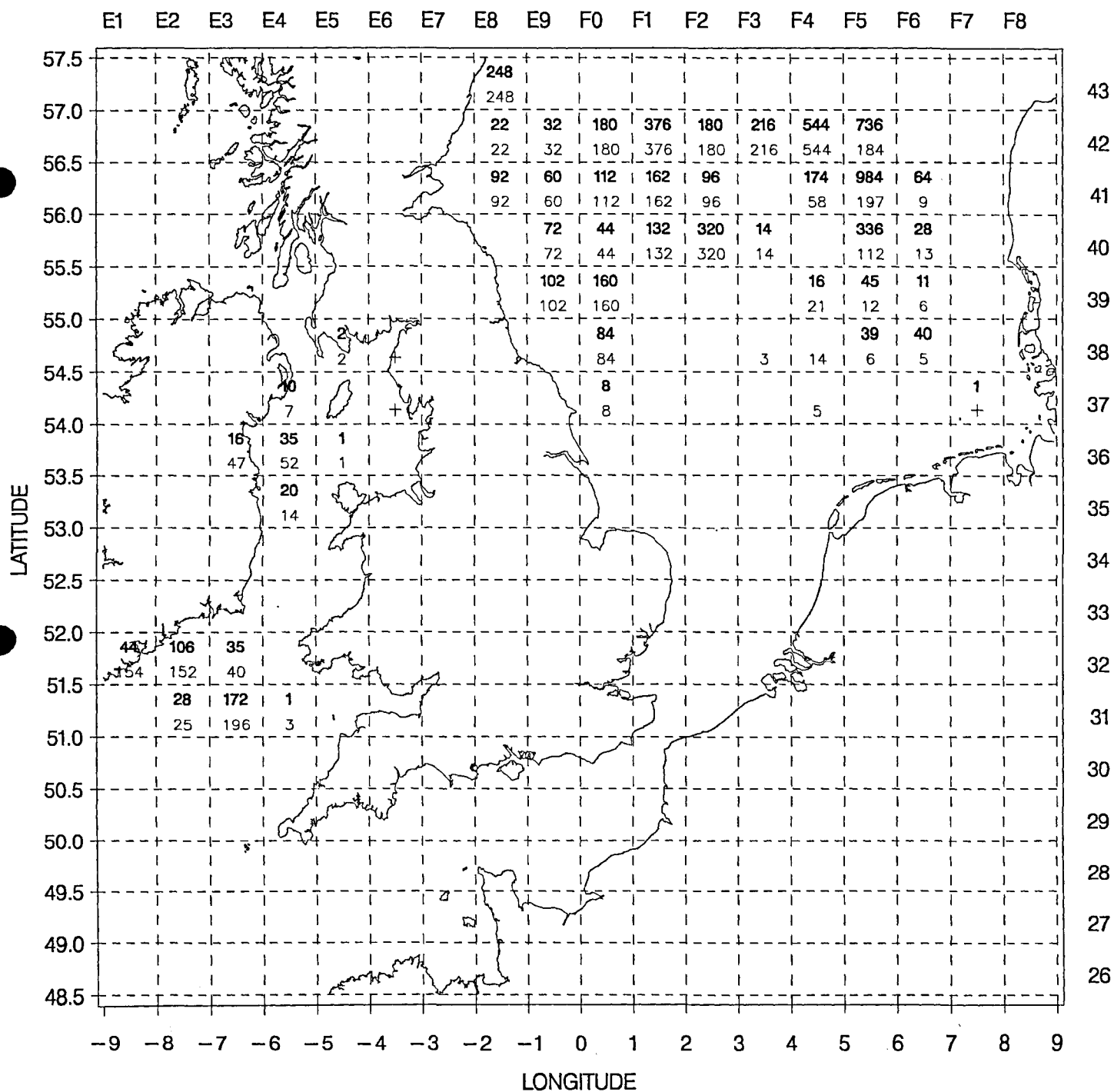


Figure 4.1.9 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

FLOUNDER

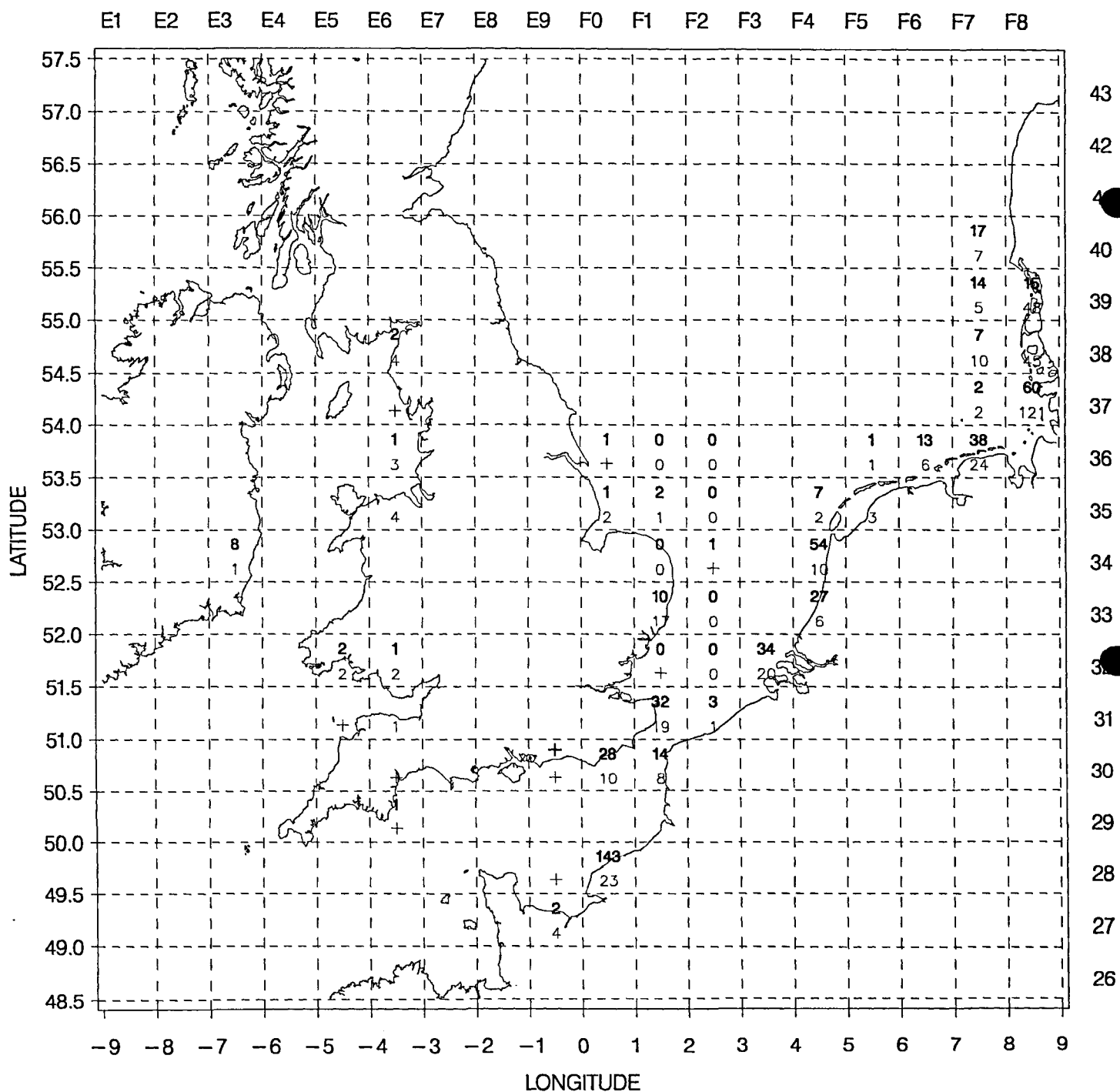


Figure 4.1.10 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

SOLENETTE

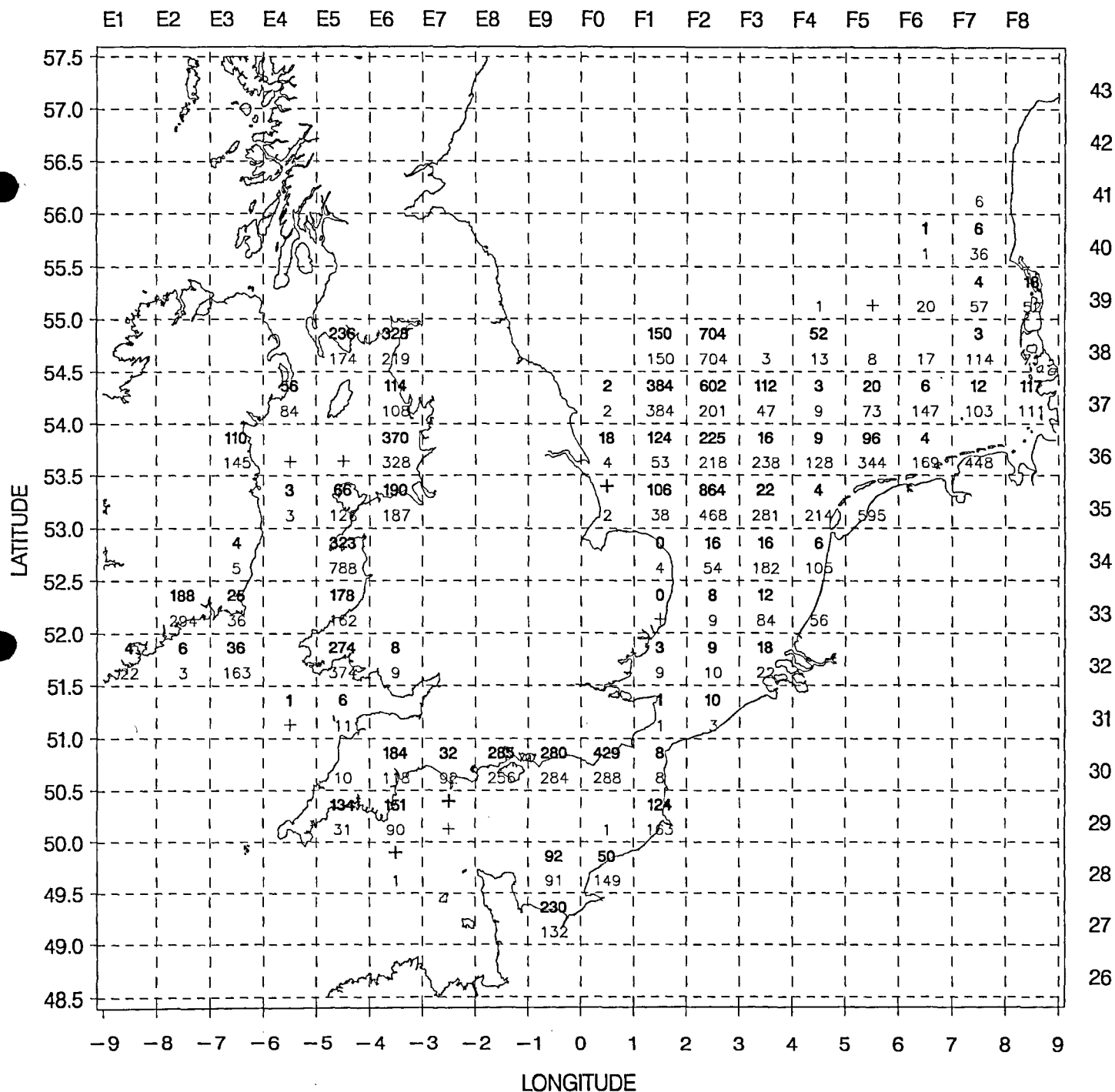


Figure 4.1.11 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

THICKBACK SOLE

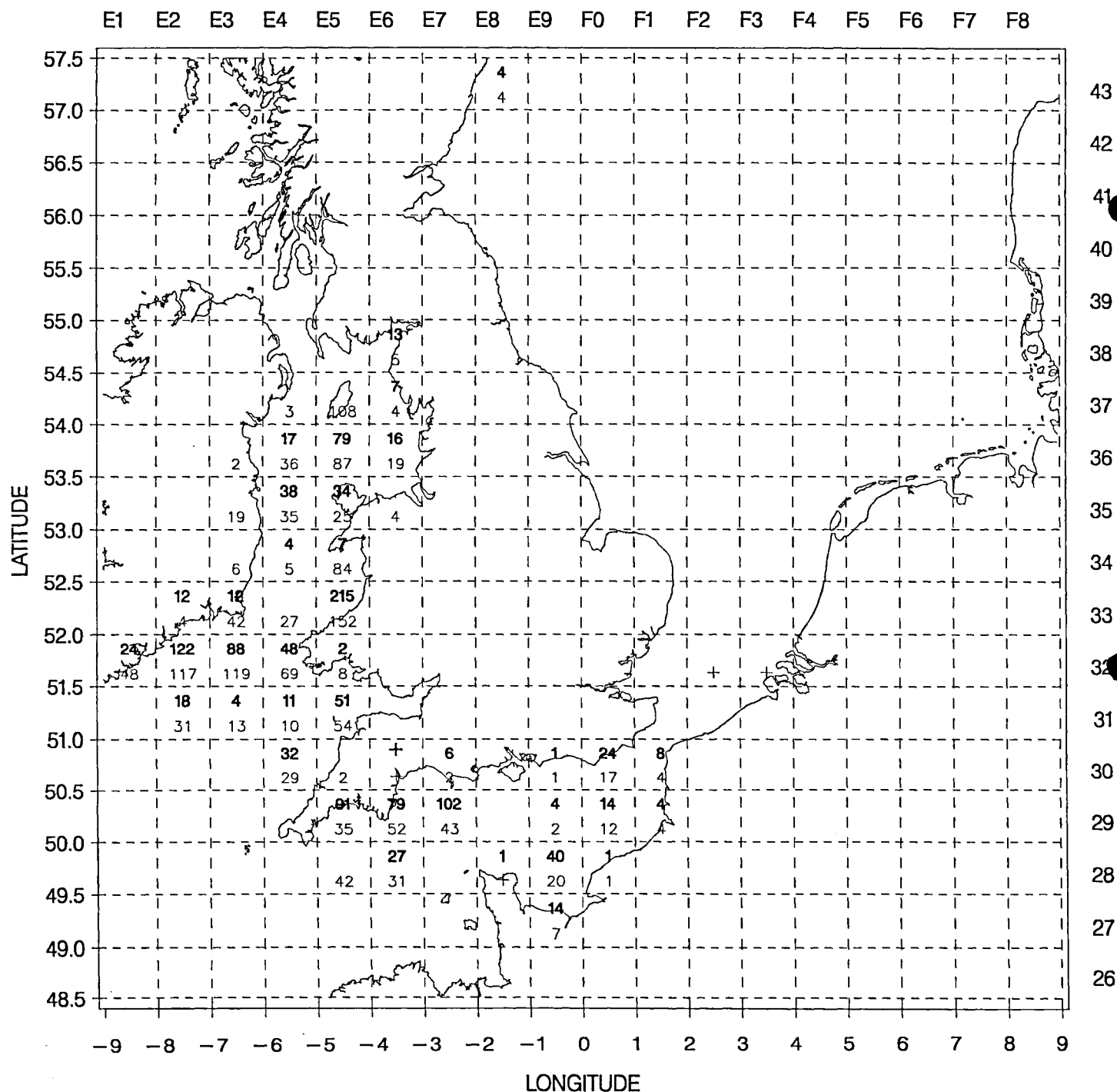


Figure 4.1.12 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

TUB GURNARD

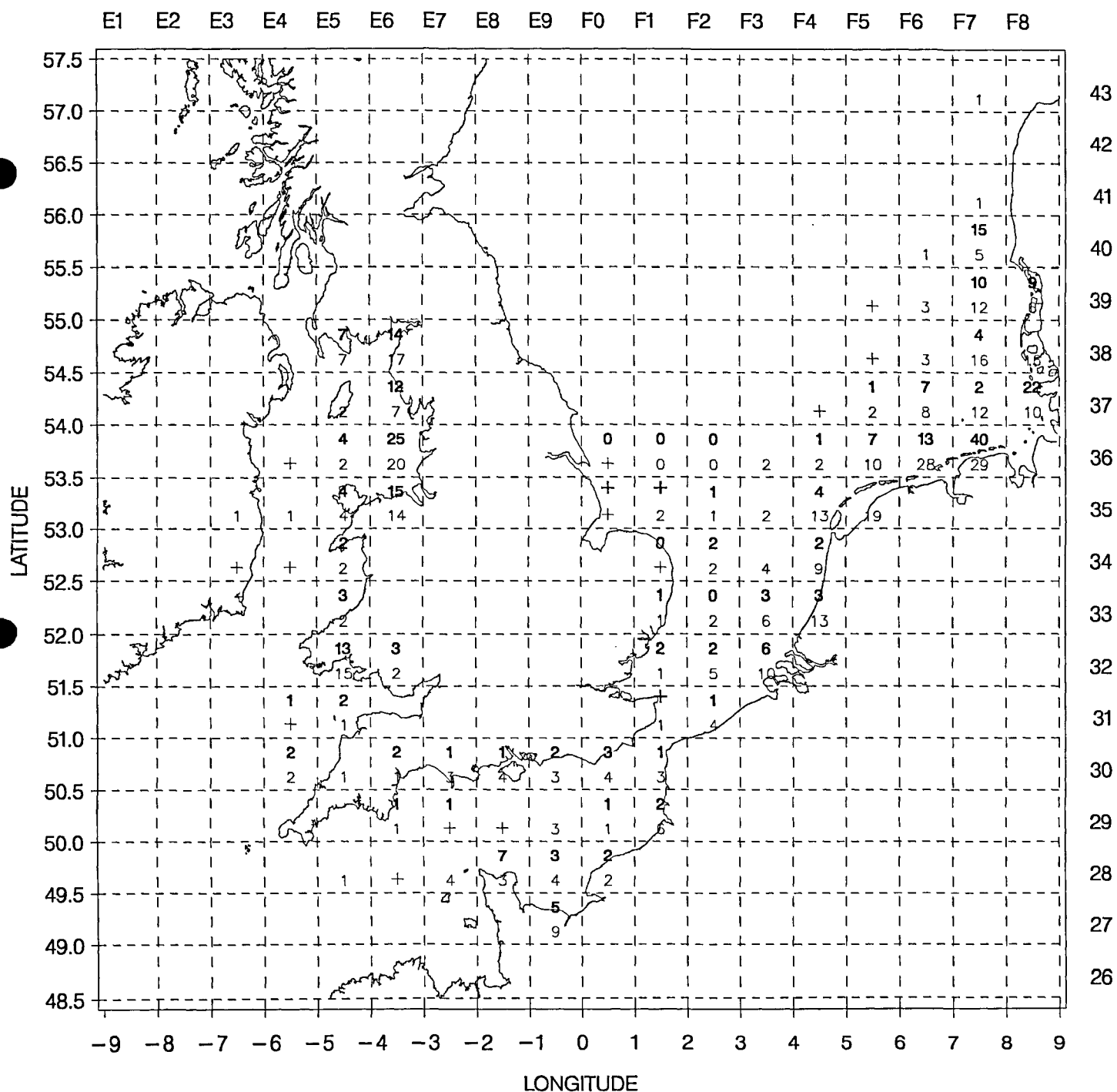


Figure 4.1.13 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

GREY GURNARD

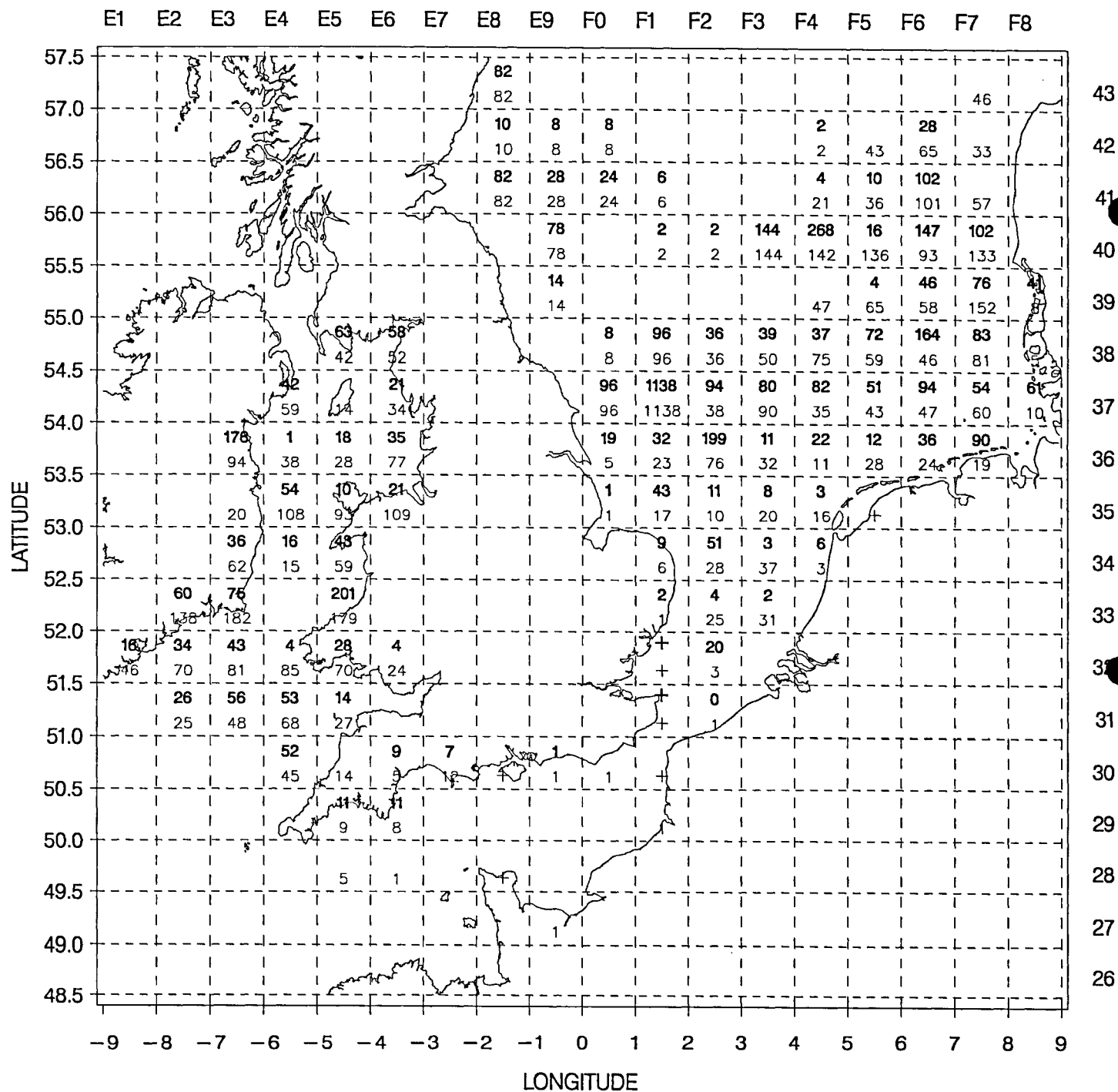


Figure 4.1.14 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

POGGE (ARMED BULLHEAD)

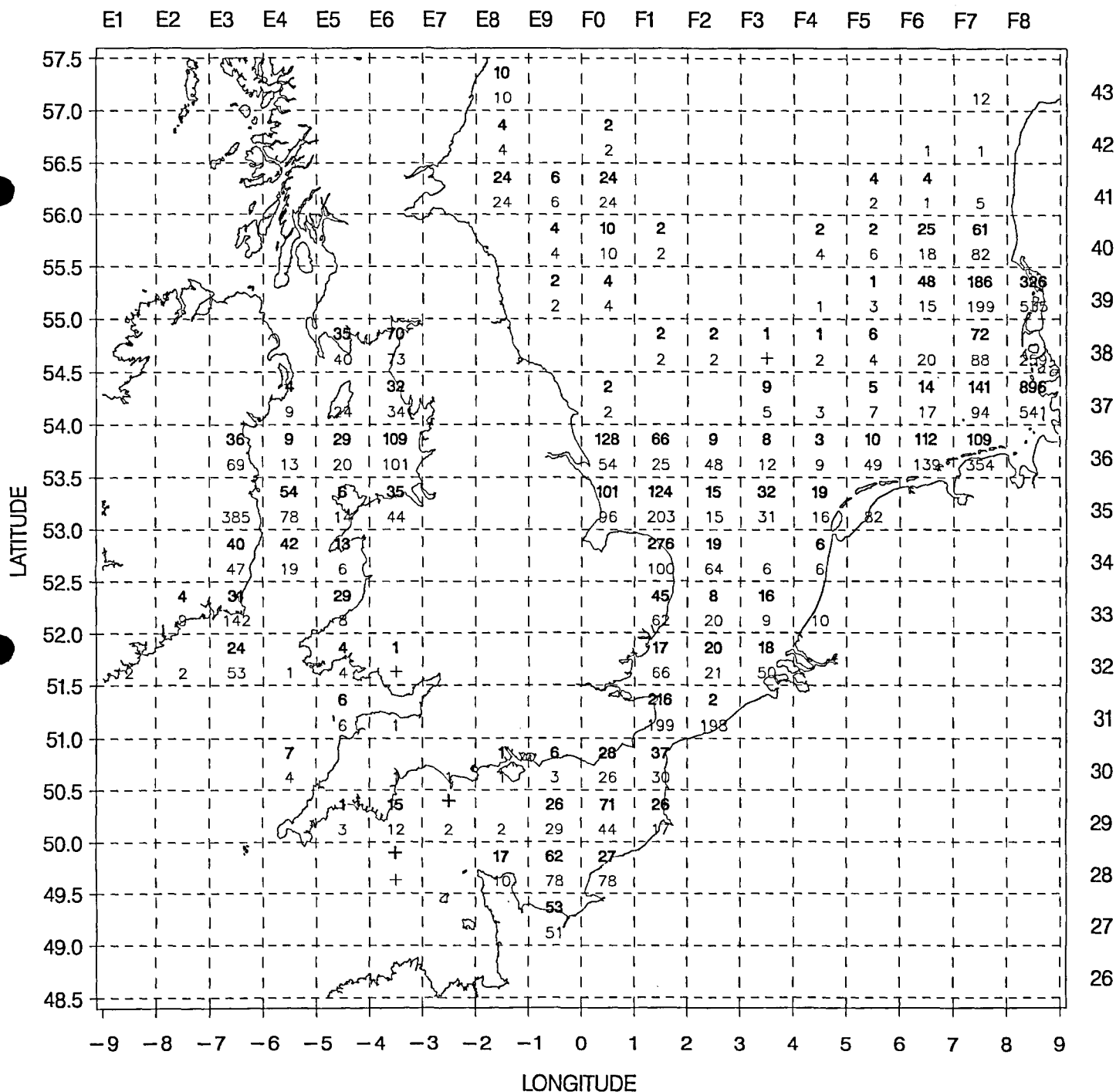


Figure 4.1.15 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

LESSER WEEVER

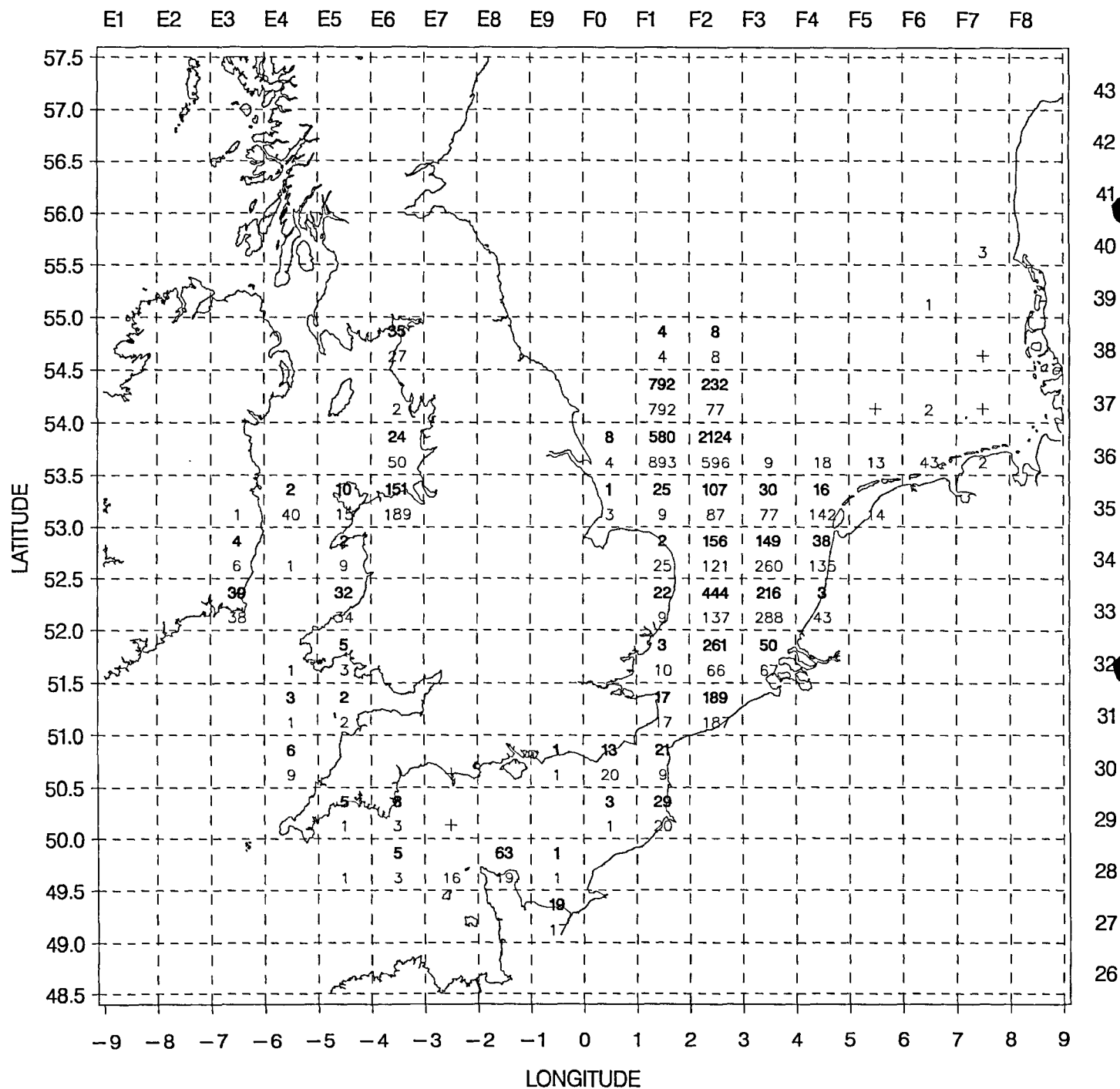


Figure 4.1.16 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

COMMON DRAGONET

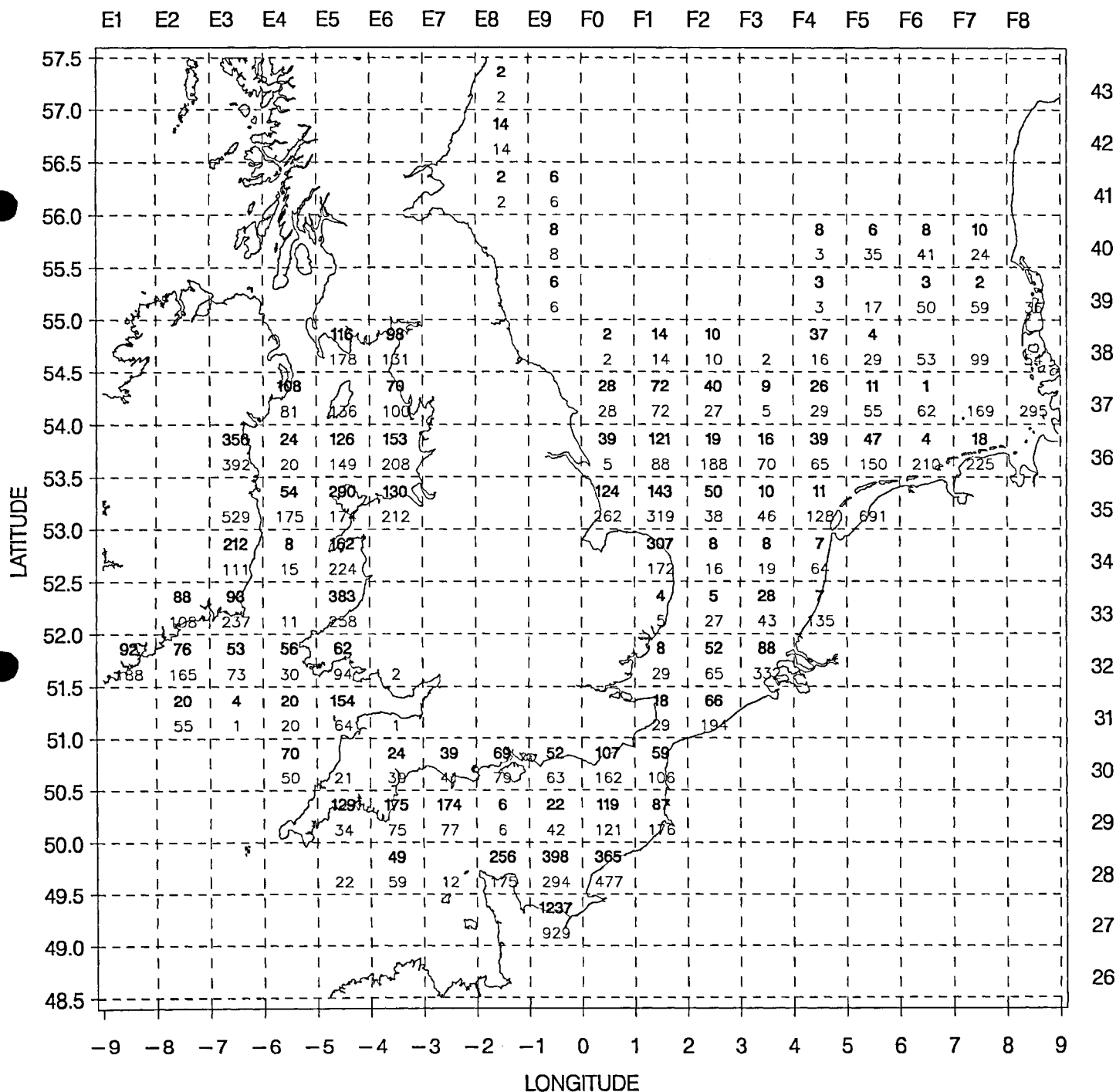


Figure 4.1.17 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

LESSER SPOTTED DOGFISH

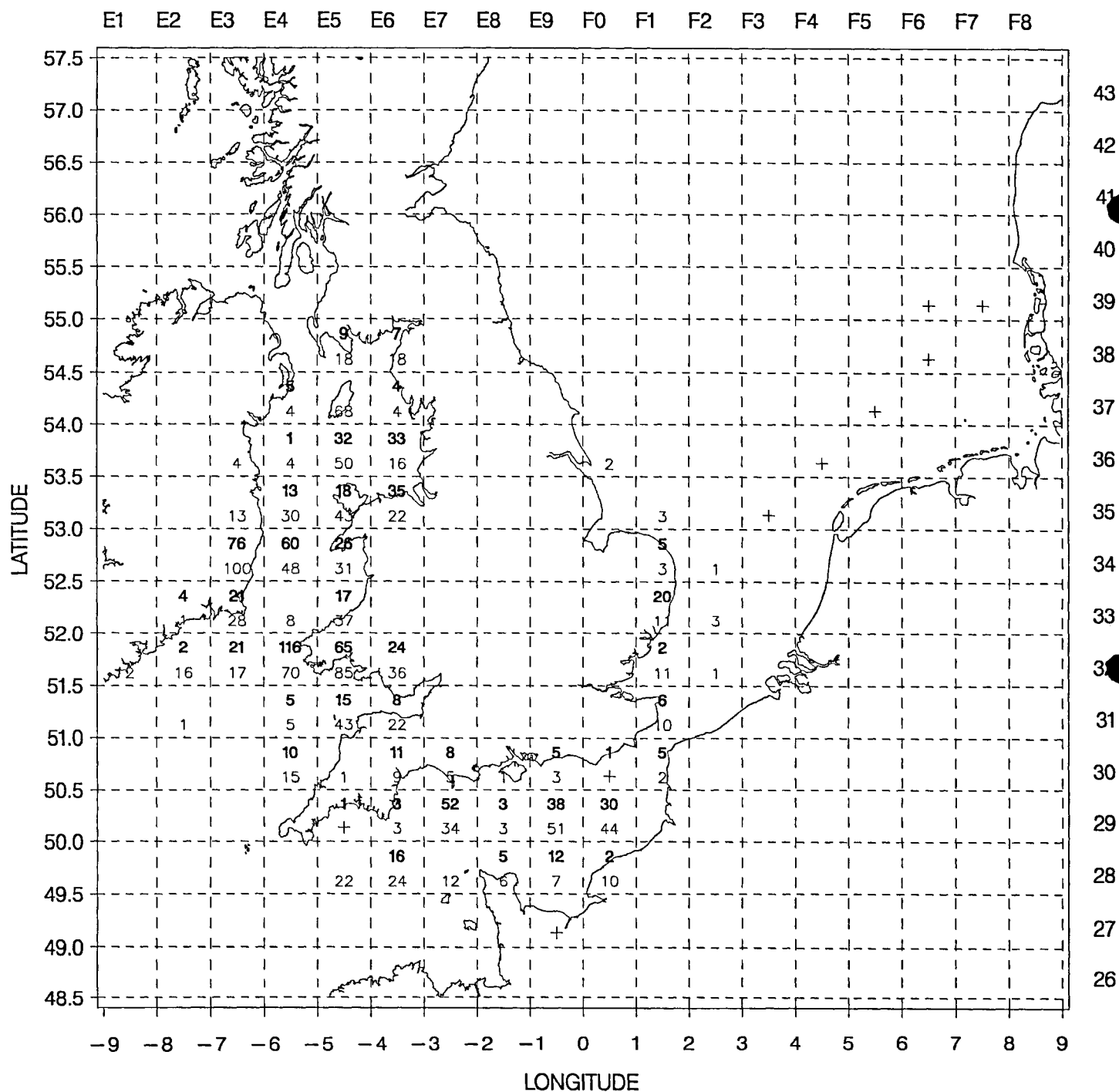


Figure 4.1.18 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

RAYS

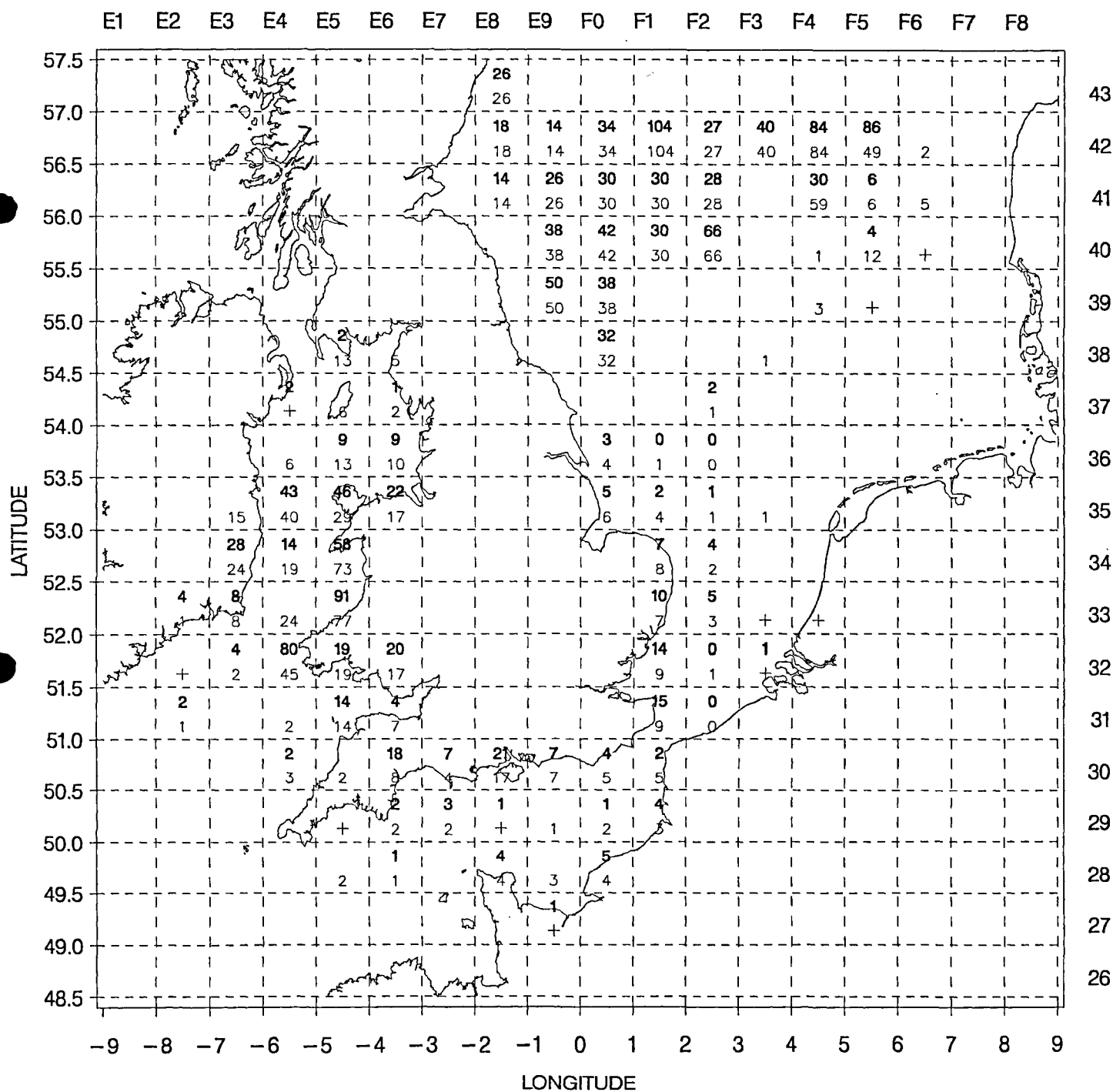


Figure 4.1.19 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

COD

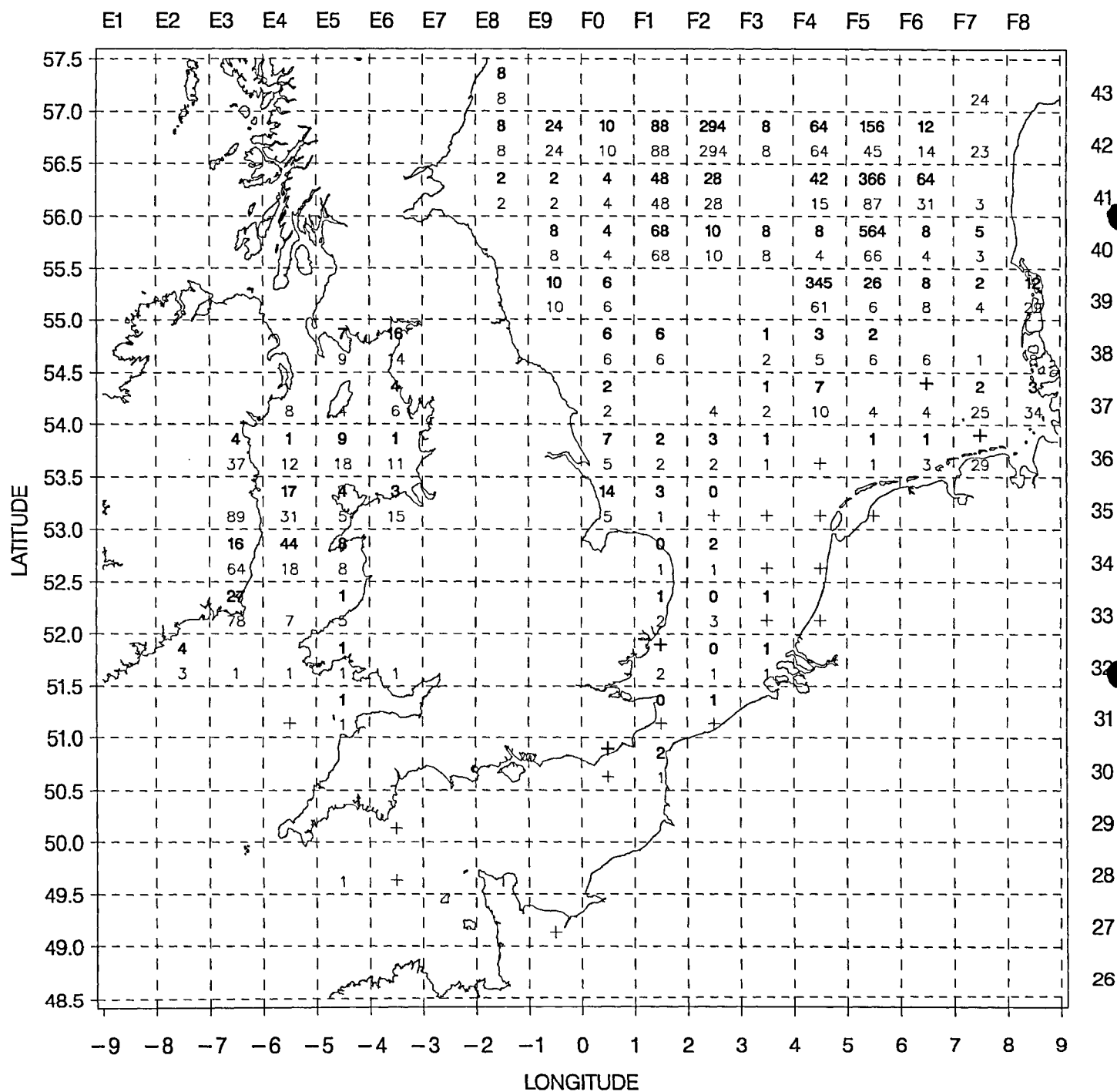


Figure 4.1.20 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

POOR COD

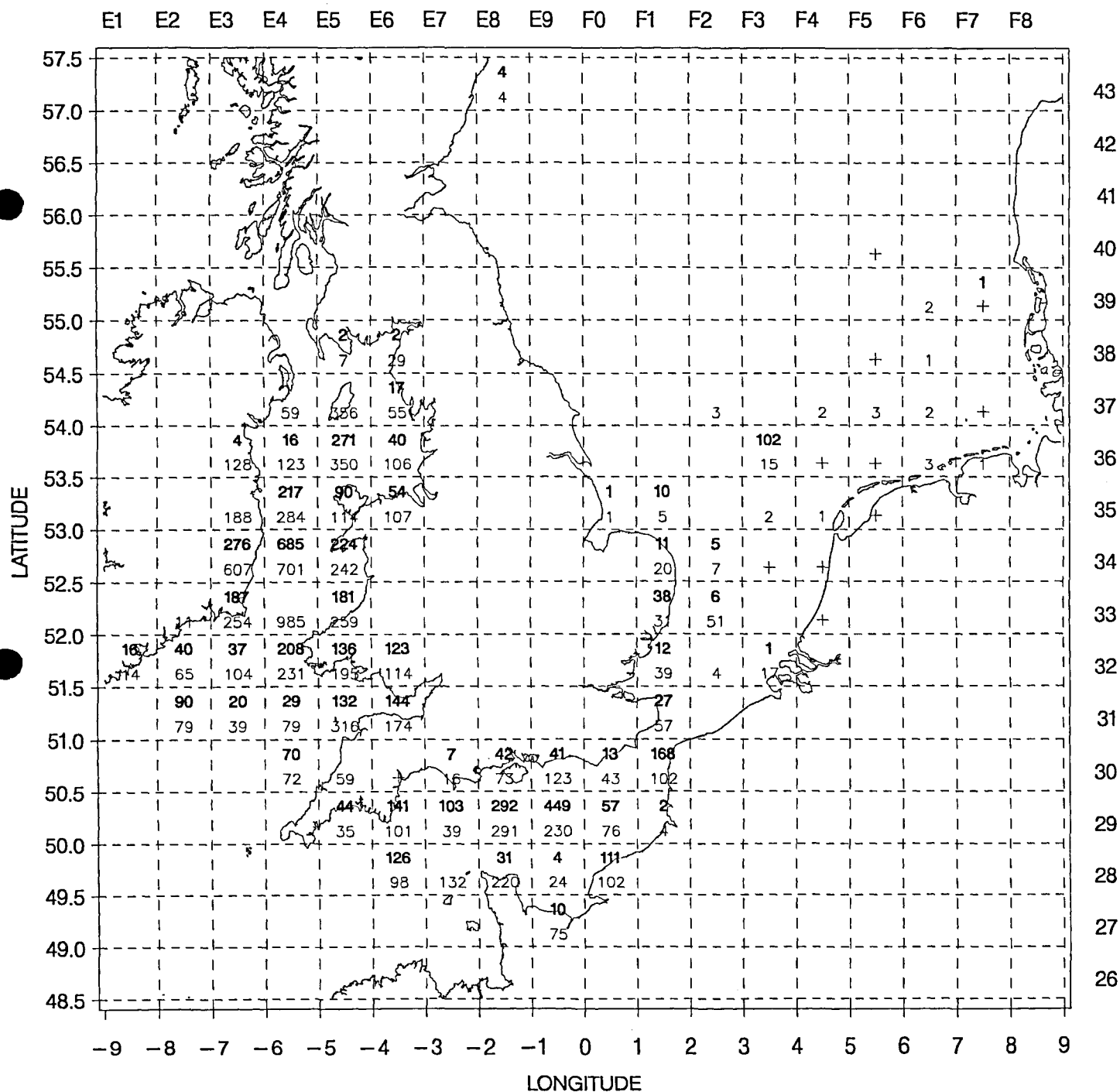


Figure 4.1.21 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

HADDOCK

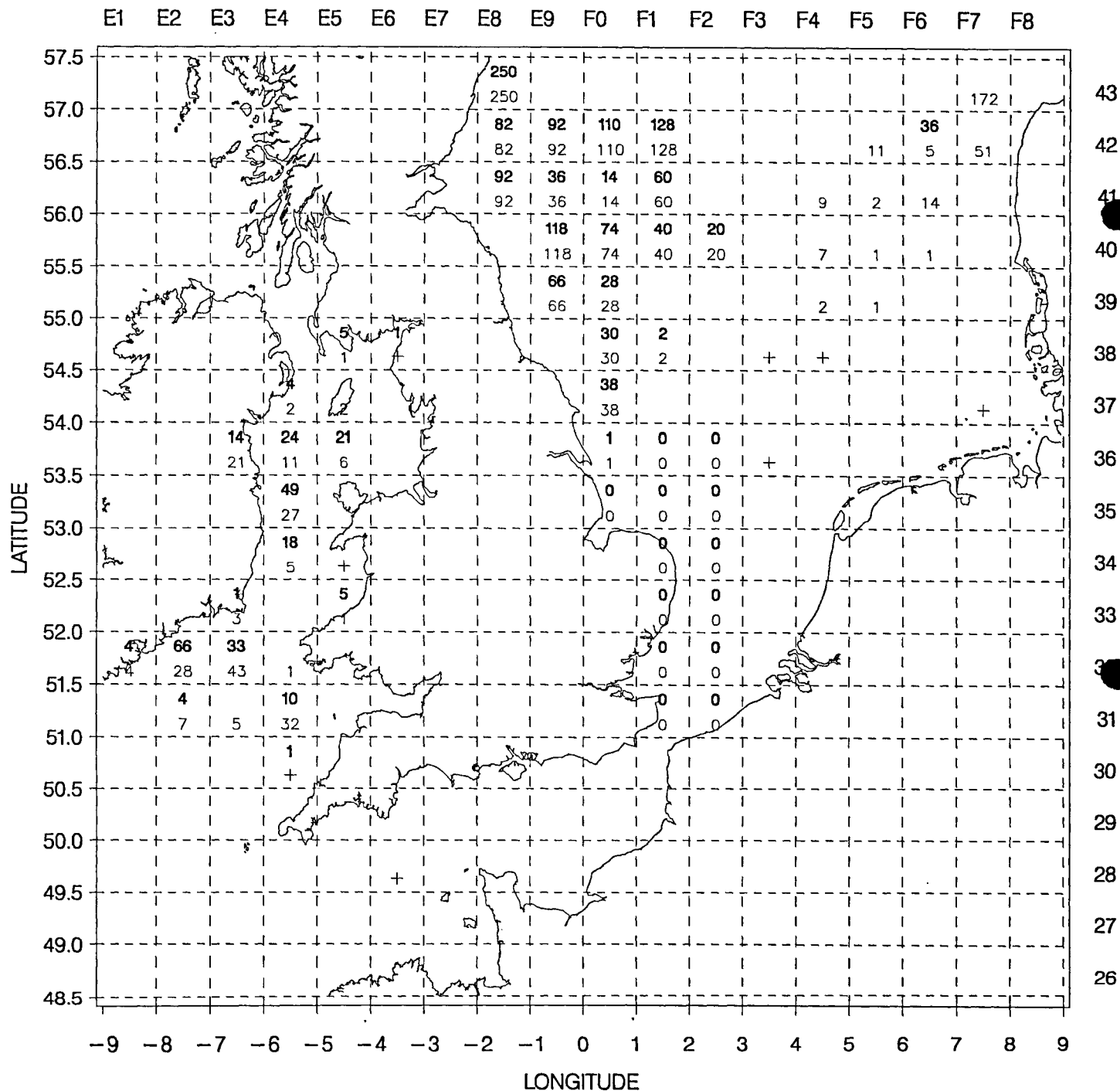


Figure 4.1.22 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

WHITING POUT (BIB)

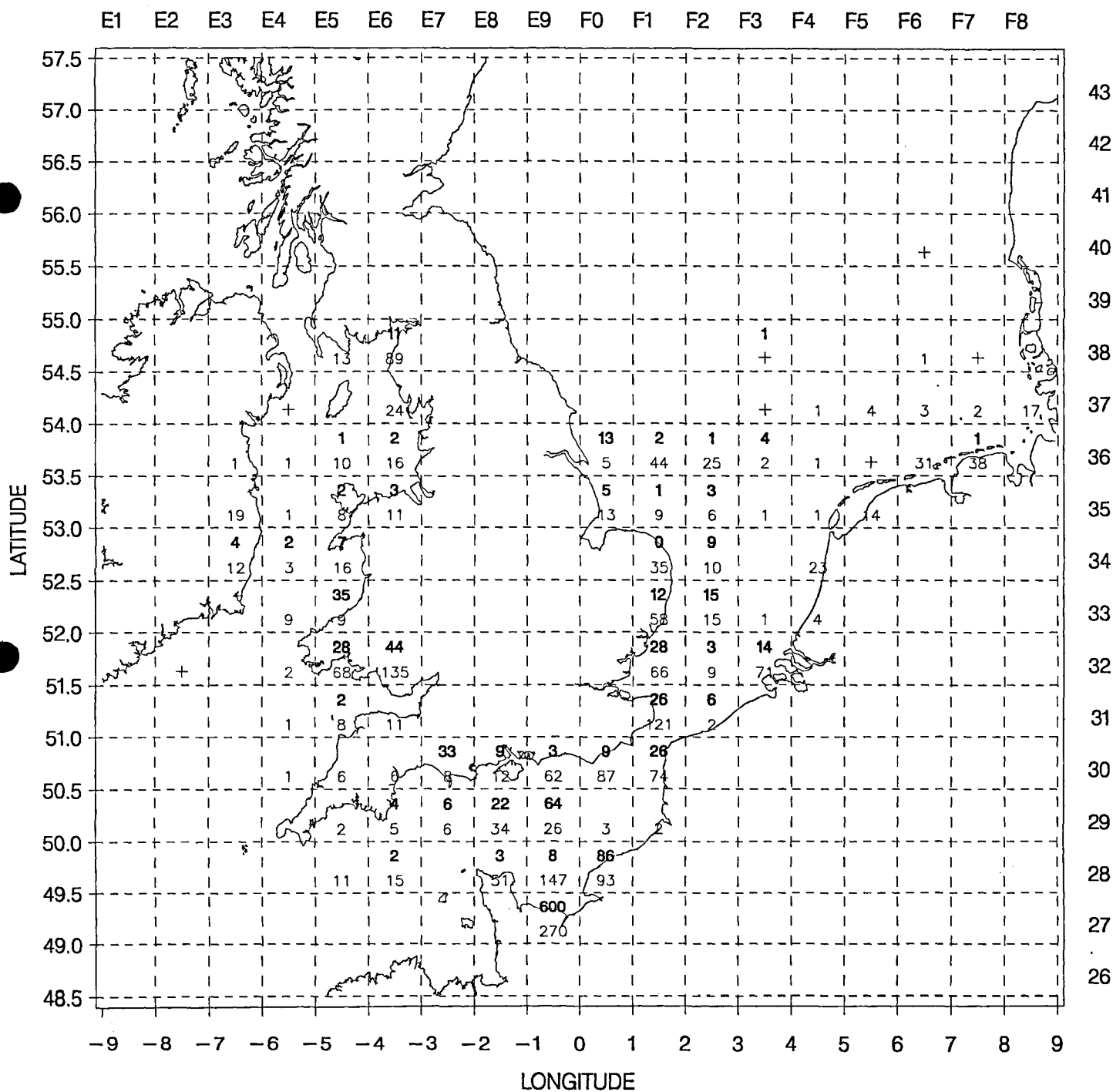


Figure 4.1.23 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

WHITING

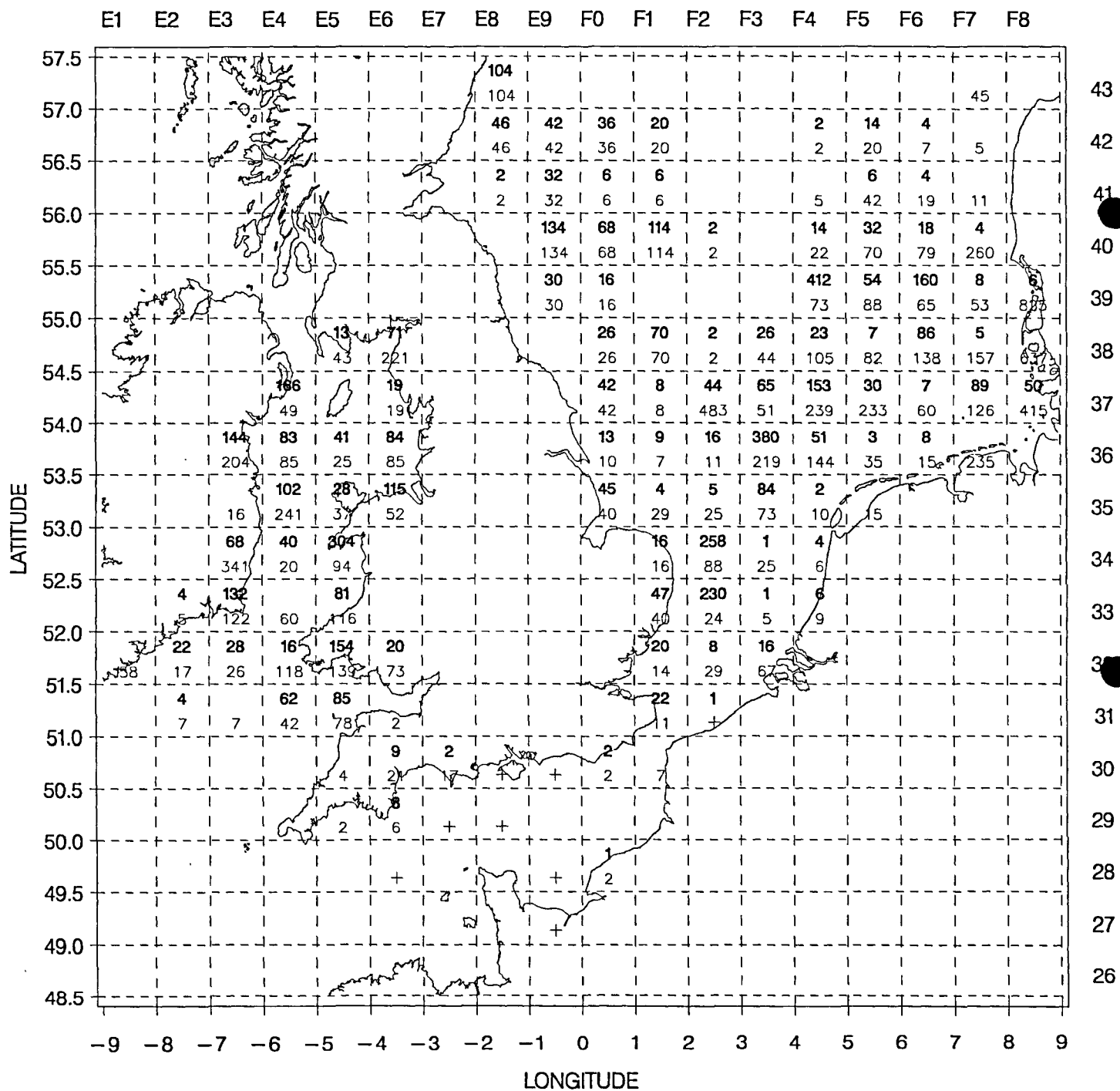


Figure 4.1.24 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

ANGLER FISH (MONK FISH)

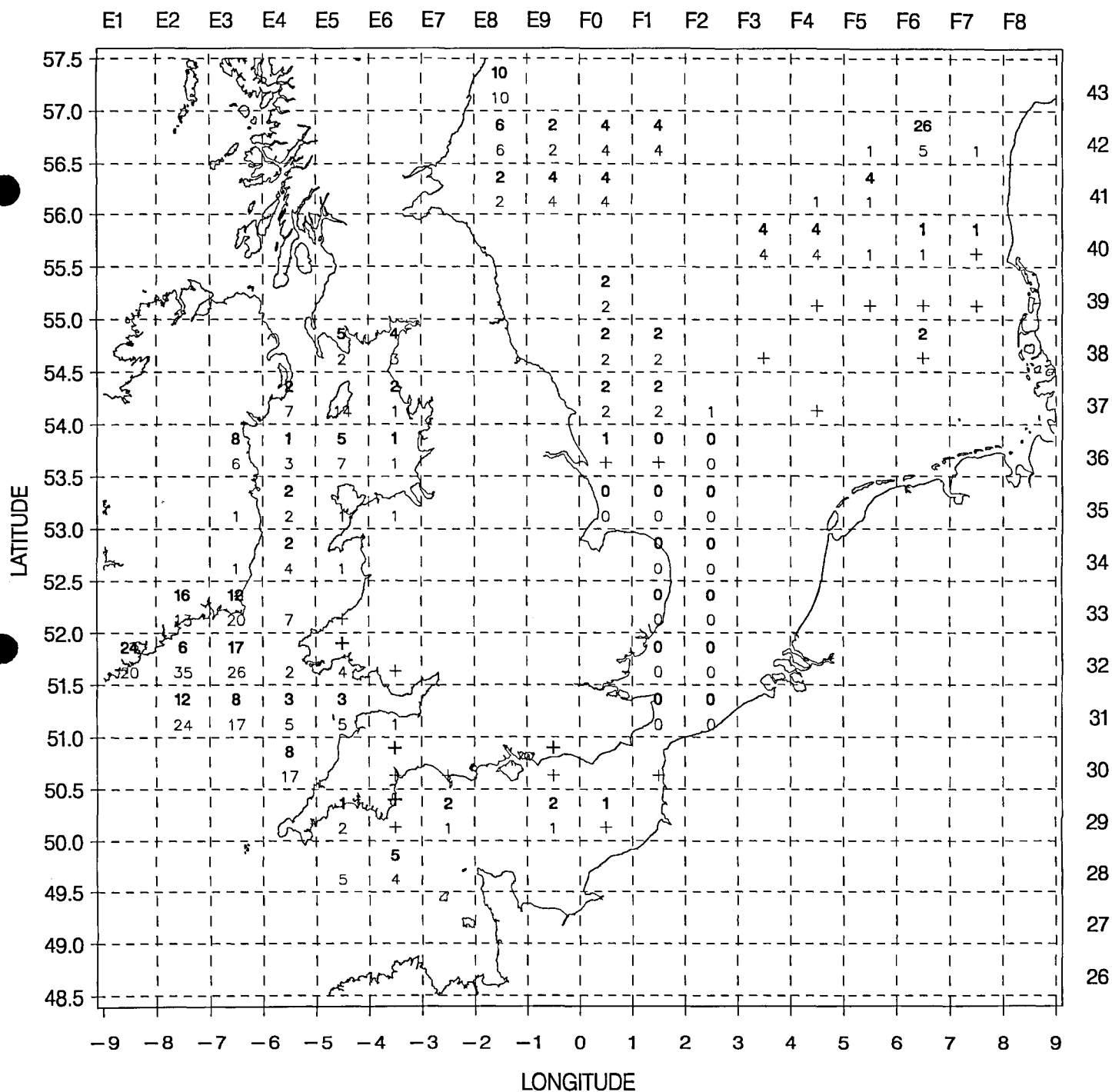


Figure 4.1.25 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

JOHN DORY

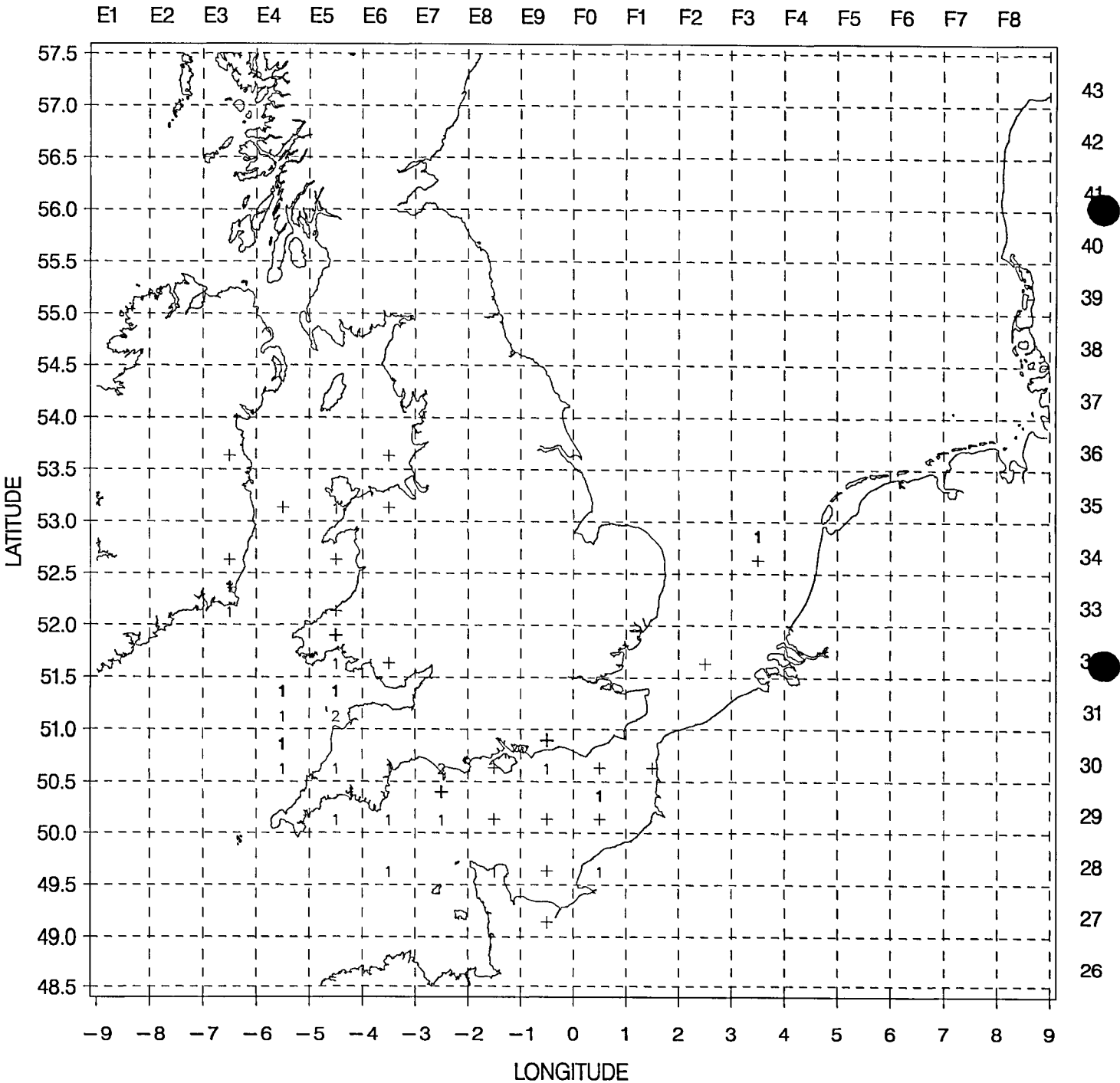


Figure 4.1.26 International beam trawl surveys 1990–1996. Catches in number/8m beam/hour per rectangle of fish species.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

RED MULLET

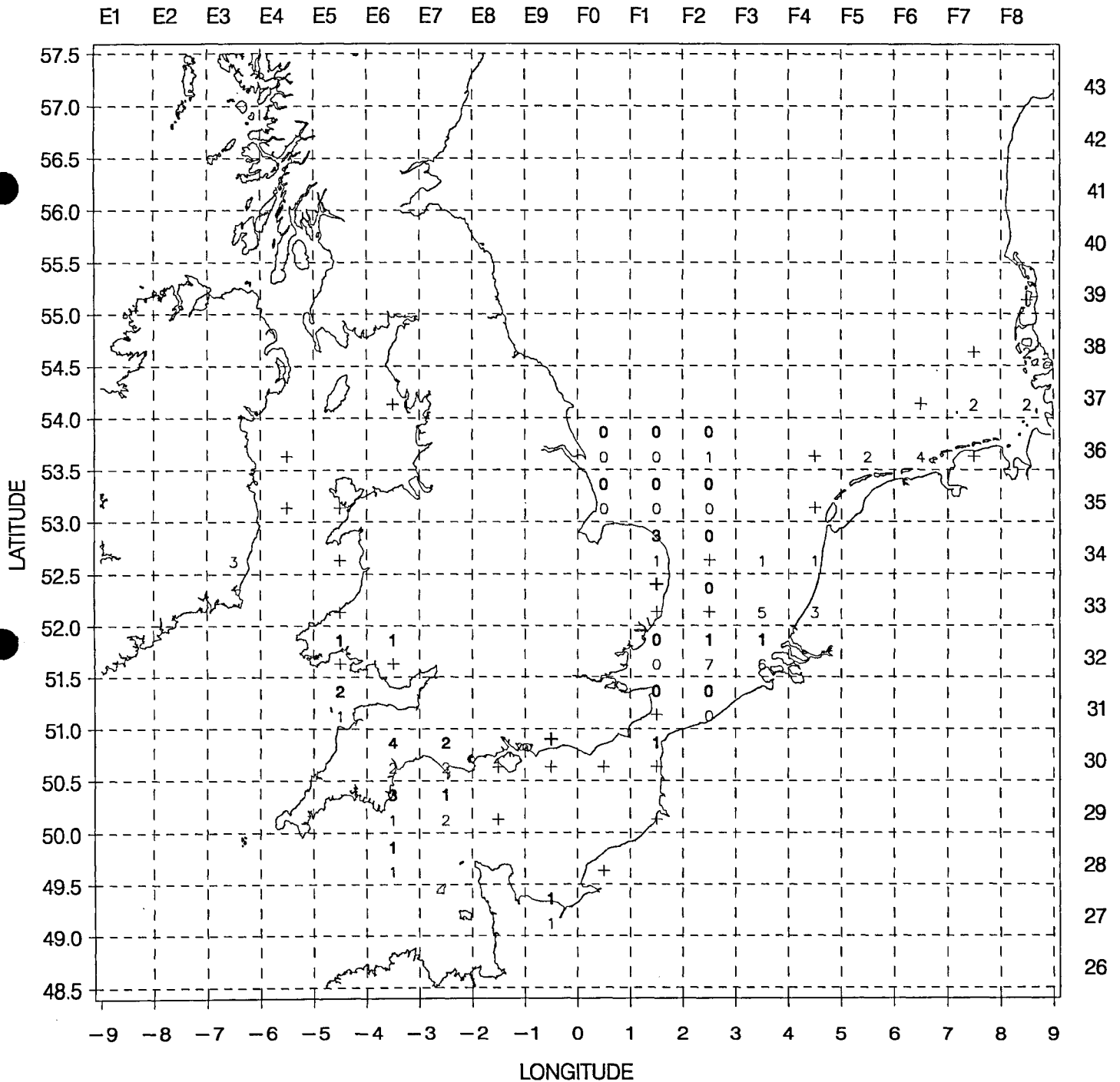


Figure 4.1.27 Catches in number/8m beam/hour per rectangle of edible crab.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

1996 data in bold, above the survey mean. Values are numbers/8m beam/hour ('+' = 0.1–0.5)

EDIBLE CRAB

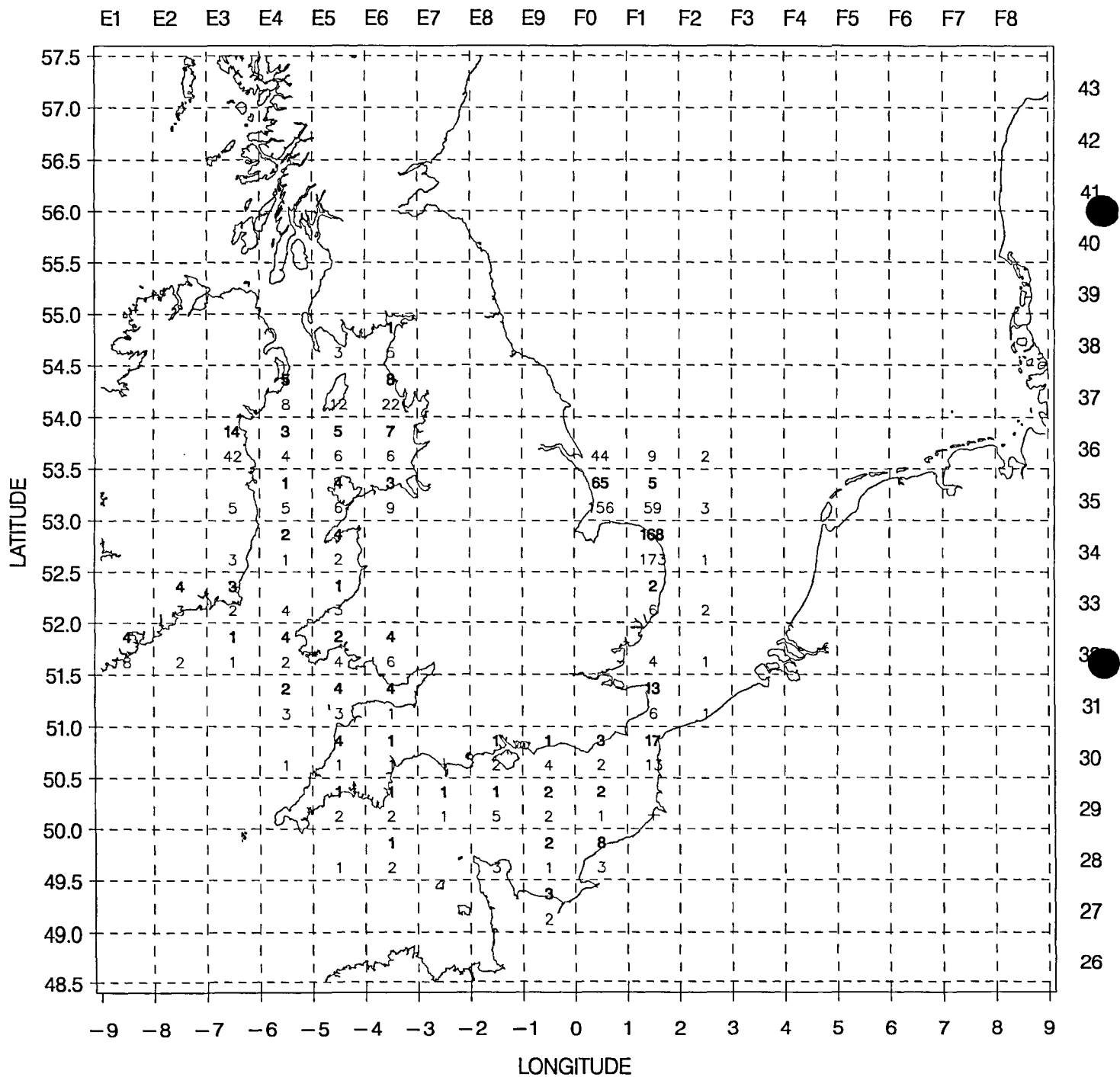


Figure 4.4.1 Total number of species and total number of hauls per rectangle.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996

Demersal Commercial and Non-target species

Total number of species (above) and total number of hauls (below)

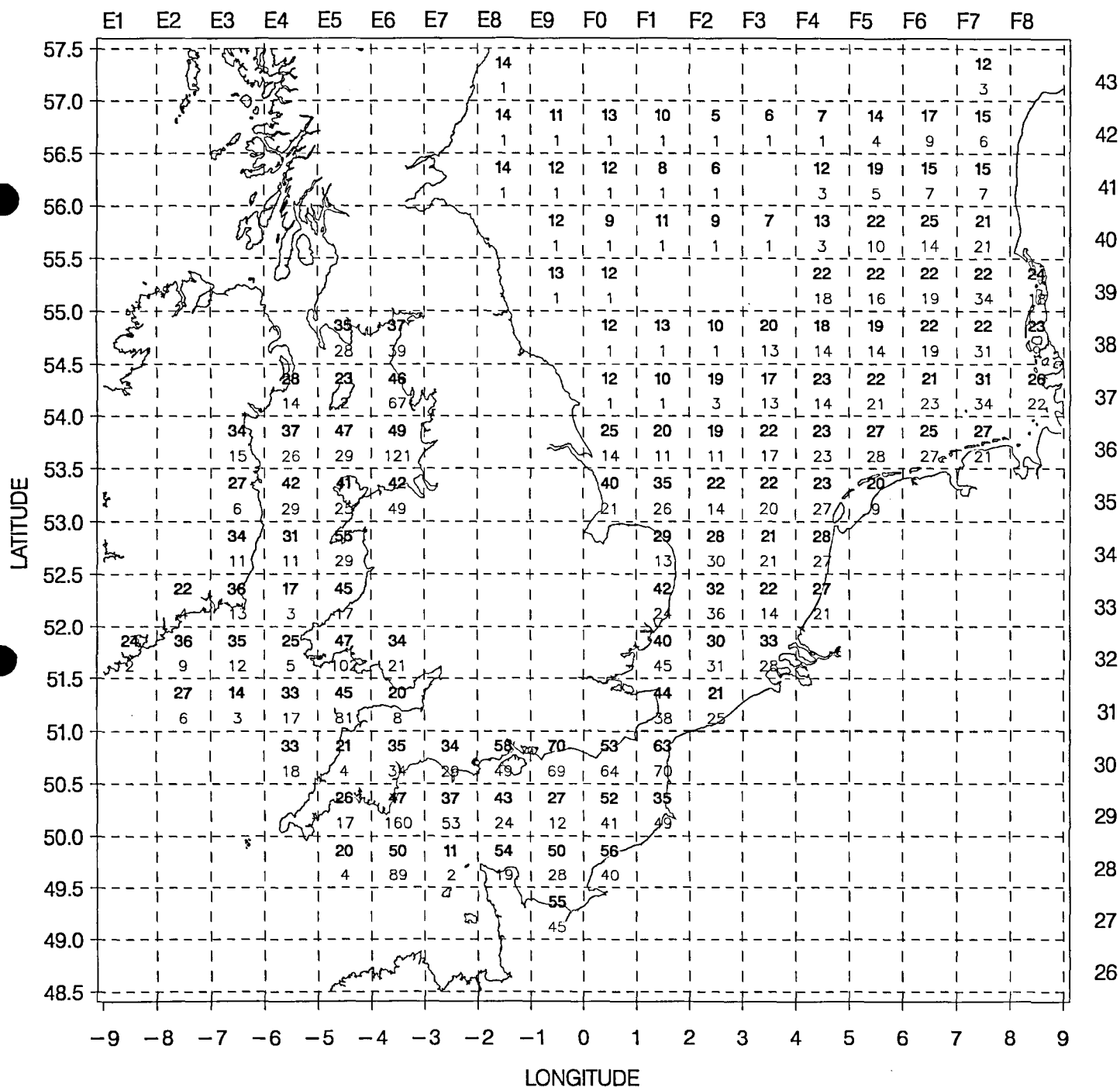


Figure 4.4.2 Shannon-Weiner diversity index per rectangle.

INTERNATIONAL BEAM TRAWL SURVEYS 1990 to 1996 (Demersal Commercial and Non Target species) SHANNON WEINER DIVERSITY INDEX

