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REPORT OF THE  
INTERNATIONAL BOTTOM TRAWL SURVEY IN THE  
NORTH SEA, SKAGERRAK AND KATTEGAT  
IN 1992: QUARTER 2, 3 AND 4

The International Bottom Trawl Survey Working Group

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## 1 INTRODUCTION

This report presents the final results for the International Bottom Trawl Survey (IBTS) in the second, third and fourth quarter of 1992. The survey was formerly called the International Young Fish Survey (IYFS). In 1990 it was decided to combine the effort of the International Young Fish Survey with a number of national surveys such as the English and Scottish Groundfish Surveys into a quarterly coordinated bottom trawl survey, to be held for a period of 5 years. These quarterly surveys started in 1991. This report presents the results of the quarterly surveys in 1992. The results for the first quarter IBTS are also given in separate reports, but first quarter indices are given in this report as well to give a better overview of the changes within a whole year.

The data in this report comprise the bottom trawl catches of the 8 standard species (herring *Clupea harengus*, sprat *Sprattus sprattus*, mackerel *Scomber scombrus*, cod *Gadus morhua*, haddock *Melanogrammus aeglefinus*, whiting *Merlangius merlangus*, saithe *Pollachius virens* and Norway pout *Trisopterus esmarki*). Also summarised results of temperature and salinity sampling are presented.

## 2 SURVEY METHODS AND PARTICIPATION

For all matters on survey methodology, the reader is referred to the IBTS Manual (ICES, 1996b). Details on the participation in the 1992 surveys are given in Table 2.1

## 3 STANDARD OUTPUT FROM THE ICES IBTS DATA BASE

For details on the standard analysis of the data the reader is referred to a description by Pedersen (1989). At request, copies of this paper are available at the ICES Secretariat.

In 1994 the Herring Assessment Working Group for the Area South of 62°N has adopted a new index for 1-ringer abundance of North Sea autumn spawners. The new index is based on daytime catches in all statistical rectangles sampled during the quarter 1 survey, both in the North Sea and in the Skagerrak/Kattegat. In the calculation of this index, catches made in rectangles shallower than 10 m, or deeper than 200 m (250 m in Skagerrak), have been given less weight. The weighting factors are given in Figure 3.1.

It is implicitly assumed that all 1-ringer herring in the North Sea, Skagerrak, and Kattegat are autumn spawners. Unsampled rectangles are allocated the mean catch rate estimated within "roundfish areas" and the index is expressed as the mean catch rate (number per hour) for the entire survey area. The indices for 2+-ringers have been revised in the same way, with the exception that the catches in Skagerrak and Kattegat are assumed to be 0. This implicitly assumed that all 2+-ringers in Skagerrak and Kattegat are local or Baltic spring spawners. The use of "zero" catches instead of "missing" catches of 2+-ringers in this area is convenient because it brings the indices of all age groups on a similar scale so that for instance mortalities can be calculated directly from the indices.

The above mentioned rules for separation of autumn and spring spawners were intended for the first quarter IBTS data. In this report similar rules have been adopted as well for the second, third and fourth quarter data. The indices for 0-ringers in third and fourth quarter are calculated in a similar way as for the 1-ringers.

The IBTS Working Group decided at the meeting in November 1995 (ICES 1996a) that saithe should be added to the list of standard species. The indices of saithe for each age group are calculated in a similar way as for 1-ringer herring (see above) with the exception that also night-time hauls are used for saithe.

The Herring Assessment Working Group has also for sprat adopted a new index series (ICES 1993) in which only hauls between 10 and 150 m depth are included. The standard area has remained the same: Division IVb only.

For the index of the remaining species (cod, haddock, whiting, Norway pout and mackerel), the catch at age per hour is averaged for all hauls within a rectangle, and the survey index is calculated by taking the average of all rectangles within a species-specific standard area. Rectangles where no haul was made, are excluded from the calculation.

The standard gear for IBTS is the GOV trawl, but in the third quarter of 1992 an Aberdeen 40 ft trawl has been used by "Scotia". See Knijn *et al.* (1993) for specifications of the Aberdeen 40 ft trawl. In the calculation of indices it is assumed that all trawl types have the same size and fishing power.

## **4 RESULTS FOR 1992**

In the analysis only day-light hauls are used for herring, whereas for the other species all valid hauls are used. The number of hauls used for herring and for the other species is shown in Figures 4.1 and 4.2.

The number of otoliths sampled per target species, per roundfish area and quarter is given in Table 4.1.

Per species a set of figures gives the distributions of the 0-, 1-, 2-, and 3+ group and the mean length of 1-group fish per rectangle. In the analysis a specific standard area for each species is used to calculate the index of year class strength. This area is indicated in the figures. The distributions are given with dots of expanding size. Within one page, showing 2 or 4 quarterly distributions, the same scaling has been used. The catch in number per hour of the biggest dot is indicated. The surface area of each dot is relative to the average number per hour caught.

The mean age composition of the eight standard species within the relevant standard areas is given in Table 4.2.

### **Herring**

Mean numbers of 0-, 1-, 2- and 3+ ringed herring are given per rectangle in Figures 4.3–4.6. Mean length per rectangle of 1-ringed herring are given in Figure 4.7. It should be noted that the term "age group" in herring refers to number of winter rings and not to years. All juvenile herring in the North Sea are assumed to be autumn spawners, and this means that for instance age group 1 herring in February 1992 represent year class 1990.

### **Sprat**

The distributions of 0-, 1-, 2- and 3+ groups, and the mean length of 1-group fish are given in Figures 4.8–4.12.

### **Mackerel**

The distributions of 0-, 1-, 2- and 3+ groups, and the mean length of 1-group fish are given in Figures 4.13–4.17.

### **Cod**

The distributions of 0-, 1-, 2-, and 3+ group, and the mean length of 1-group fish are given in Figures 4.18–4.22.

### **Haddock**

The distributions of 0-, 1-, 2-, and 3+ group, and the mean length of 1-group fish are given in Figures 4.23–4.27.

### **Whiting**

The distributions of 0-, 1-, 2-, and 3+ group, and the mean length of 1-group fish are given in Figures 4.28–4.32.

## **Saithe**

The distributions of 2-, and 3+ group, and the mean length of 2-group fish are given in Figures 4.33–4.35.

## **Norway pout**

The distributions of 0-, 1-, 2-, and 3+ group, and the mean length of 1-group fish are given in Figures 4.36–4.40.

## **5 HYDROGRAPHIC DATA**

### **5.1 Hydro-Chemistry Survey**

Details concerning the data collected during the three surveys are as follows:

Quarter 2: 300 stations from 20 April to 8 June from four ships (“Walter Herwig”, “Johan Hjort”, “Isis” and “Tridens”)

Quarter 3: 228 stations from 14 August to 23 September from four ships (“Thalassa”, “Tridens”, “Cirolana” and “Argos”)

Quarter 4: 250 stations from 16 October to 27 November from five ships (“Dana”, “G.O. Sars”, “Isis”, “Tridens”, and “Cirolana”)

Charts showing the distribution of bottom (<20m of bottom) temperature and salinity for each of the surveys are shown in Figures 5.1 to 5.6.

Digital (gif) copies of these charts may be retrieved or viewed from <ftp://ftp.ices.dk/dist/ocean/iyfs/1992>. The ftp directory also includes charts showing the location of the stations.

## **6 REFERENCES**

Knijn J.R, Boon, T.W, Heessen, H.J.L and Hislop, J.R.G. 1993. Atlas of North Sea Fishes. ICES Cooperative Research Report. No. 194, 268 pp.

ICES 1993. Report of the Herring Assessment Working Group for the Area South of 62°N. ICES Doc. CM 1993/Assess:15.

ICES 1996a. Report of the International Bottom Trawl Survey Working Group. ICES Doc. CM 1996/H:1.

ICES 1996b. Manual for the International Bottom Trawl Surveys. Rev. V. Addendum to ICES CM 1996/H:1.

Pedersen, L. 1989. International Young Fish Survey, computation of aggregated standard tables and charts. ICES Secretariat, section computer management.

**Table 2.1** Participation and number of hauls in the IBTS for 1992.

Year	Country	Vessel	Period	Number of Hauls	
				ABD	GOV
Quarter 1	Sweden	Argos	3/2–20/2		47
	Denmark	Dana	30/1–17/2		40
	Norway	G.O. Sars	26/1–10/2		49
	UK Scotland	Scotia	30/1–1/3		64
	Germany	Solea	8/2–15/2		31
	France	Thalassa	13/1–28/1		53
	Netherlands	Tridens	4/2–26/2		45
	Germany	Walter Herwig	31/1–24/2		62
Quarter 2	Netherlands	Isis	21/4–6/5		28
	Norway	Johan Hjort	15/5–30/5		50
	UK Scotland	Scotia	11/5–29/5		73
	Netherlands	Tridens	4/5–14/5		39
	Germany	Walter Herwig	13/5–7/6		65
Quarter 3	Sweden	Argos	7/9–23/9		48
	UK England	Cirolana	14/8–10/9		75
	UK Scotland	Scotia	6/8–25/8	89	
	France	Thalassa	26/8–10/9		61
	Netherlands	Tridens	24/8–3/9		32
	Germany	Walter Herwig	15/7–2/8		63
Quarter 4	UK England	Cirolana	21/10–20/11		78
	Denmark	Dana	29/10–23/11		78
	Norway	G.O. Sars	16/10–8/11		63
	Netherlands	Isis	19/10–5/11		38
	Netherlands	Tridens	19/10–28/10		32

Gear used:

ABD Aberdeen 48 ft Trawl

GOV Grand Overture Verticale trawl

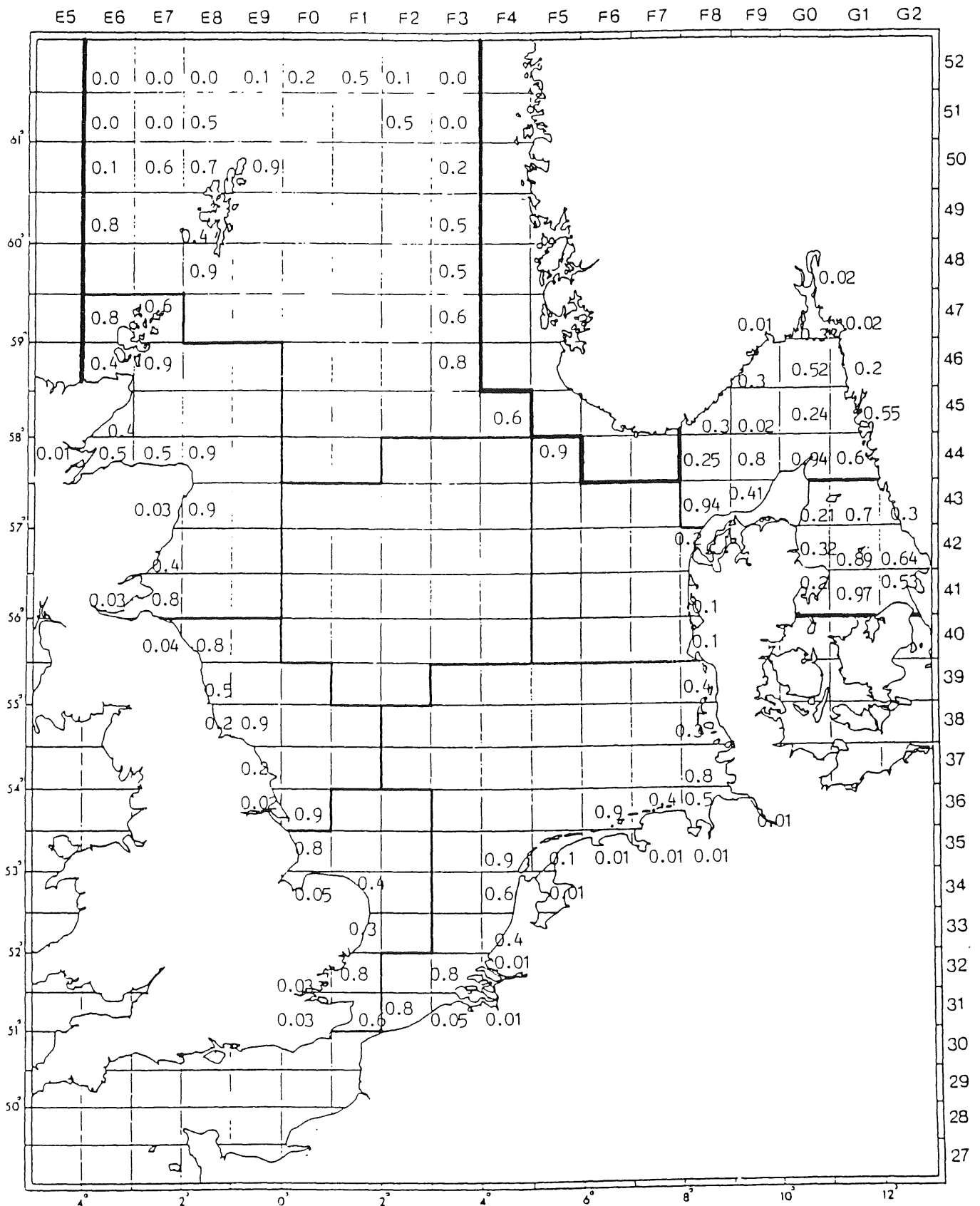
**Table 4.1** Number of otoliths sampled per species, roundfish area and quarter in 1992

Species	Roundfish area									Total
	1	2	3	4	5	6	7	8	9	
<b>Quarter 1</b>										
Herring	774	599	338	500	214	932	434	420	462	4,673
Sprat	-	82	110	33	130	719	-	92	161	1,327
Mackerel	112	23	-	-	-	21	-	-	-	156
Cod	586	384	275	142	51	651	71	220	373	2,753
Haddock	1,249	933	829	317	-	3	228	-	-	3,559
Whiting	907	736	703	328	419	1,010	488	221	206	5,018
Saithe	318	2	-	-	-	-	-	-	-	320
Norway pout	287	250	194	71	-	-	-	-	-	802
<b>Quarter 2</b>										
Herring	473	352	263	375	174	354	149	371	500	3,011
Sprat	15	85	92	107	34	87	48	149	172	789
Mackerel	87	155	45	107	6	180	5	-	-	585
Cod	419	632	208	208	70	589	278	156	57	2,617
Haddock	845	869	614	249	2	8	409	52	-	3,048
Whiting	658	629	541	390	244	681	229	67	33	3,472
Saithe	444	79	13	-	-	-	4	46	-	586
Norway pout	241	261	148	127	-	-	75	21	-	873
<b>Quarter 3</b>										
Herring	562	385	741	409	206	216	239	249	879	3,886
Sprat	25	43	40	128	71	231	40	57	130	765
Mackerel	128	353	182	100	107	209	91	-	-	1,170
Cod	765	520	227	567	72	616	232	280	243	3,522
Haddock	1,913	1,052	869	503	1	3	193	-	-	4,534
Whiting	1,299	795	729	640	404	644	407	-	-	4,918
Saithe	632	9	19	-	-	1	7	-	-	668
Norway pout	517	193	122	146	-	-	13	-	-	991
<b>Quarter 4</b>										
Herring	759	409	113	417	150	400	645	-	-	2,893
Sprat	23	180	120	104	135	537	291	134	-	1,524
Mackerel	232	61	16	24	79	157	4	-	-	572
Cod	768	462	117	413	81	308	182	144	134	2,609
Haddock	1,217	756	1,082	528	-	22	234	154	26	4,019
Whiting	1,160	647	669	595	337	752	480	170	204	5,014
Saithe	365	1	1	-	-	-	46	-	-	413
Norway pout	540	250	163	272	-	-	28	99	-	1,352



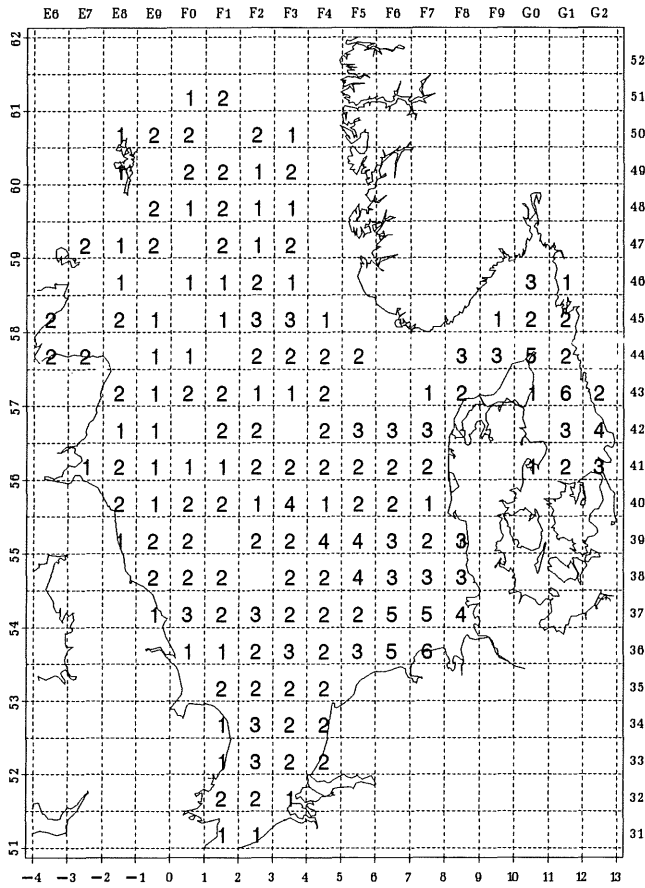
**Table 4.2** Age composition of standard species in 1992 for the relevant standard areas.

	Quarter	Age						6+
		0	1	2	3	4	5	
Herring	1	.0	1,204.8	380.4	181.3	63.6	101.7	-
	2	.0	3,164.4	766.7	110.1	22.2	42.5	-
	3	2,901.6	1,074.3	452.9	166.2	80.6	159.9	-
	4	3,318.2	773.5	301.5	55.5	27.9	66.2	-
Sprat	1	.0	1,560.5	340.2	37.8	5.5	.4	-
	2	.0	2,388.7	2,962.8	587.6	175.8	.0	-
	3	56.5	3,992.4	3,372.7	204.9	33.6	2.5	-
	4	2,916.2	8,339.8	2,625.6	164.8	51.4	13.2	-
Mackerel	1	.0	16.0	.4	2.2	1.1	.0	.0
	2	.0	.8	2.7	3.1	.9	.2	2.0
	3	.1	40.1	46.7	30.2	10.5	10.4	15.0
	4	1.4	5.8	6.2	6.7	3.9	2.1	4.0
Cod	1	.0	13.0	4.4	1.1	1.0	.3	.5
	2	2.9	51.2	5.2	1.5	.9	.2	.2
	3	19.7	43.8	3.6	.7	.5	.2	.1
	4	51.4	40.4	3.0	1.3	.5	.2	.2
Haddock	1	.0	1,114.6	343.5	18.0	3.0	.6	2.0
	2	1.5	740.2	257.1	17.2	2.7	.6	1.7
	3	2,716.9	589.7	187.1	10.4	1.6	.4	1.4
	4	2,474.1	860.7	213.8	7.2	.8	.1	.4
Whiting	1	.0	904.3	677.5	250.2	162.8	14.9	14.2
	2	.2	881.1	357.7	116.1	47.5	19.2	11.7
	3	1,381.5	595.0	297.8	72.9	57.9	10.3	6.3
	4	1,194.5	682.3	359.6	105.1	53.6	17.2	13.7
Saithe	1	.0	.0	.1	.6	3.0	.4	.7
	2	.0	.0	.1	.9	7.5	.9	.4
	3	.0	.4	.4	1.4	3.0	.5	.3
	4	.1	.1	.3	1.6	3.9	3.4	4.6
Norway pout	1	.0	8,094.7	934.6	32.3	4.2	.0	.2
	2	.0	7,133.6	1,148.9	108.5	2.7	.0	.0
	3	2,587.8	4,365.8	640.2	48.2	2.8	.0	.1
	4	5,984.1	4,657.6	312.6	3.0	.0	.0	.0

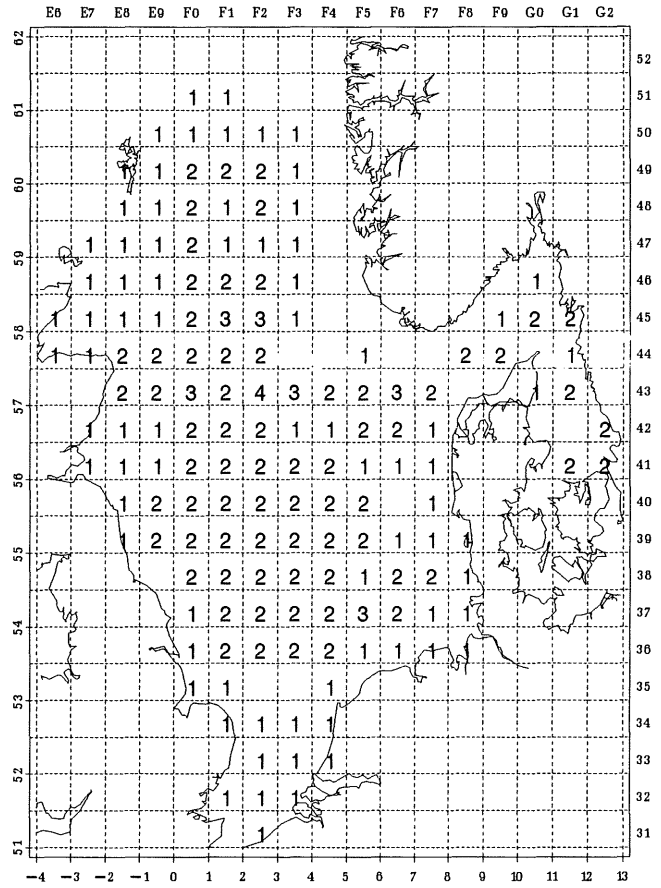


**Figure 3.1** Weighting factors used in the calculation of the indices for herring and saithe. Numbers denote the relative weight of a given rectangle. Only weighting factors less than 1 are shown, other rectangles are given a weight of 1.

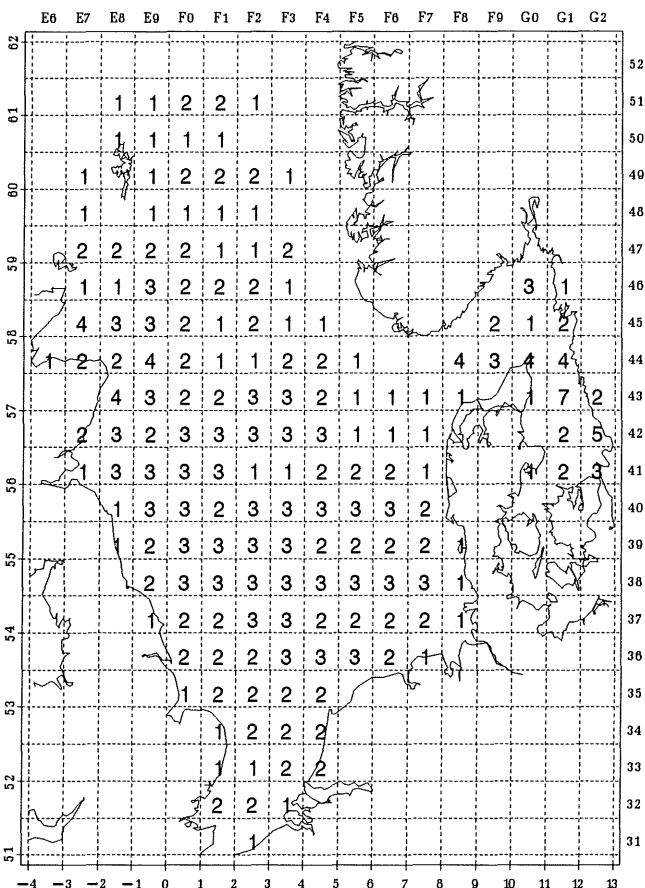
Number of daytime hauls. 1992 quarter 1



Number of daytime hauls. 1992 quarter 2



Number of daytime hauls. 1992 quarter 3



Number of daytime hauls. 1992 quarter 4

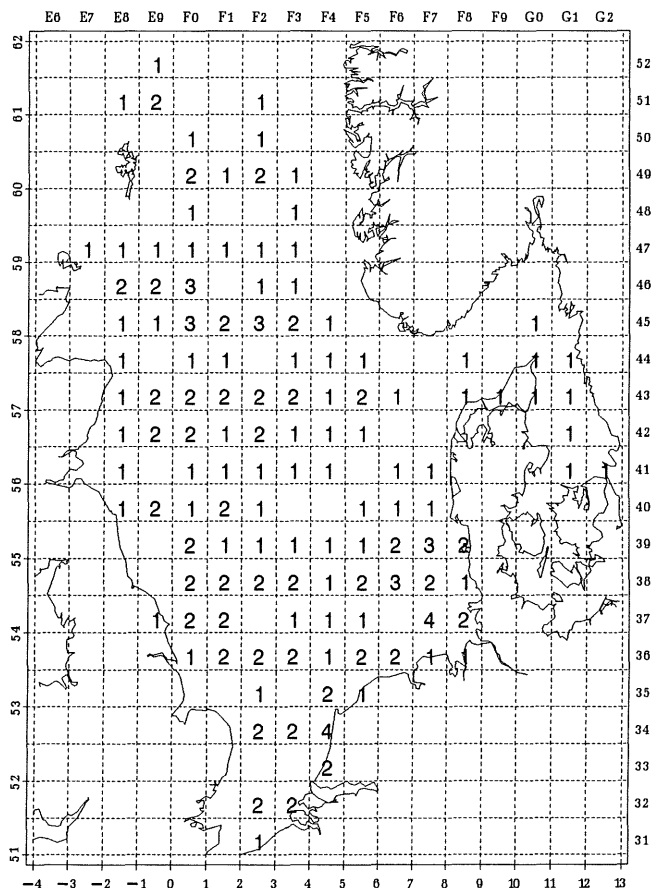
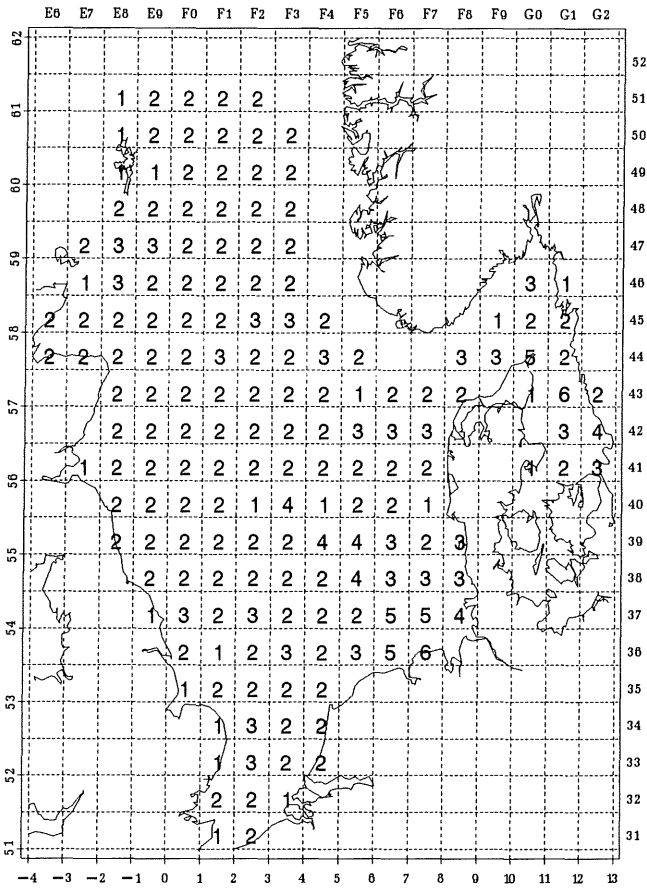
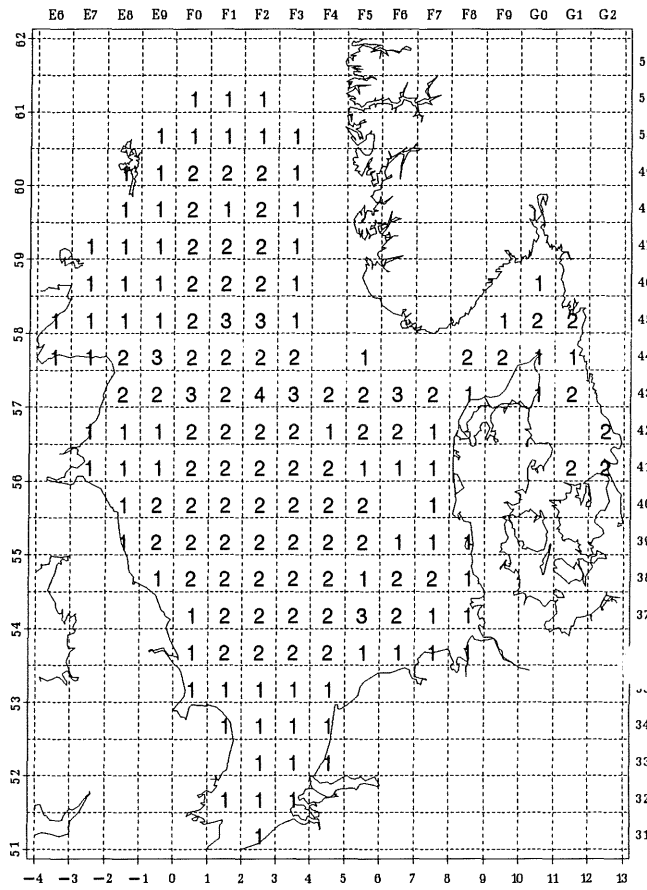


Figure 4.1 Number of valid daytime hauls.

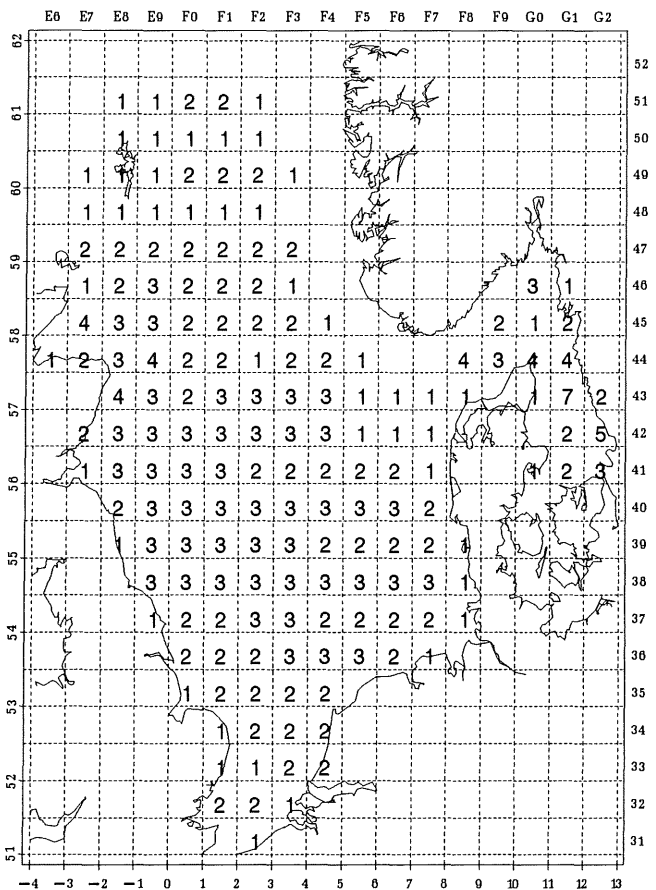
Number of hauls. 1992 quarter 1



Number of hauls. 1992 quarter 2



Number of hauls. 1992 quarter 3



Number of hauls. 1992 quarter 4

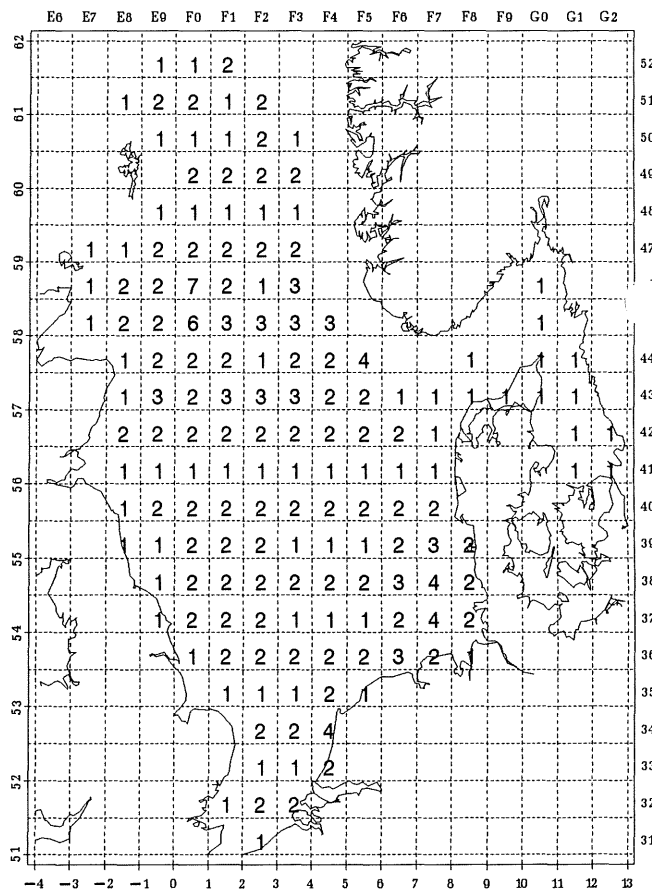
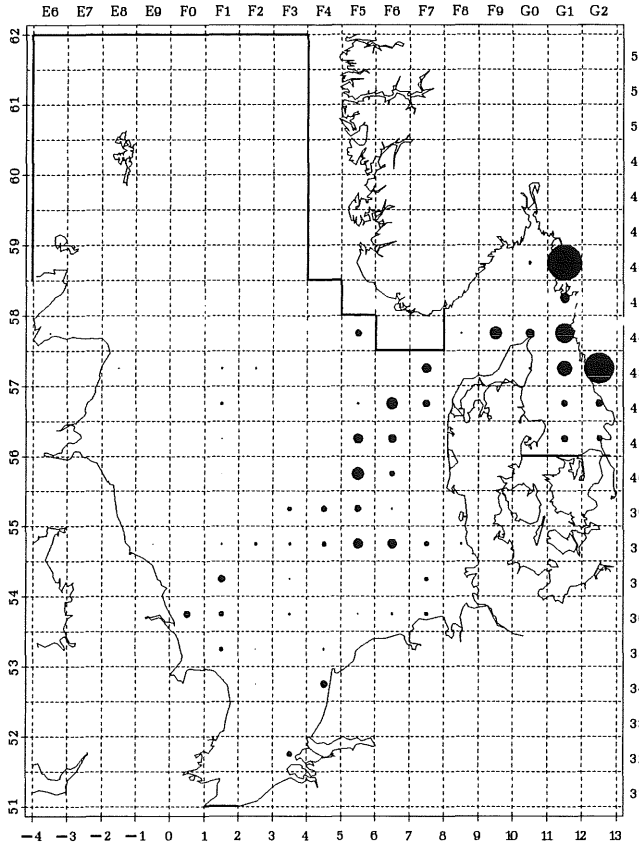


Figure 4.2 Number of valid day- and nighttime hauls.

Herring, Age group 0 1992 quarter 3  
 Max mean catch number per recangle: 201254



Herring, Age group 0 1992 quarter 4  
 Max mean catch number per recangle: 78269

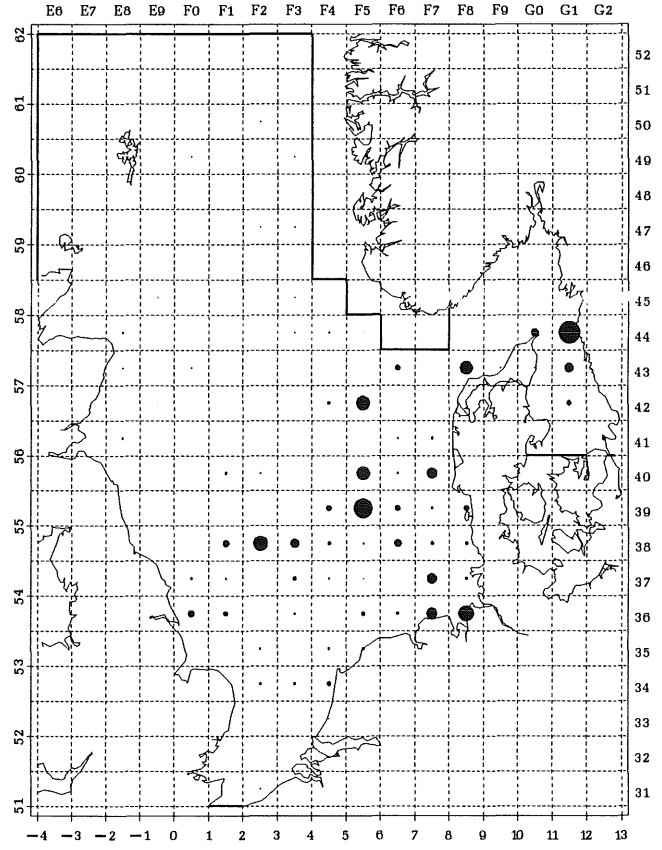
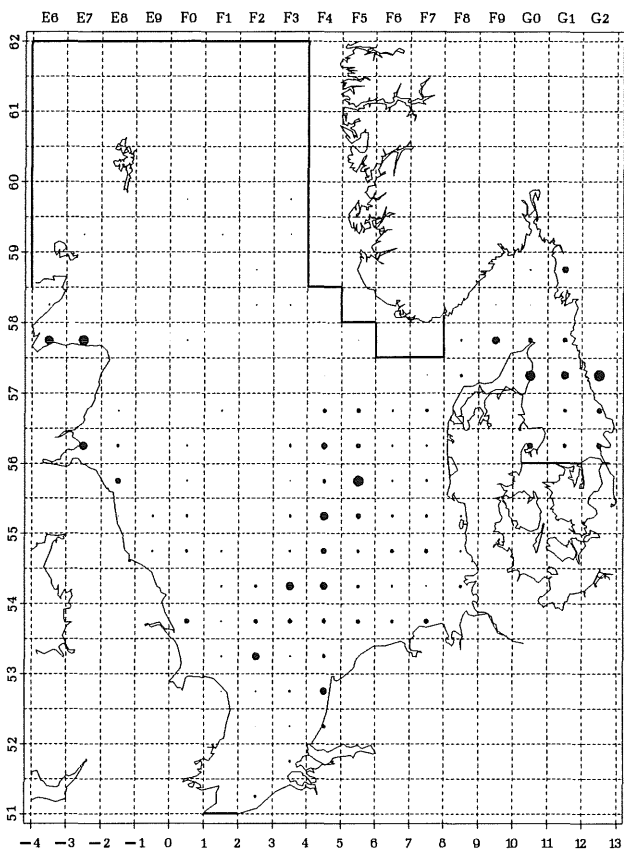
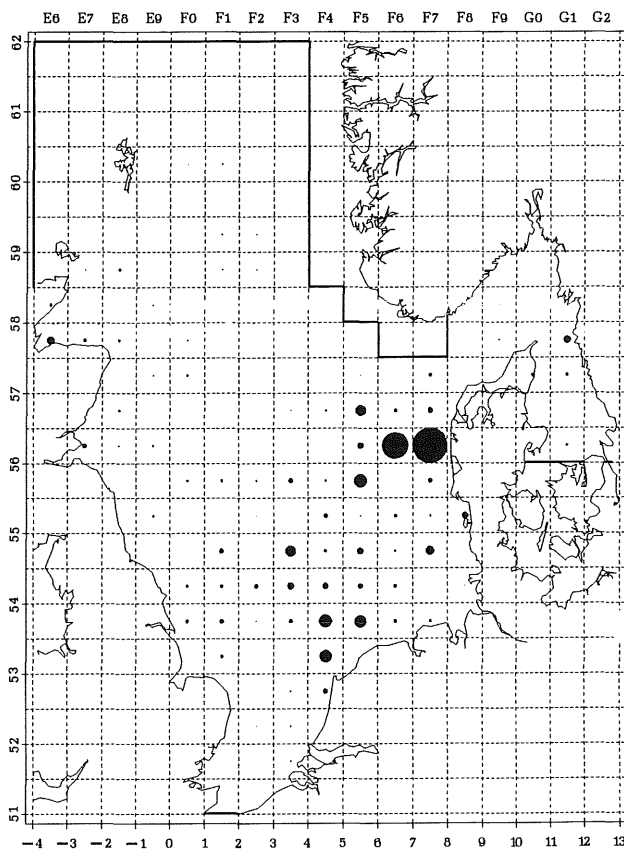


Figure 4.3 Herring: number per hour, 0-ringers.

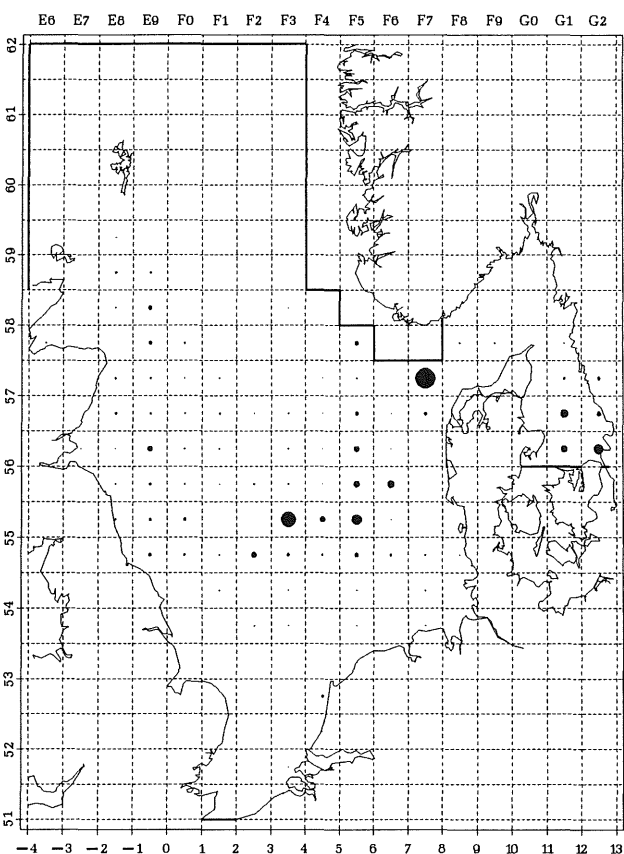
Herring, Age group 1 1992 quarter 1  
 Max mean catch number per recangle: 15929



Herring, Age group 1 1992 quarter 2  
 Max mean catch number per recangle: 173056



Herring, Age group 1 1992 quarter 3  
 Max mean catch number per recangle: 55011



Herring, Age group 1 1992 quarter 4  
 Max mean catch number per recangle: 23145

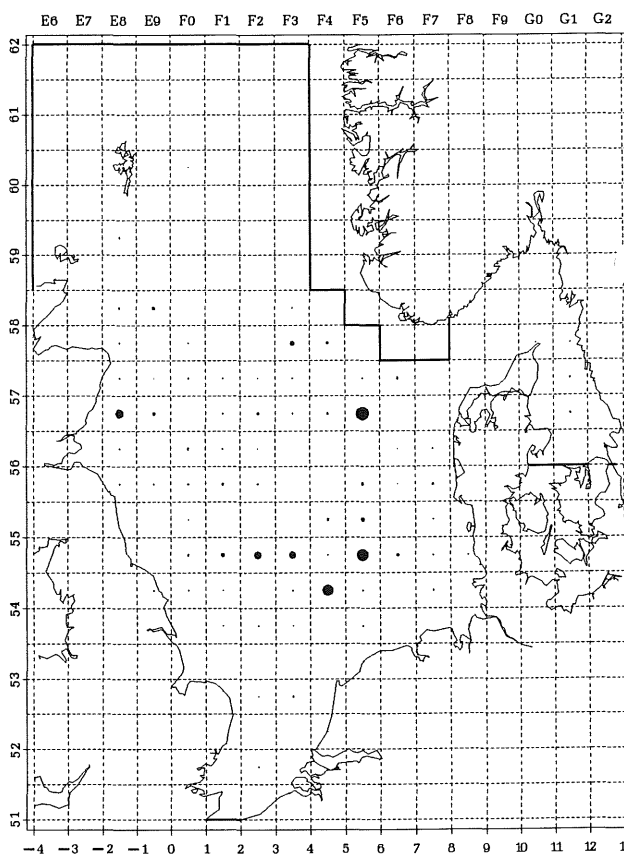
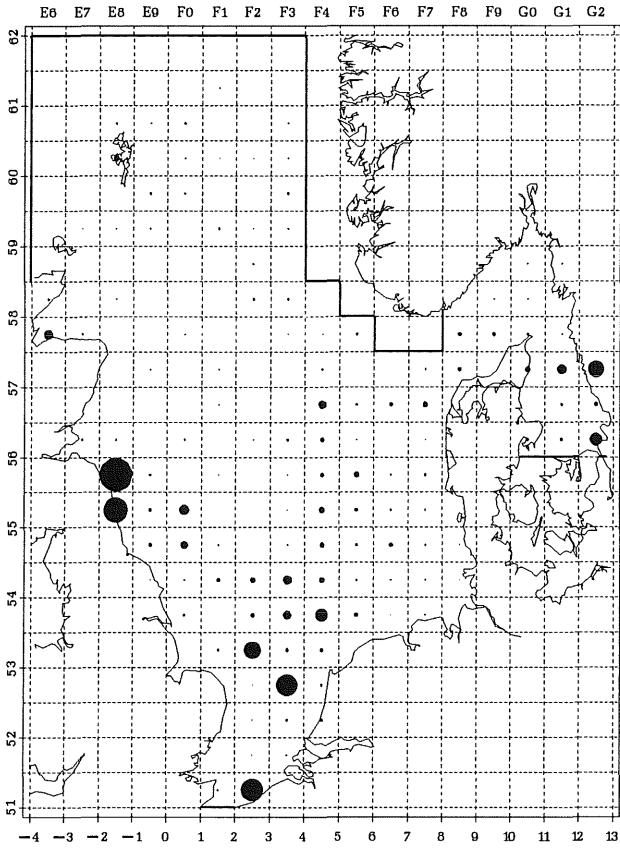
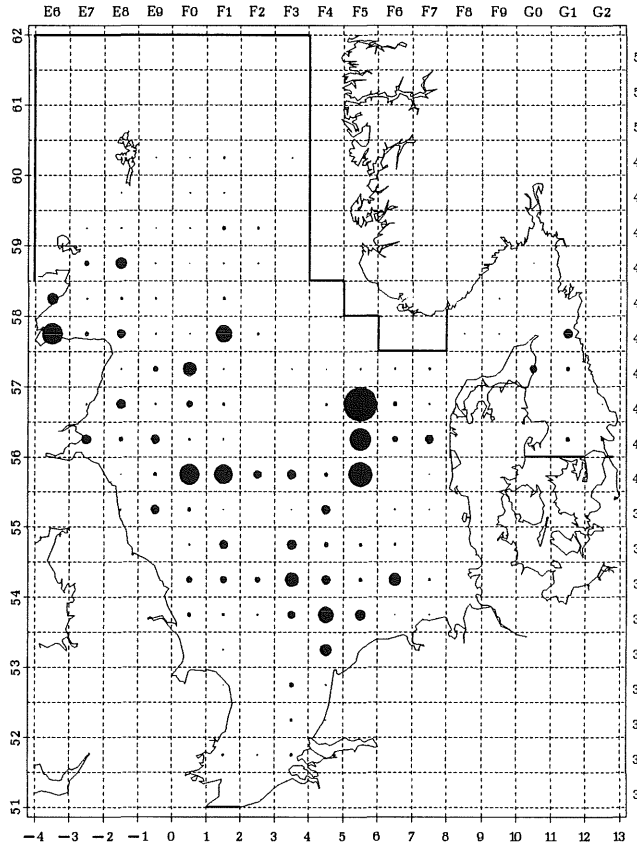


Figure 4.4 Herring: number per hour, 1-ringers.

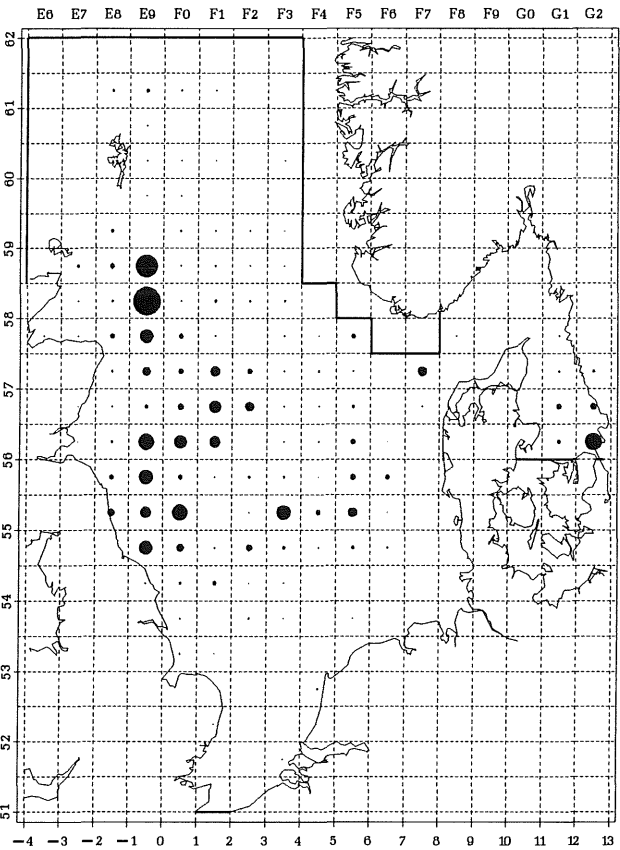
Herring, Age group 2 1992 quarter 1  
 Max mean catch number per recangle: 19242



Herring, Age group 2 1992 quarter 2  
 Max mean catch number per recangle: 19875



Herring, Age group 2 1992 quarter 3  
 Max mean catch number per recangle: 13701



Herring, Age group 2 1992 quarter 4  
 Max mean catch number per recangle: 21593

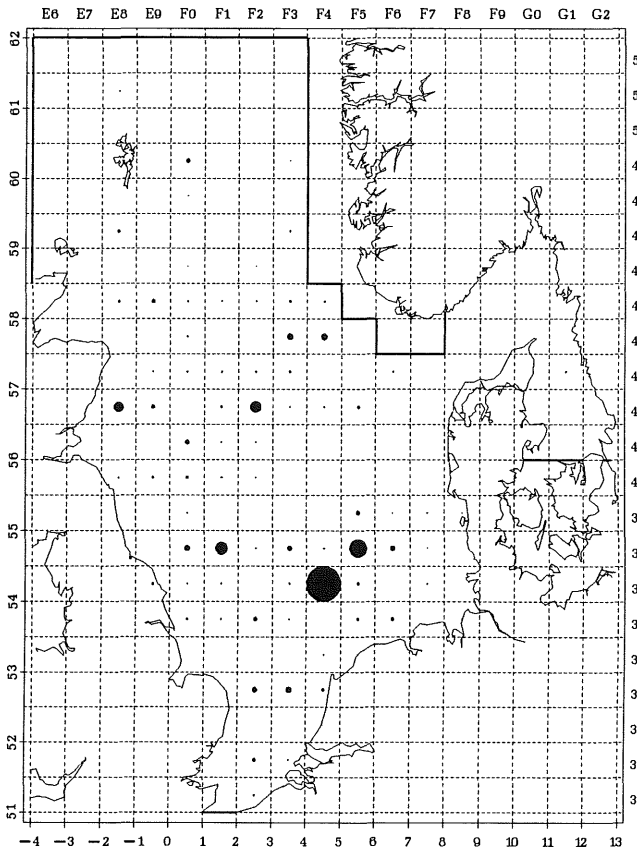
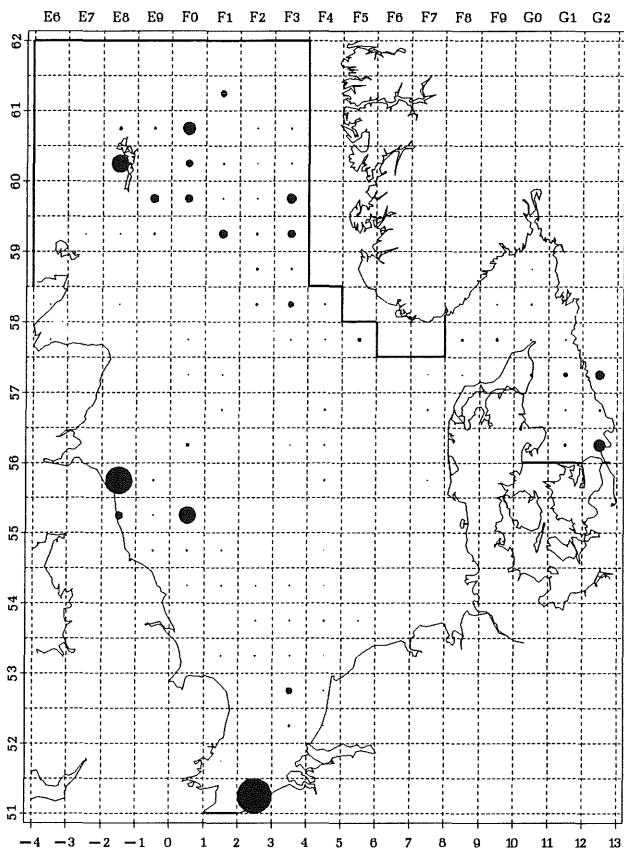
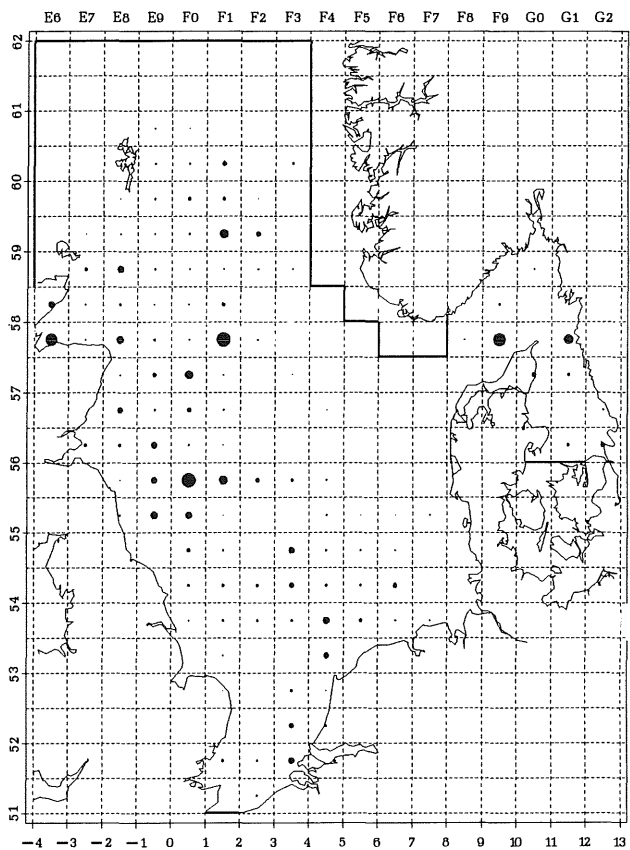


Figure 4.5 Herring: number per hour, 2-ringers.

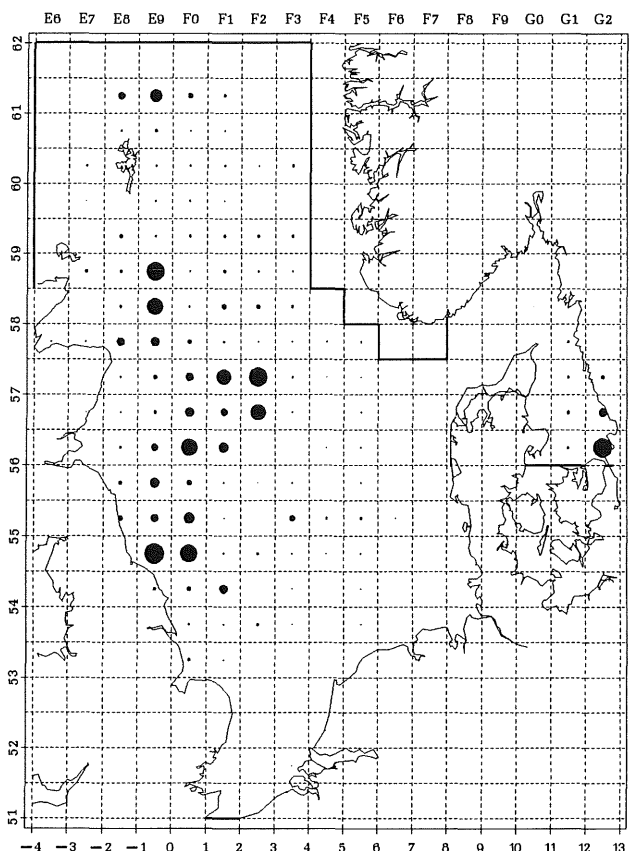
Herring, Age group 3+ 1992 quarter 1  
 Max mean catch number per recangle: 20993



Herring, Age group 3+ 1992 quarter 2  
 Max mean catch number per recangle: 3315



Herring, Age group 3+ 1992 quarter 3  
 Max mean catch number per recangle: 6665



Herring, Age group 3+ 1992 quarter 4  
 Max mean catch number per recangle: 6409

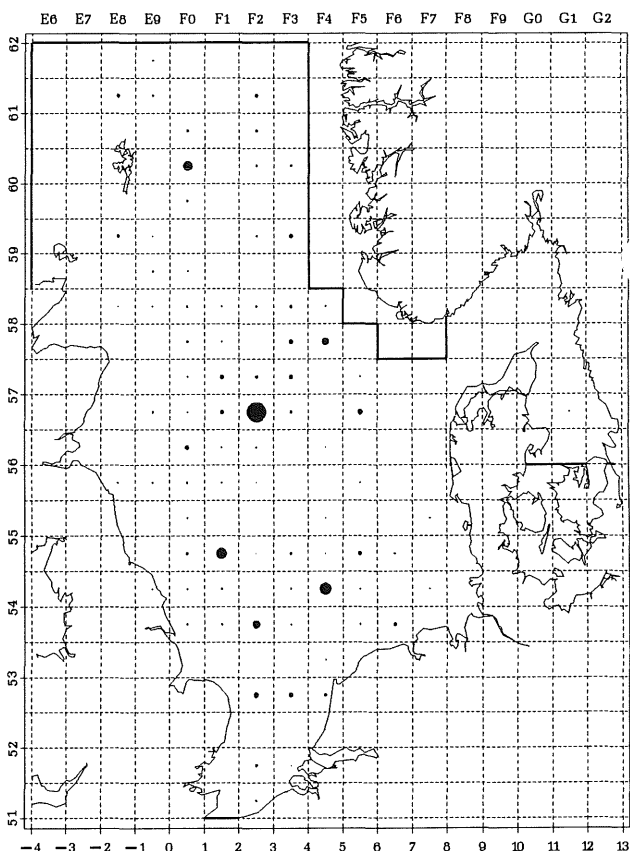
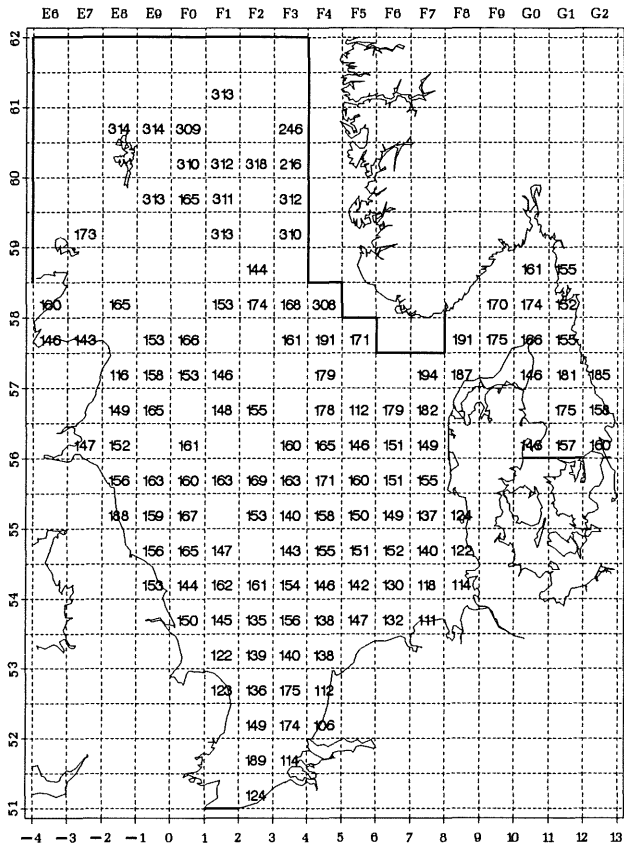


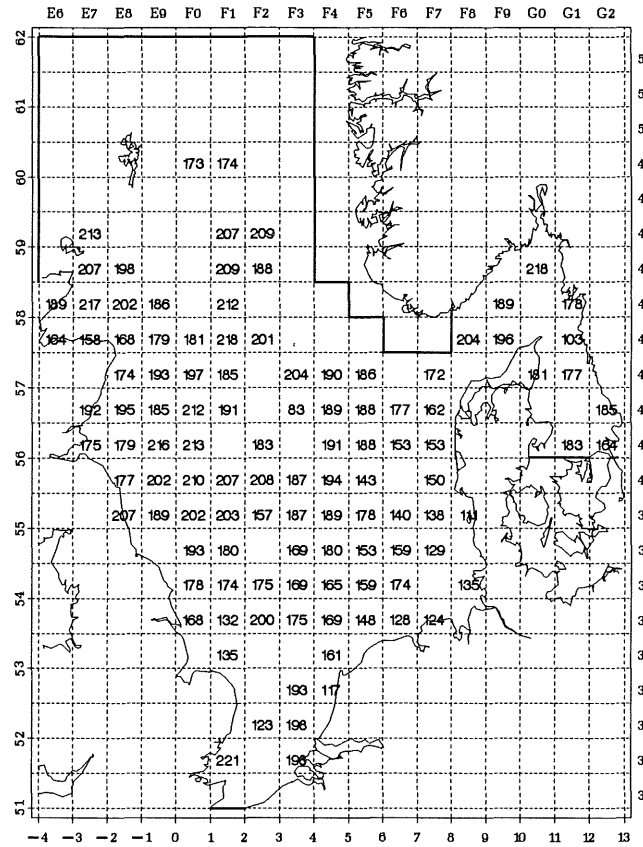
Figure 4.6 Herring: number per hour, 3+ringers.



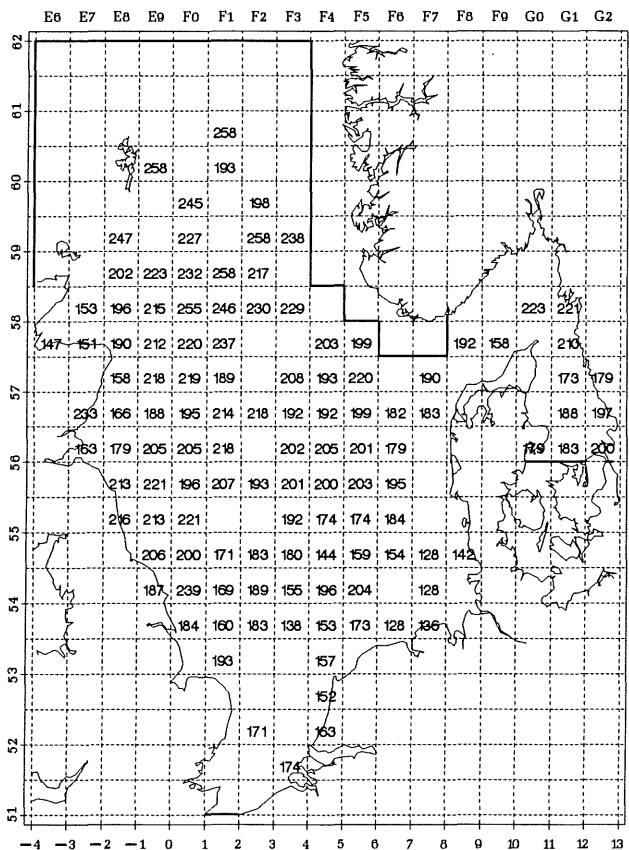
Herring, Age group 1 1992 quarter 1



Herring, Age group 1 1992 quarter 2



Herring, Age group 1 1992 quarter 3



Herring, Age group 1 1992 quarter 4

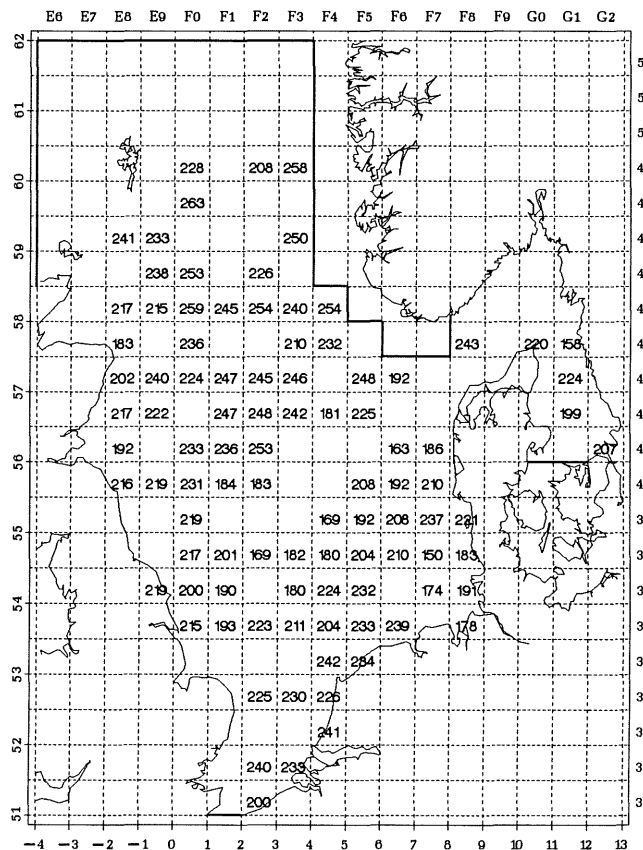
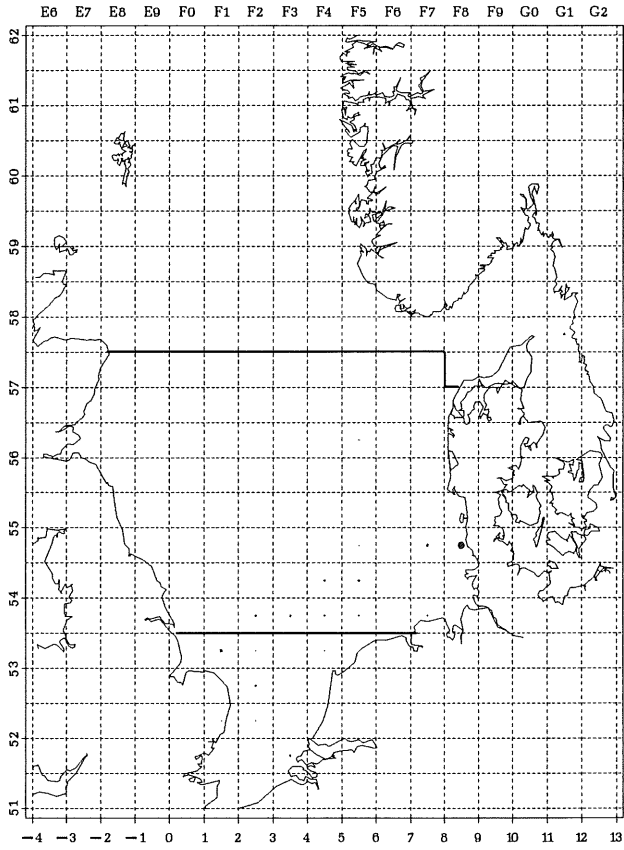


Figure 4.7 Herring: mean length (mm), 1-ringers.

Sprat, Age group 0 1992 quarter 3  
Max mean catch number per recangle: 3471



Sprat, Age group 0 1992 quarter 4  
Max mean catch number per recangle: 105089

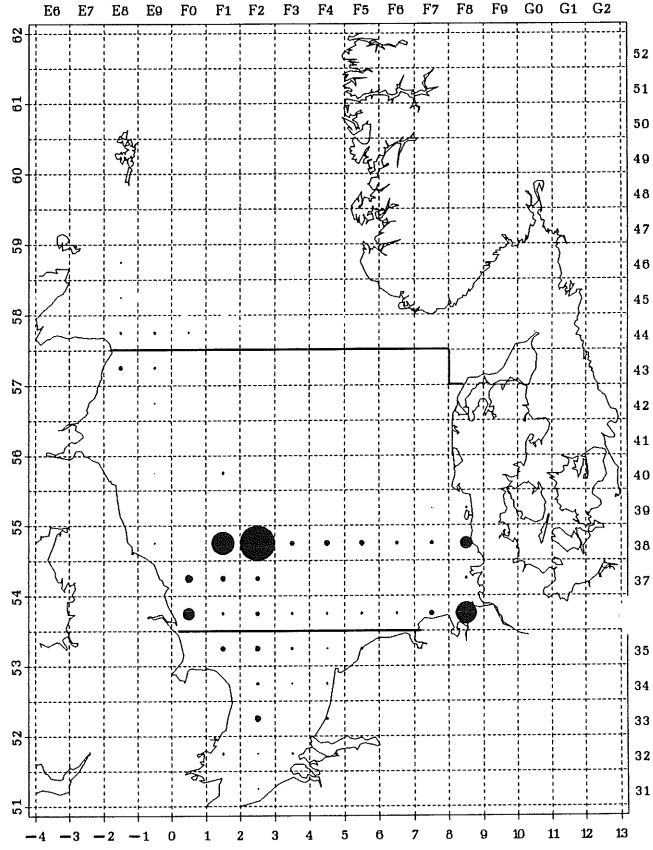
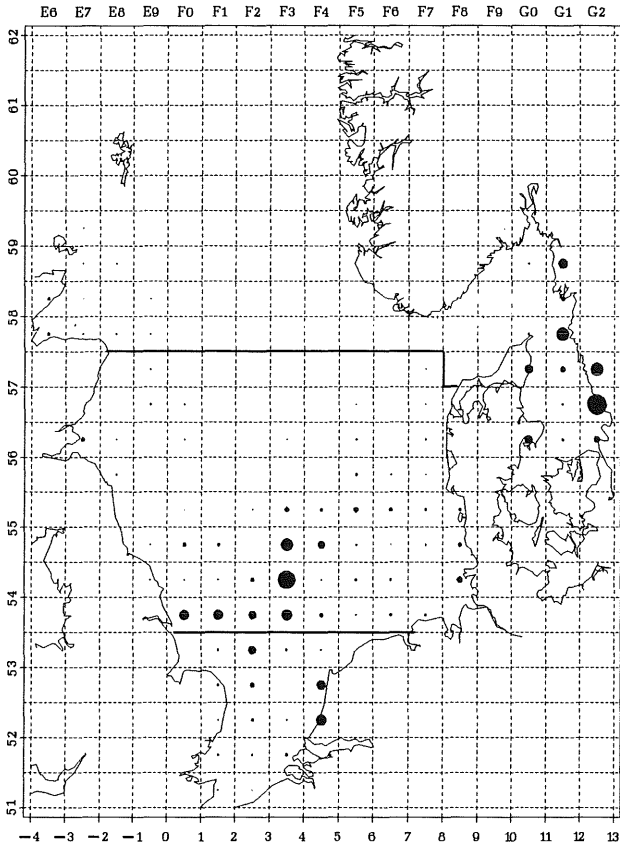
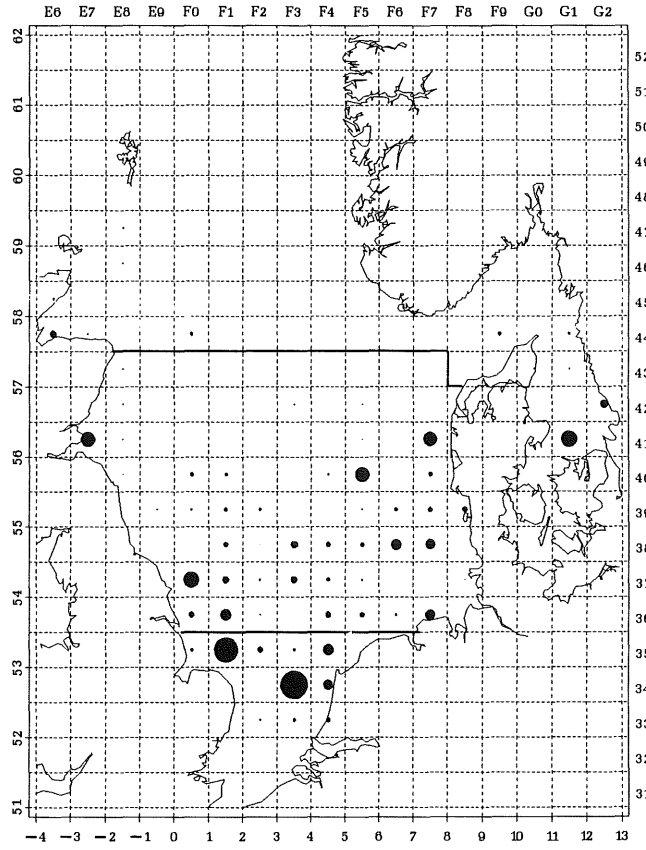


Figure 4.8 Sprat: number per hour, age-group 0.

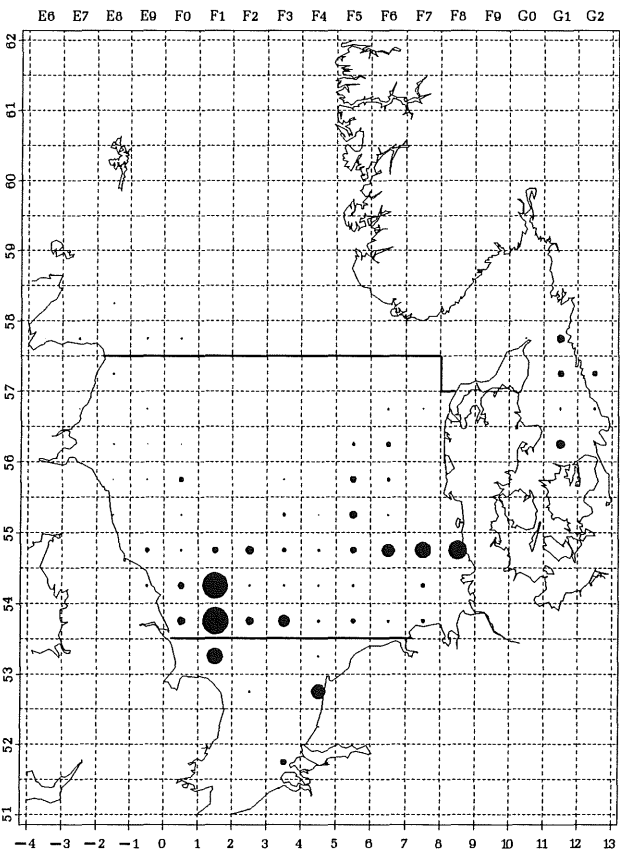
Sprat, Age group 1 1992 quarter 1  
 Max mean catch number per rectangle: 46173



Sprat, Age group 1 1992 quarter 2  
 Max mean catch number per rectangle: 90282



Sprat, Age group 1 1992 quarter 3  
 Max mean catch number per rectangle: 80833



Sprat, Age group 1 1992 quarter 4  
 Max mean catch number per rectangle: 141576

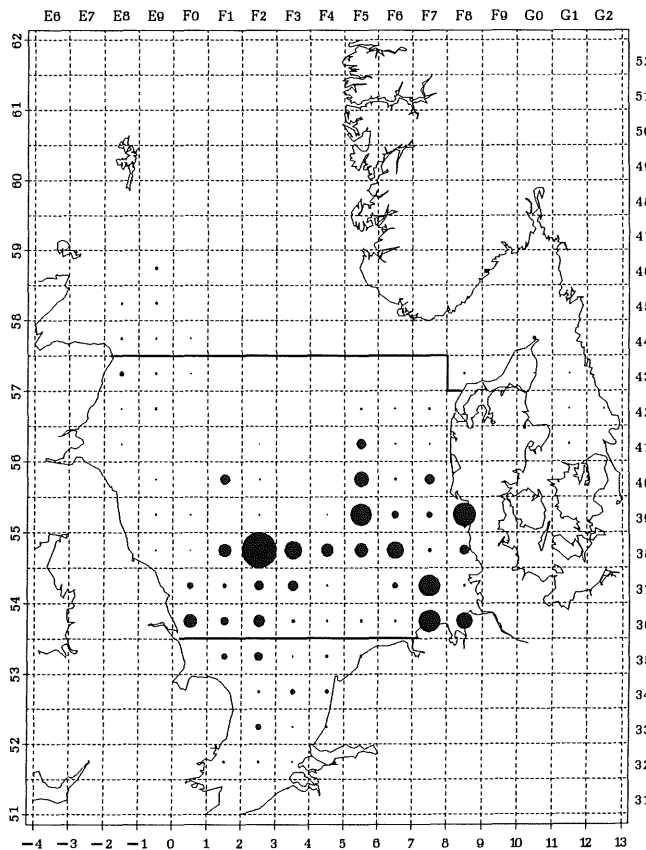
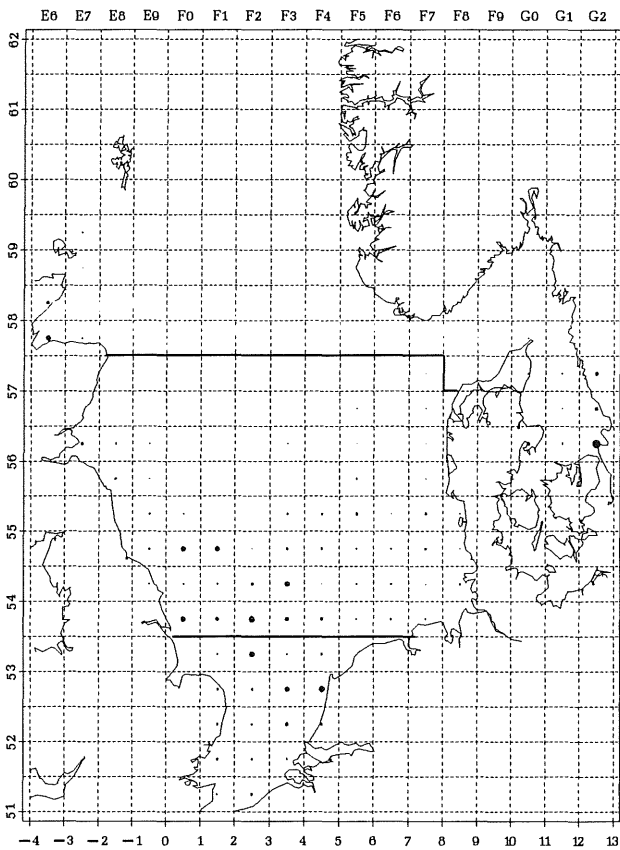
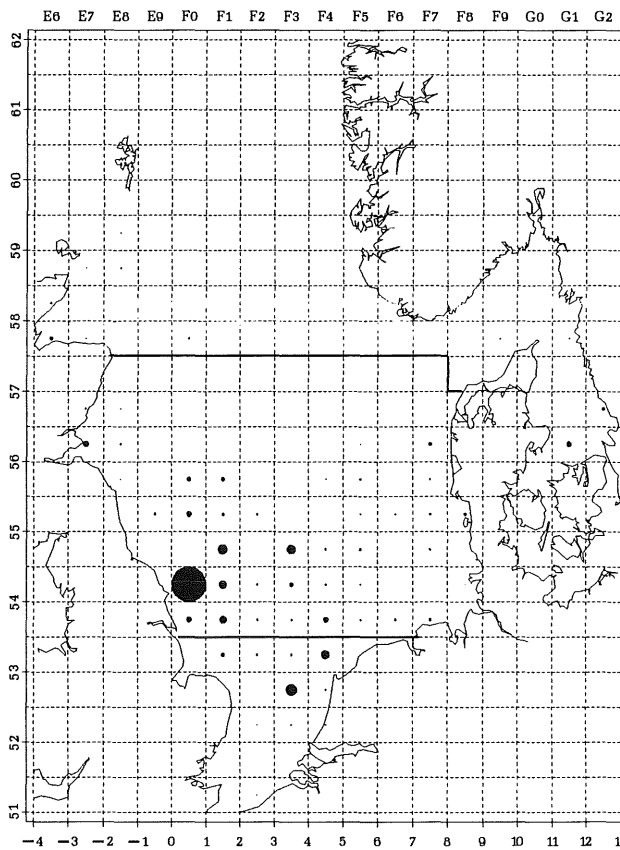


Figure 4.9 Sprat: number per hour, age-group 1.

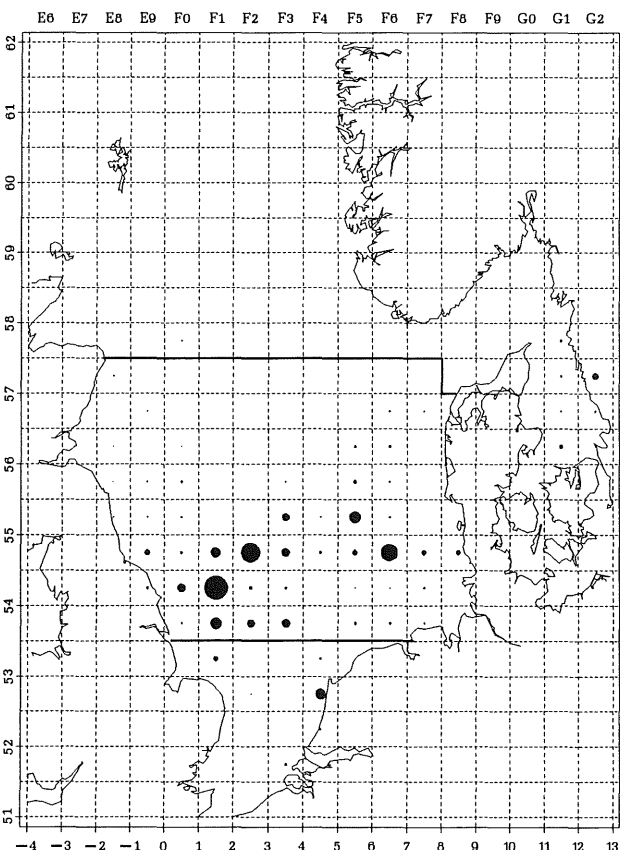
Sprat, Age group 2 1992 quarter 1  
 Max mean catch number per recangle: 7562



Sprat, Age group 2 1992 quarter 2  
 Max mean catch number per recangle: 169339



Sprat, Age group 2 1992 quarter 3  
 Max mean catch number per recangle: 76545



Sprat, Age group 2 1992 quarter 4  
 Max mean catch number per recangle: 116142

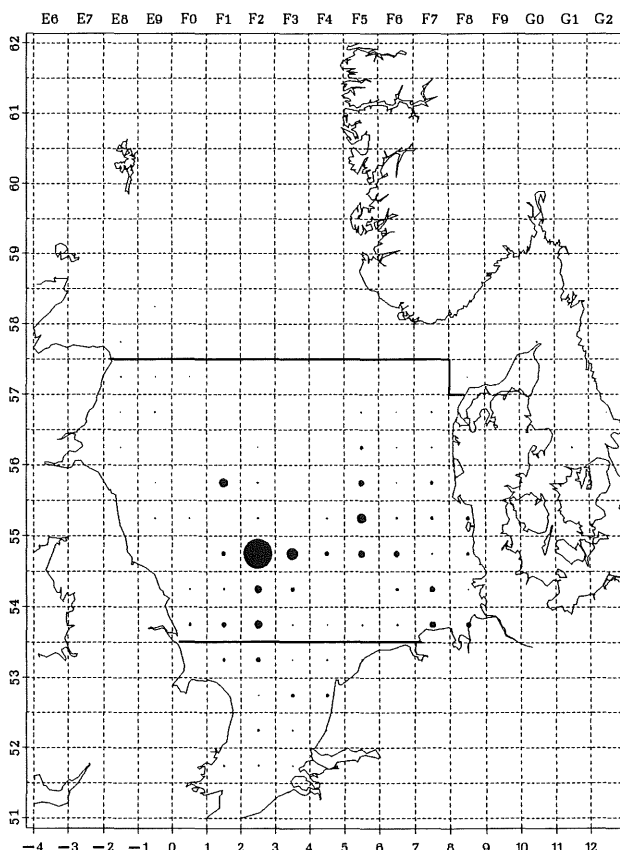
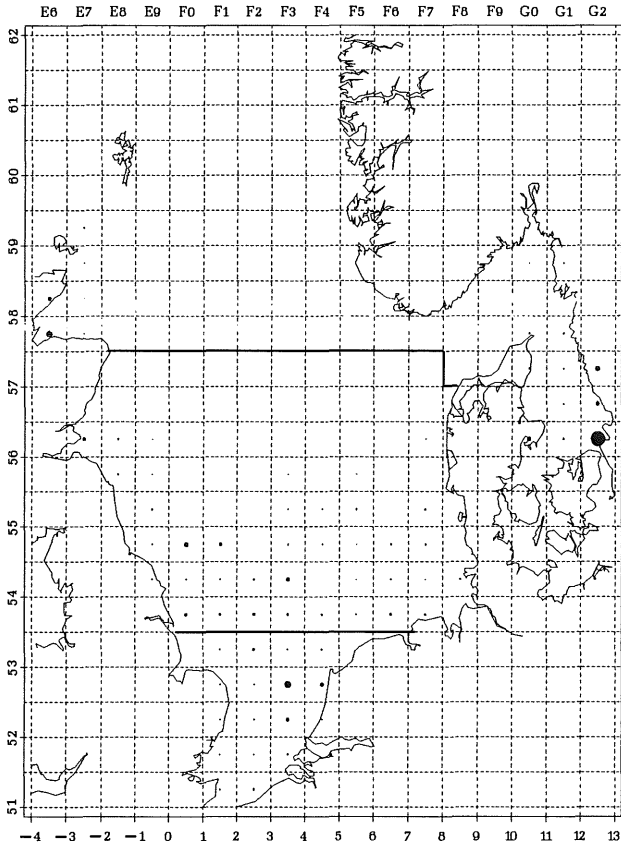
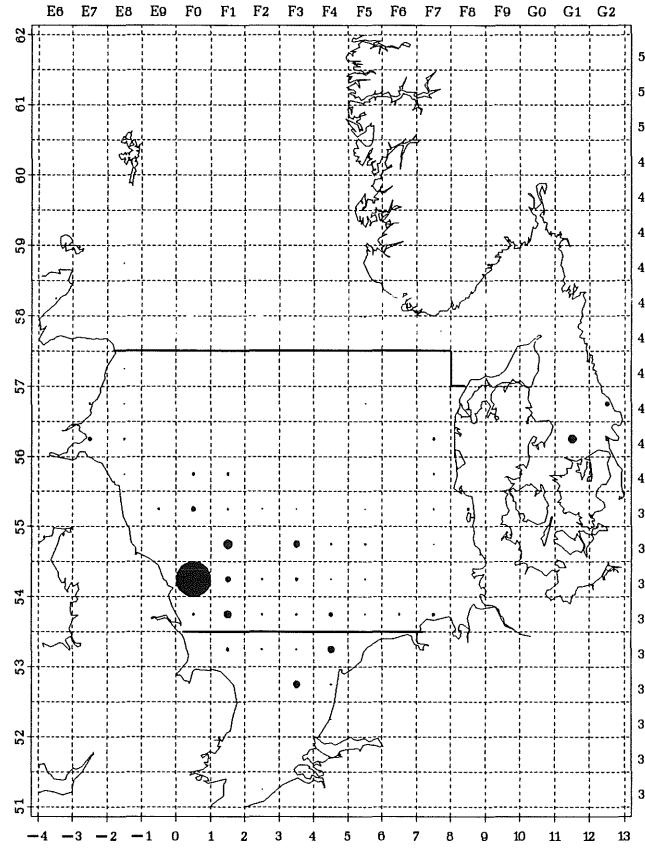


Figure 4.10 Sprat: number per hour, age-group 2.

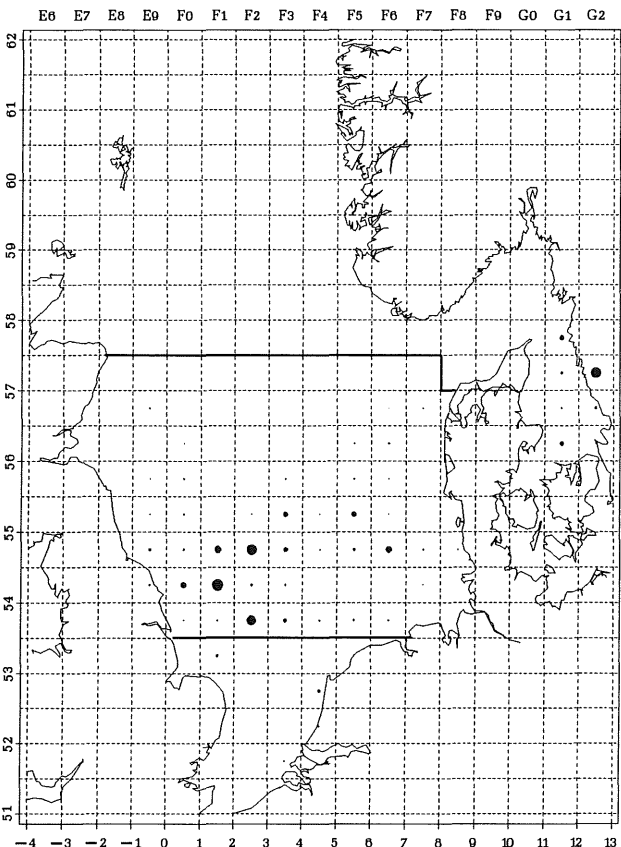
Sprat, Age group 3+ 1992 quarter 1  
 Max mean catch number per rectangle: 8079



Sprat, Age group 3+ 1992 quarter 2  
 Max mean catch number per rectangle: 48398



Sprat, Age group 3+ 1992 quarter 3  
 Max mean catch number per rectangle: 4562



Sprat, Age group 3+ 1992 quarter 4  
 Max mean catch number per rectangle: 9476

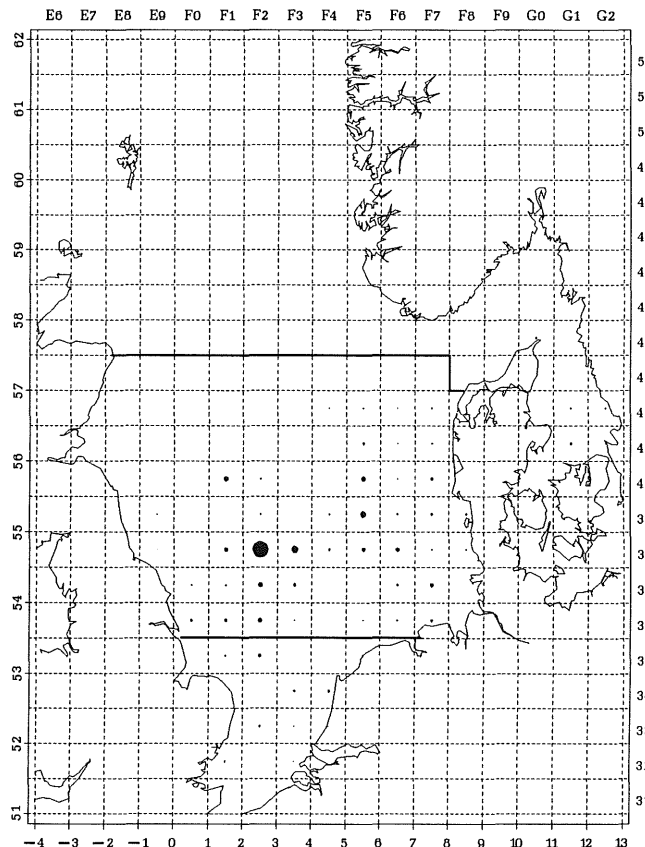
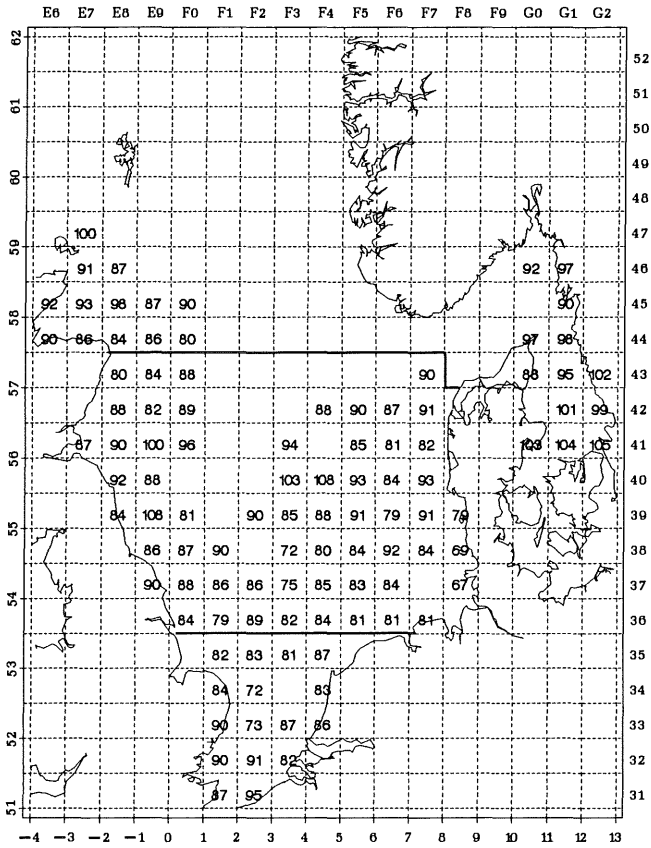
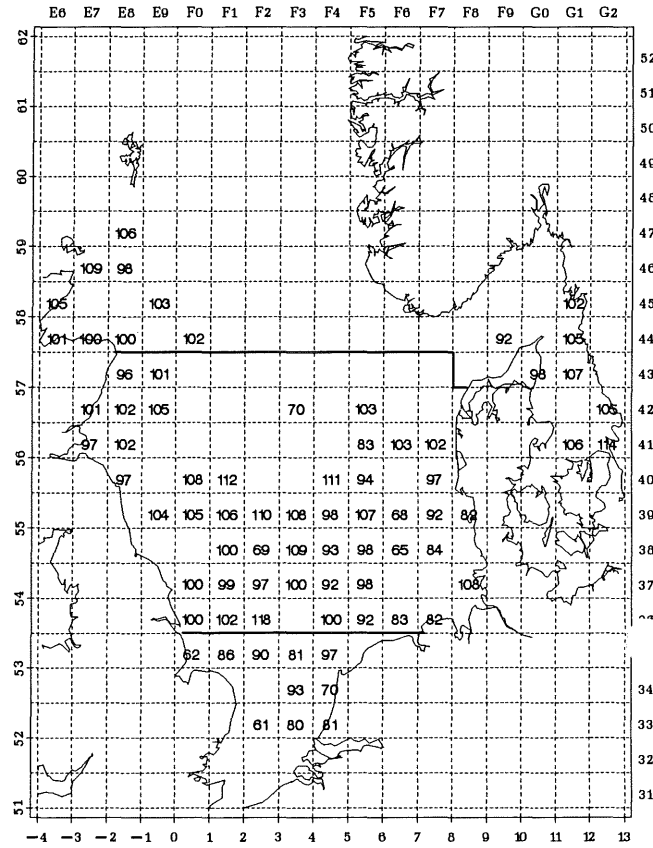


Figure 4.11 Sprat: number per hour, age-group 3+.

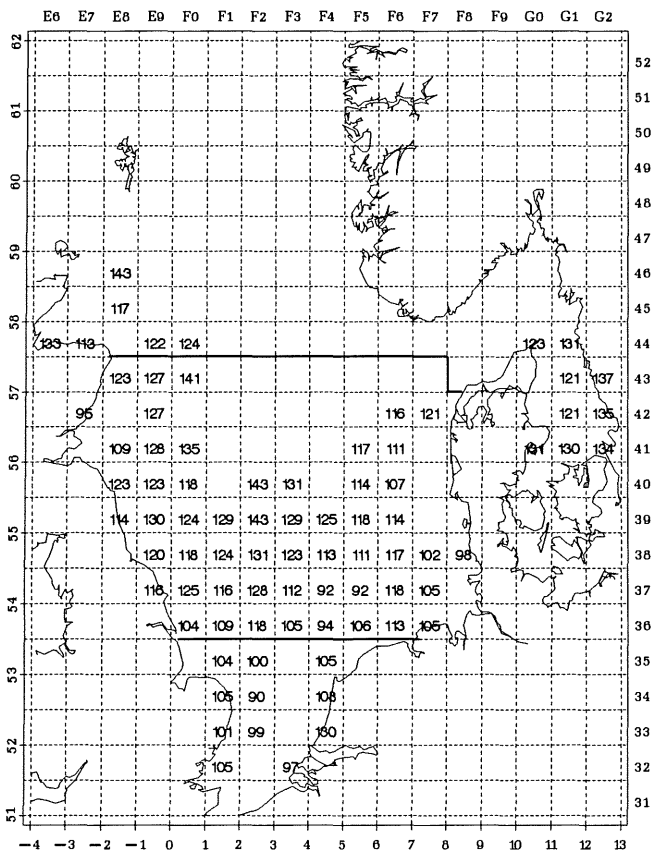
Sprat, Age group 1 1992 quarter 1



Sprat, Age group 1 1992 quarter 2



Sprat, Age group 1 1992 quarter 3



Sprat, Age group 1 1992 quarter 4

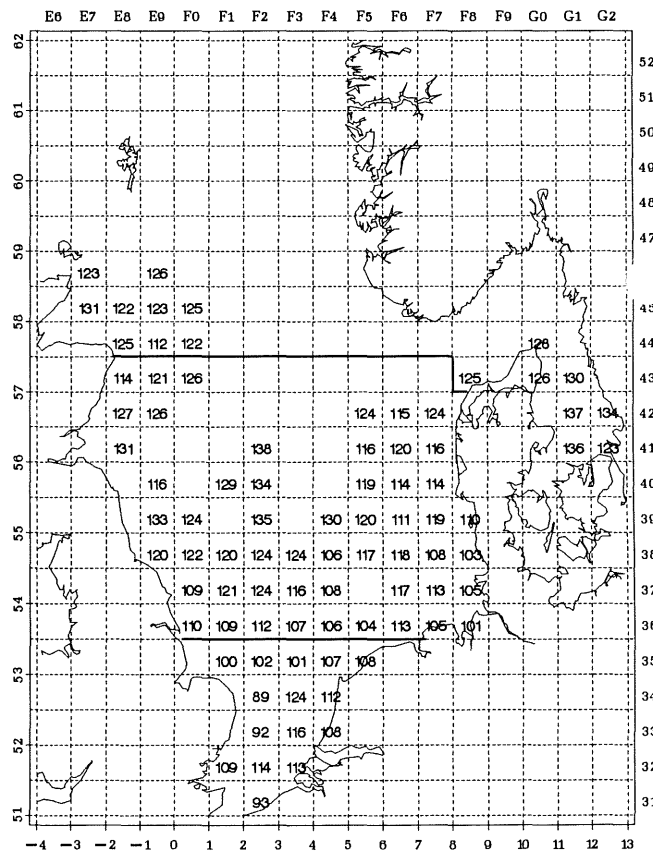
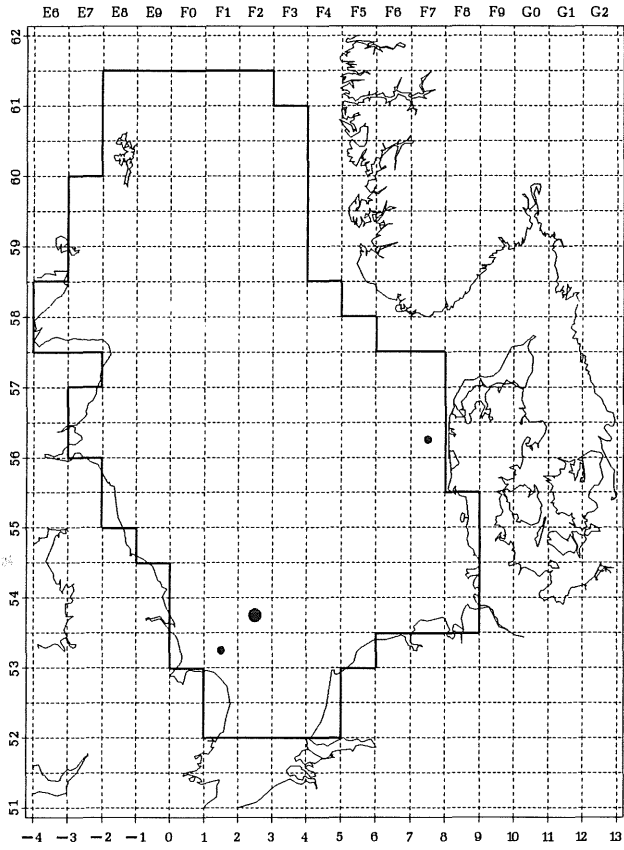


Figure 4.12 Sprat: mean length (mm), age-group 1.

Mackerel, Age group 0 1992 quarter 3  
 Max mean catch number per recangle: 6



Mackerel, Age group 0 1992 quarter 4  
 Max mean catch number per recangle: 41

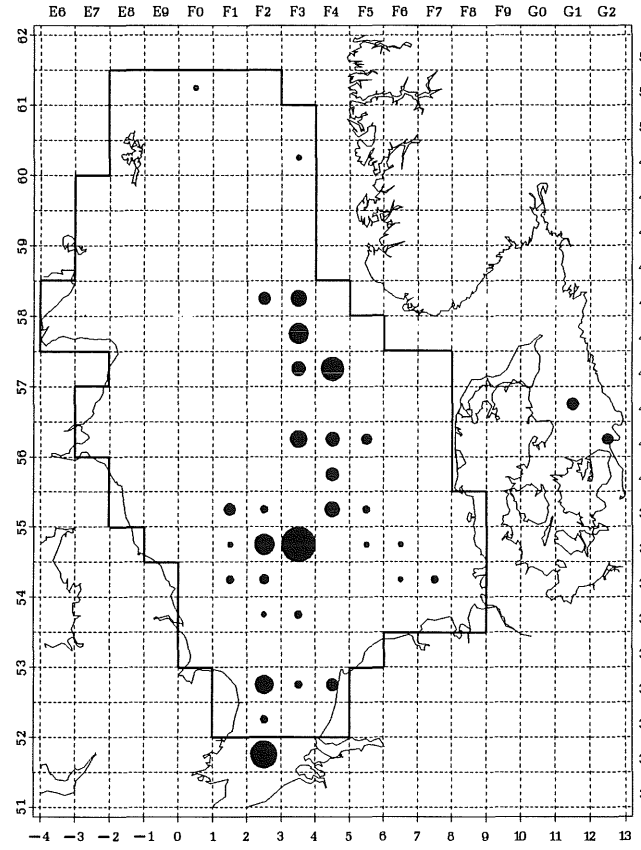
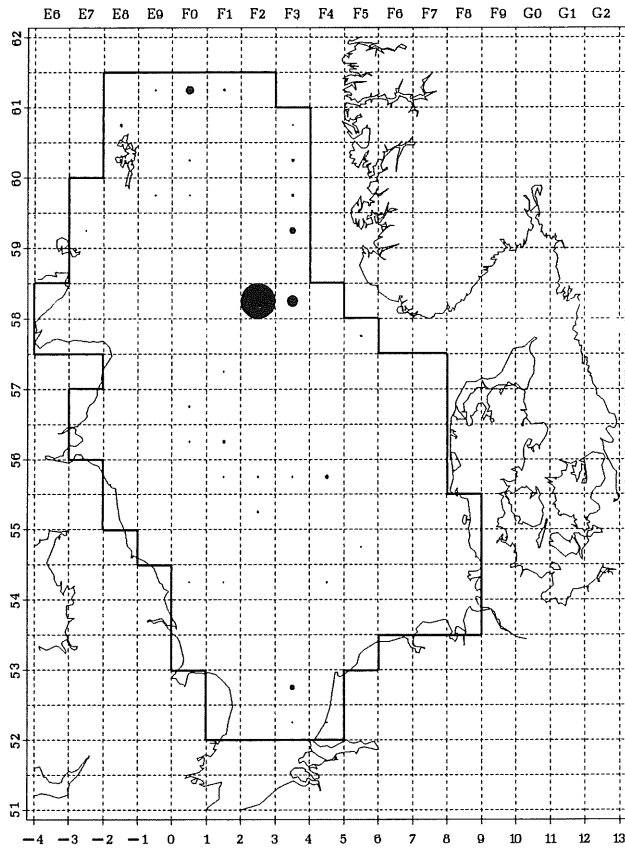
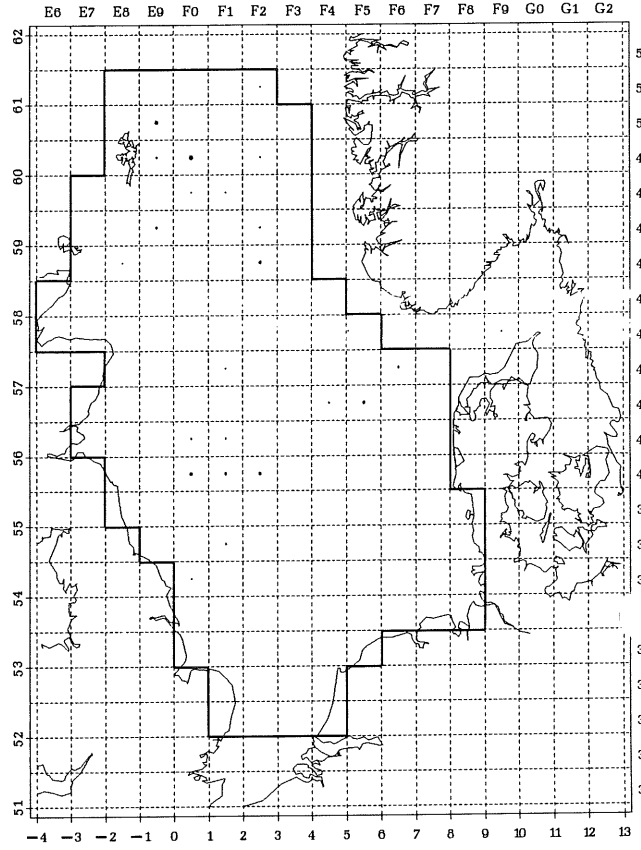


Figure 4.13 Mackerel: number per hour, age-group 0.

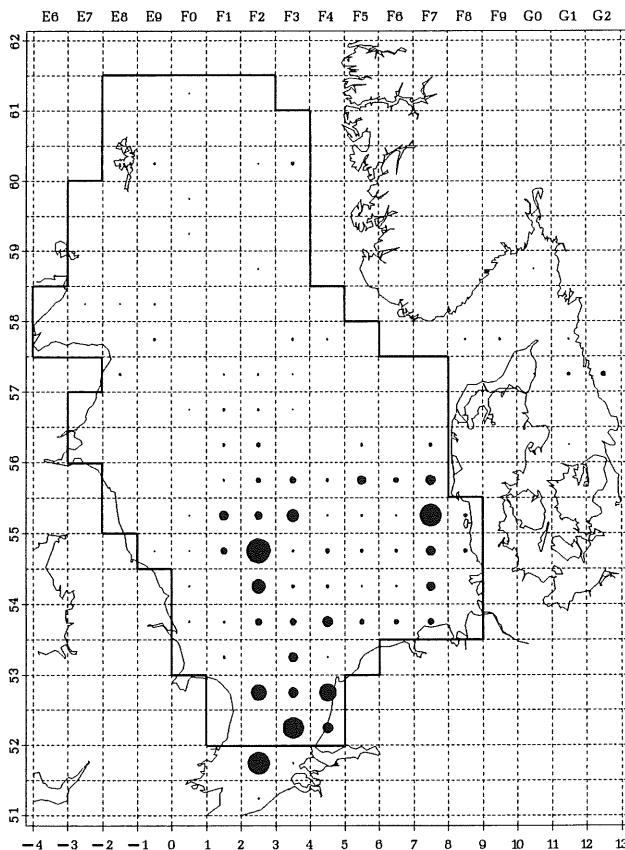
Mackerel, Age group 1 1992 quarter 1  
 Max mean catch number per recangle: 1897



Mackerel, Age group 1 1992 quarter 2  
 Max mean catch number per recangle: 21



Mackerel, Age group 1 1992 quarter 3  
 Max mean catch number per recangle: 906



Mackerel, Age group 1 1992 quarter 4  
 Max mean catch number per recangle: 853

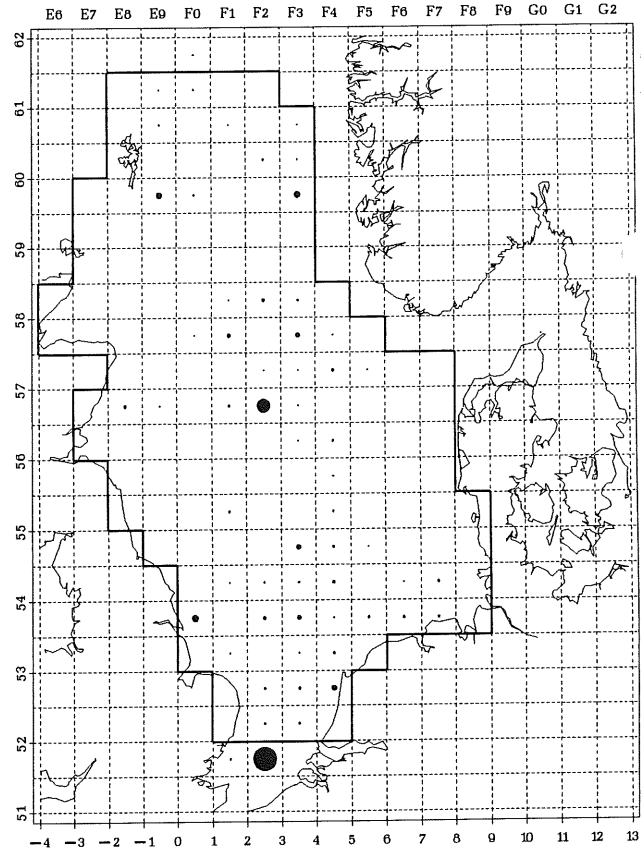
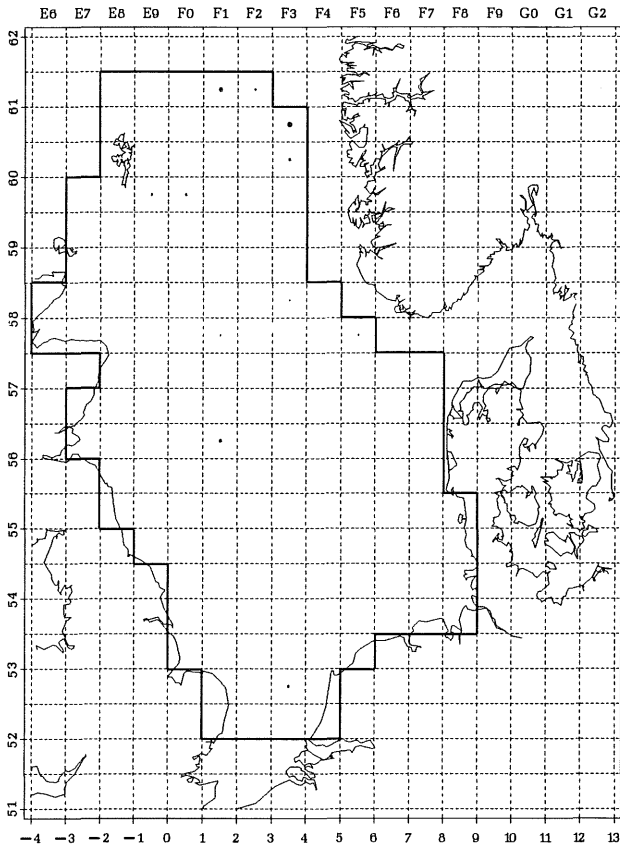


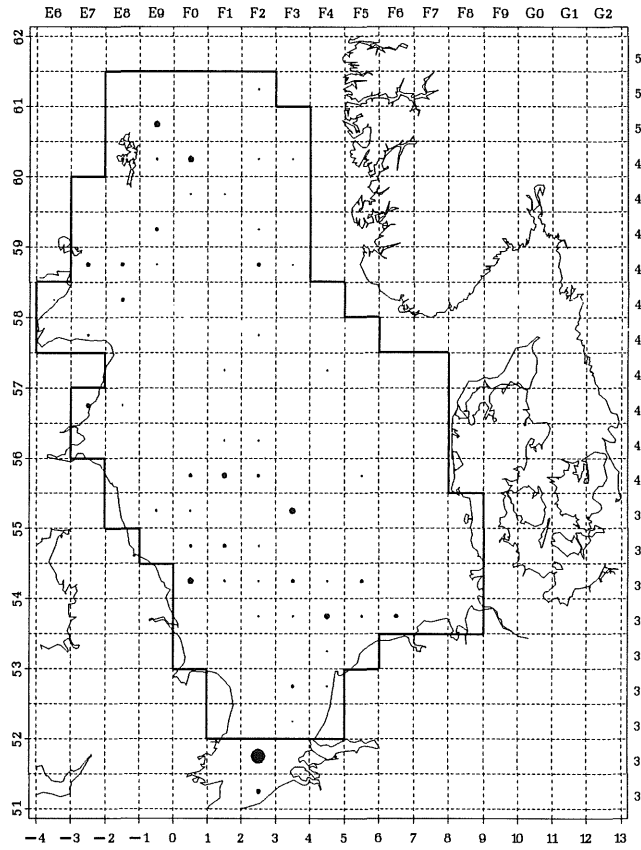
Figure 4.14 Mackerel: number per hour, age-group 1.



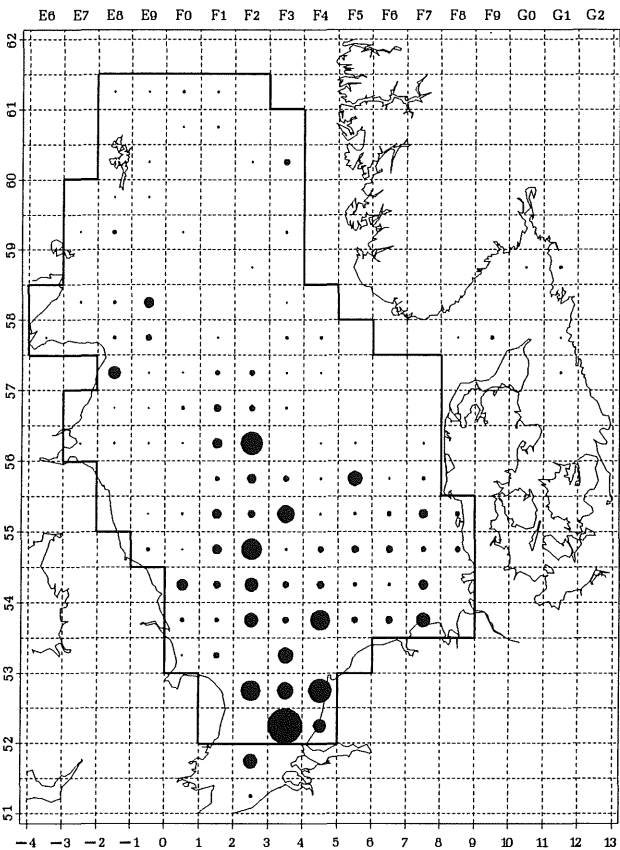
Mackerel, Age group 2 1992 quarter 1  
 Max mean catch number per recangle: 20



Mackerel, Age group 2 1992 quarter 2  
 Max mean catch number per recangle: 191



Mackerel, Age group 2 1992 quarter 3  
 Max mean catch number per recangle: 1173



Mackerel, Age group 2 1992 quarter 4  
 Max mean catch number per recangle: 268

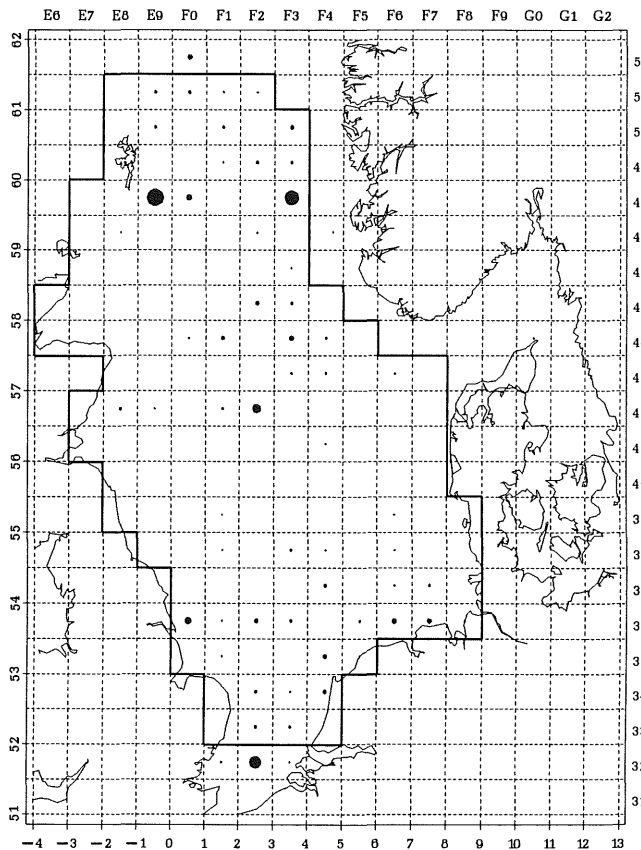
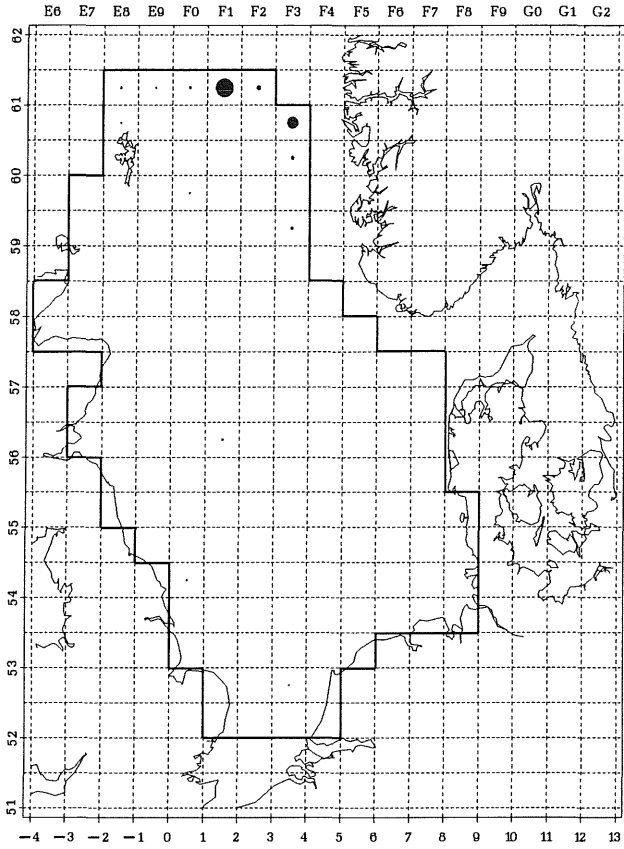
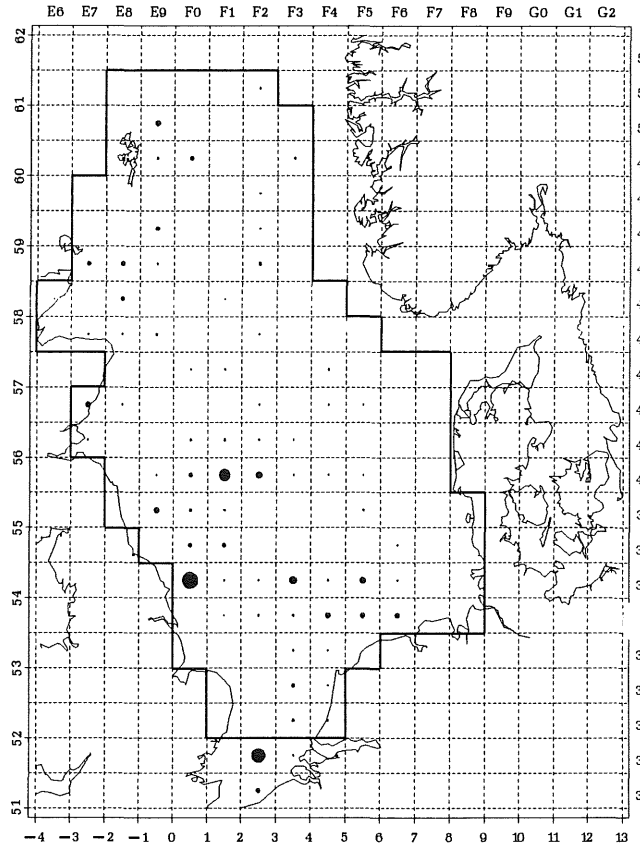


Figure 4.15 Mackerel: number per hour, age-group 2.

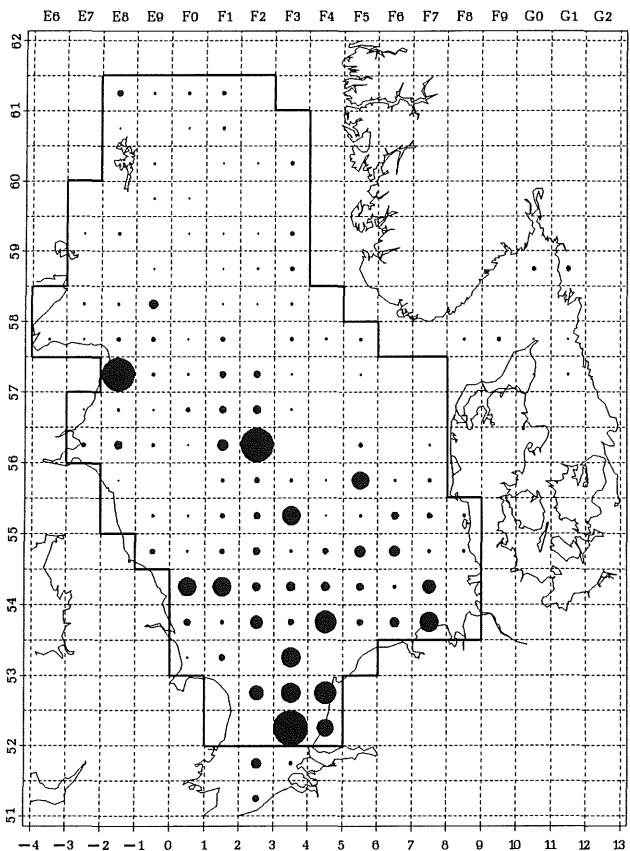
Mackerel, Age group 3+ 1992 quarter 1  
 Max mean catch number per recangle: 323



Mackerel, Age group 3+ 1992 quarter 2  
 Max mean catch number per recangle: 254



Mackerel, Age group 3+ 1992 quarter 3  
 Max mean catch number per recangle: 1225



Mackerel, Age group 3+ 1992 quarter 4  
 Max mean catch number per recangle: 550

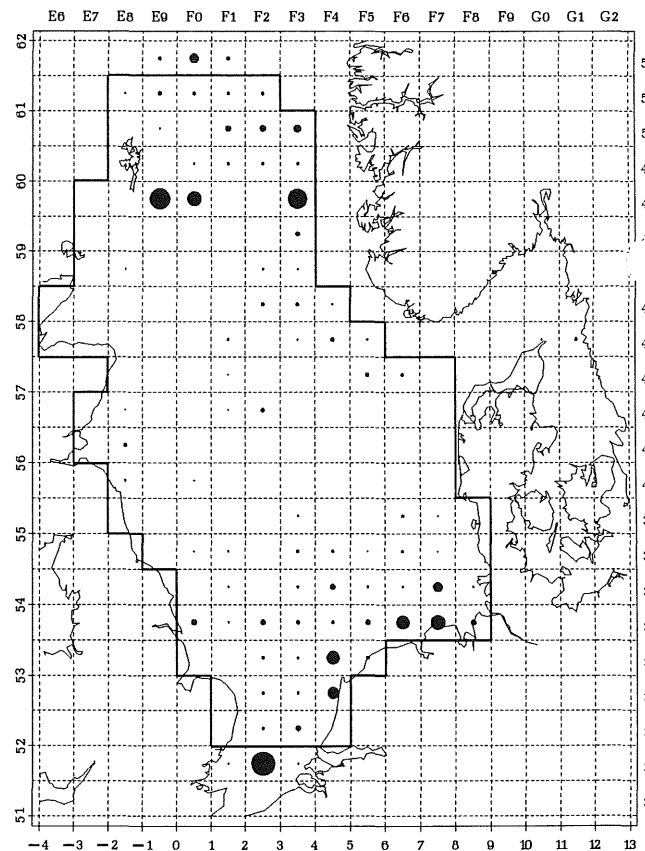
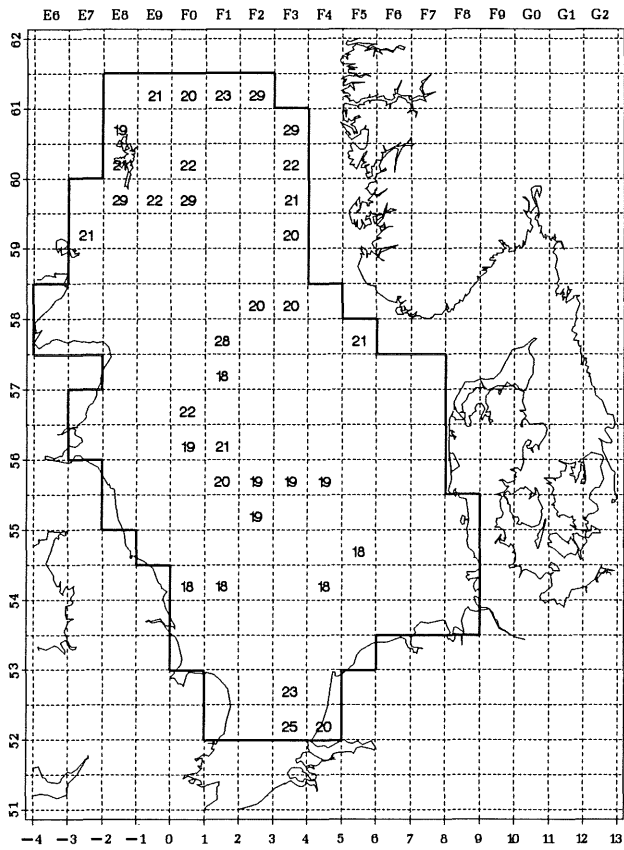
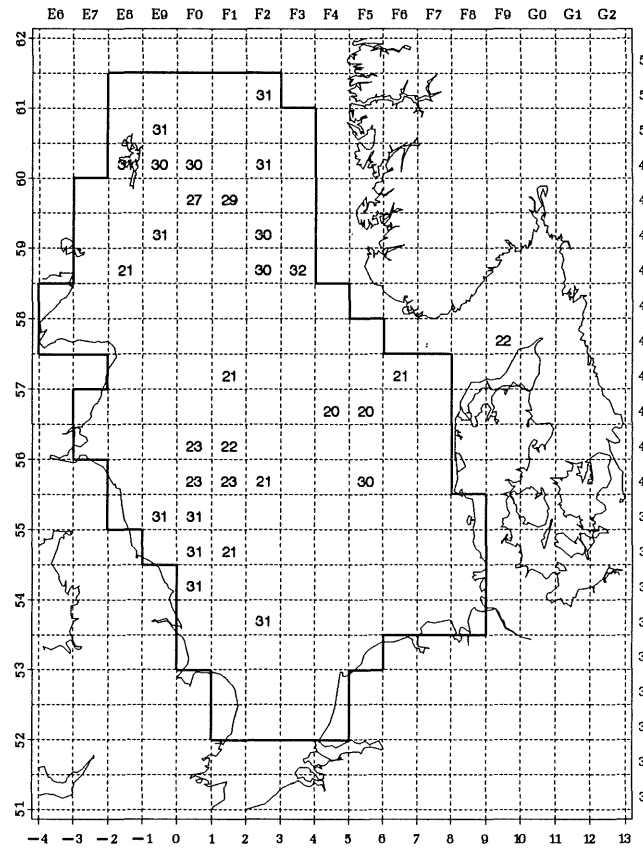


Figure 4.16 Mackerel: number per hour, age-group 3+.

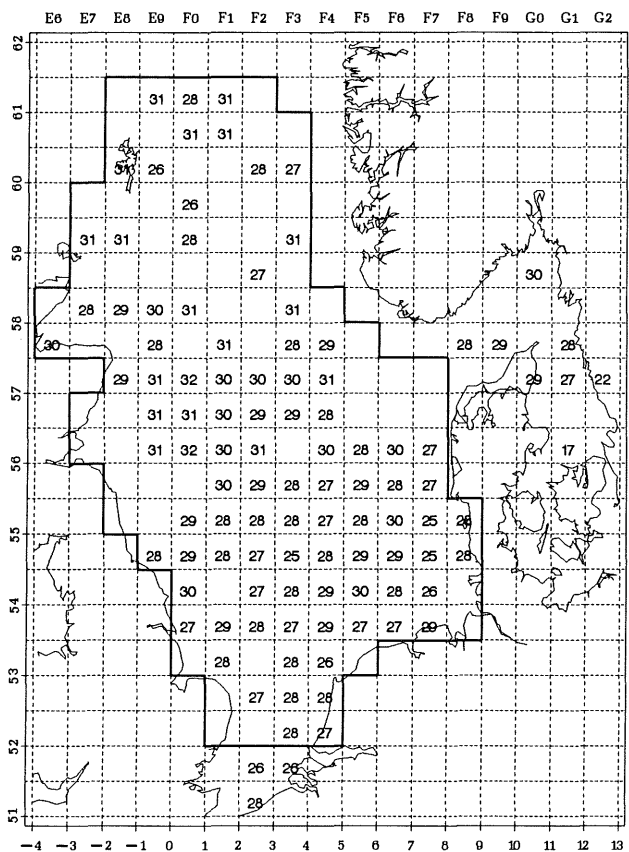
Mackerel, Age group 1 1992 quarter 1



Mackerel, Age group 1 1992 quarter 2



Mackerel, Age group 1 1992 quarter 3



Mackerel, Age group 1 1992 quarter 4

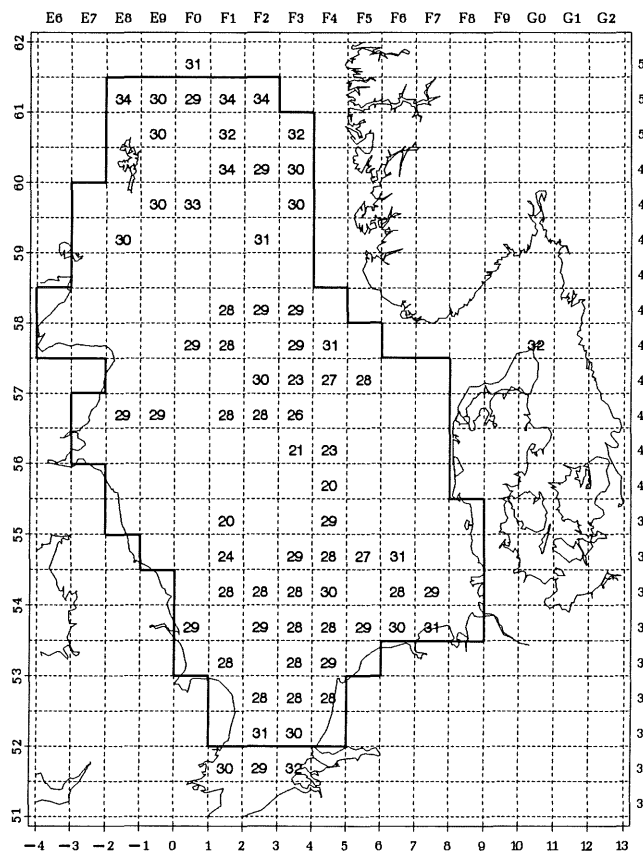
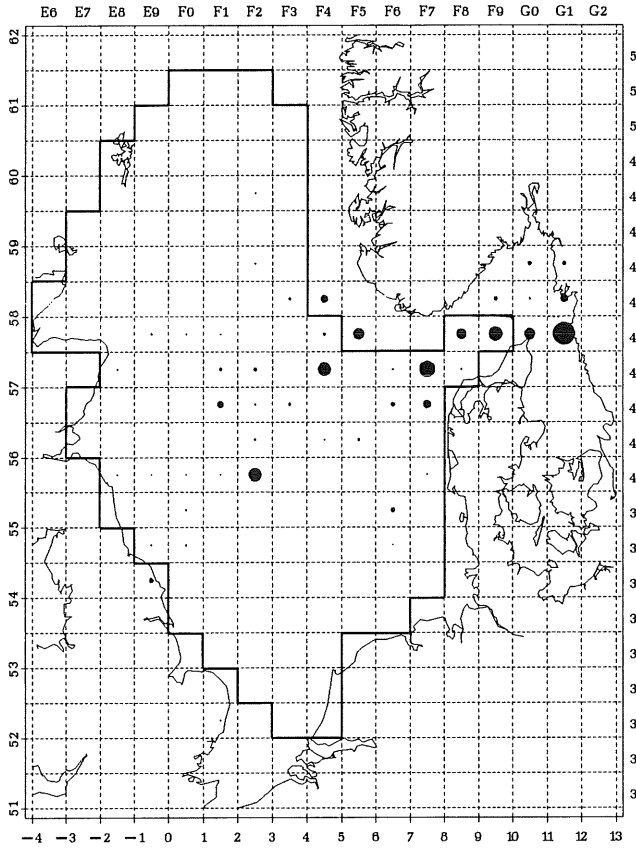


Figure 4.17 Mackerel: mean length (cm below), age-group 1.

Cod, Age group 0 1992 quarter 3  
 Max mean catch number per recangle: 1277



Cod, Age group 0 1992 quarter 4  
 Max mean catch number per recangle: 3213

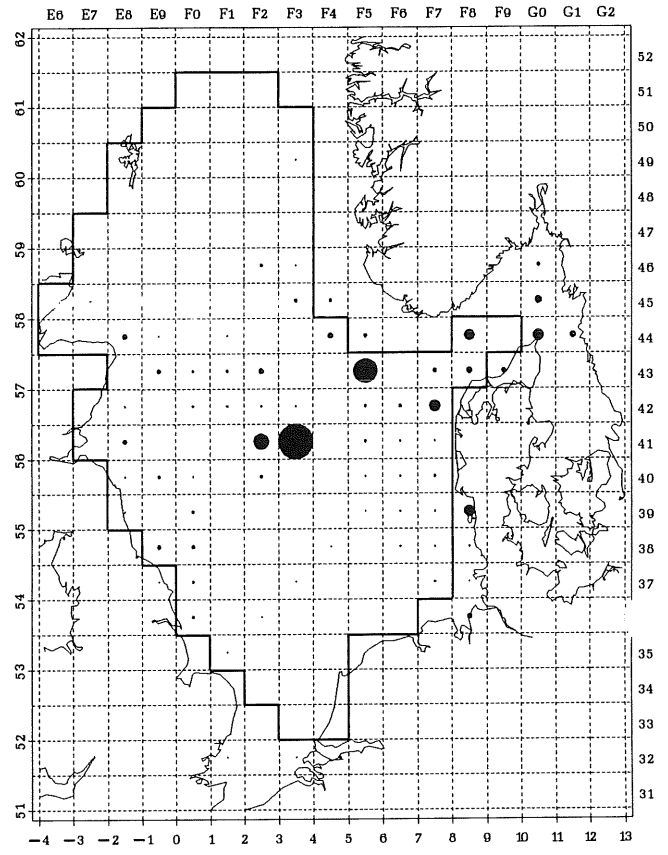
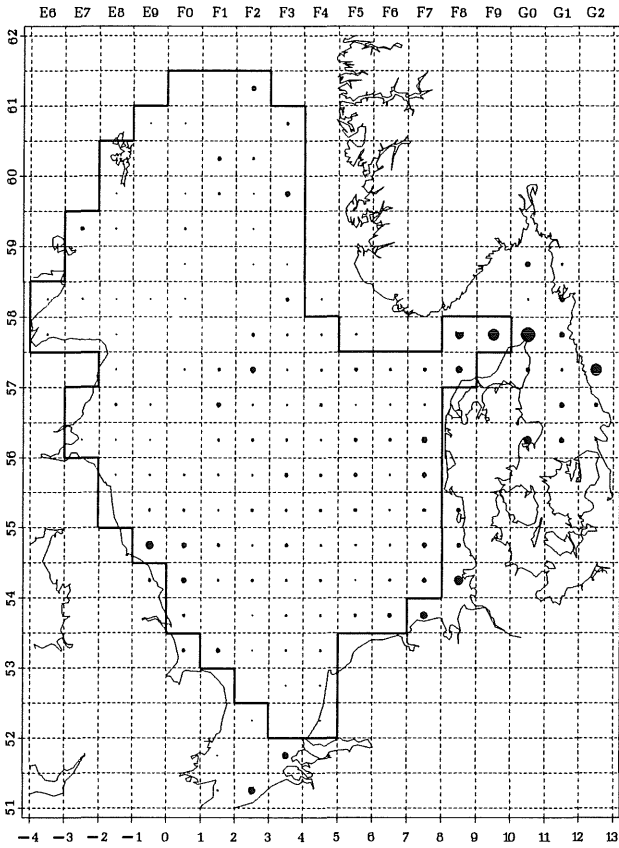
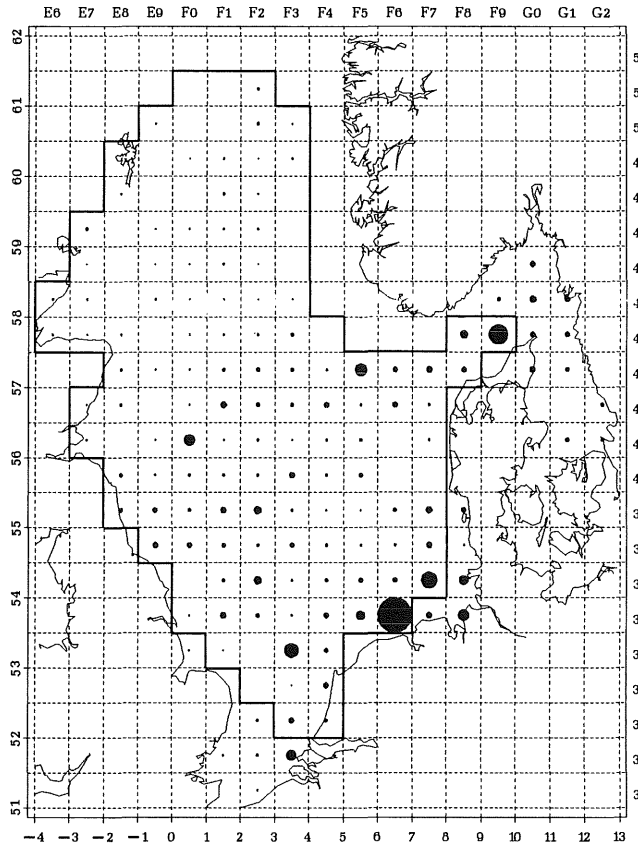


Figure 4.18 Cod: number per hour, age-group 0.

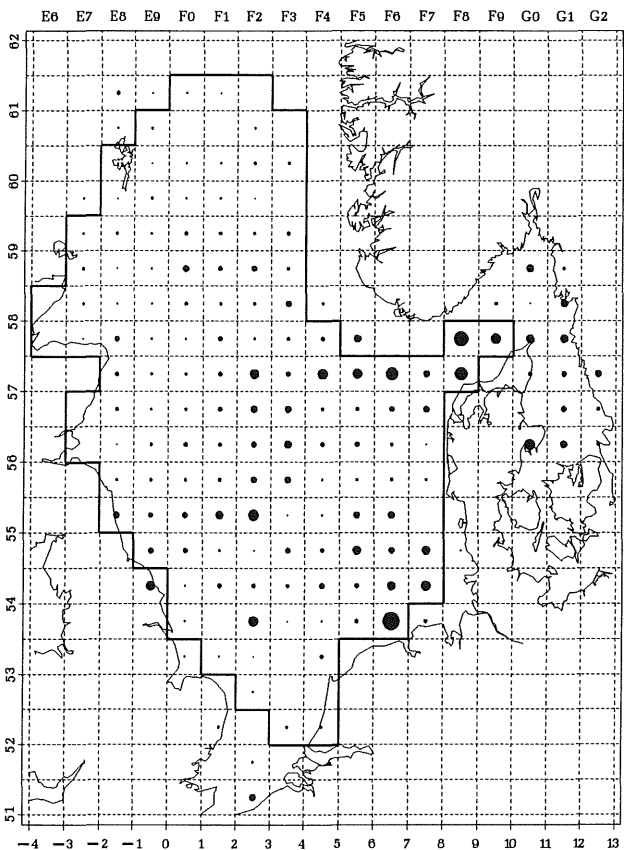
Cod, Age group 1 1992 quarter 1  
 Max mean catch number per rectangle: 370



Cod, Age group 1 1992 quarter 2  
 Max mean catch number per rectangle: 2321



Cod, Age group 1 1992 quarter 3  
 Max mean catch number per rectangle: 566



Cod, Age group 1 1992 quarter 4  
 Max mean catch number per rectangle: 424

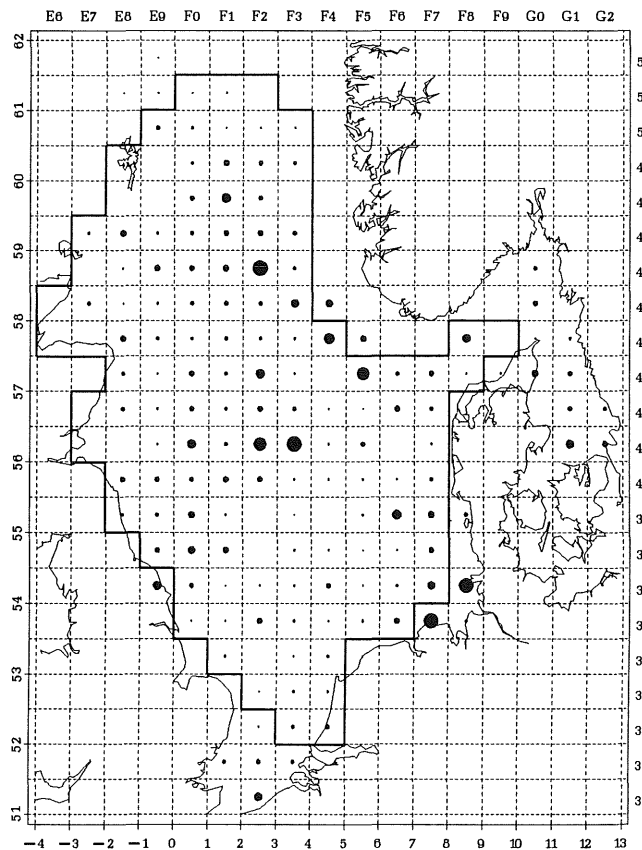
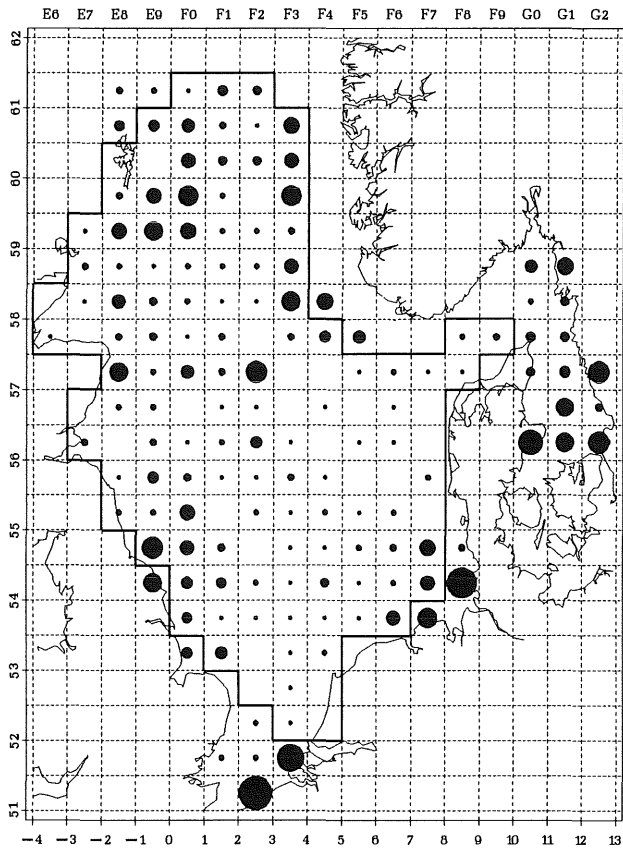
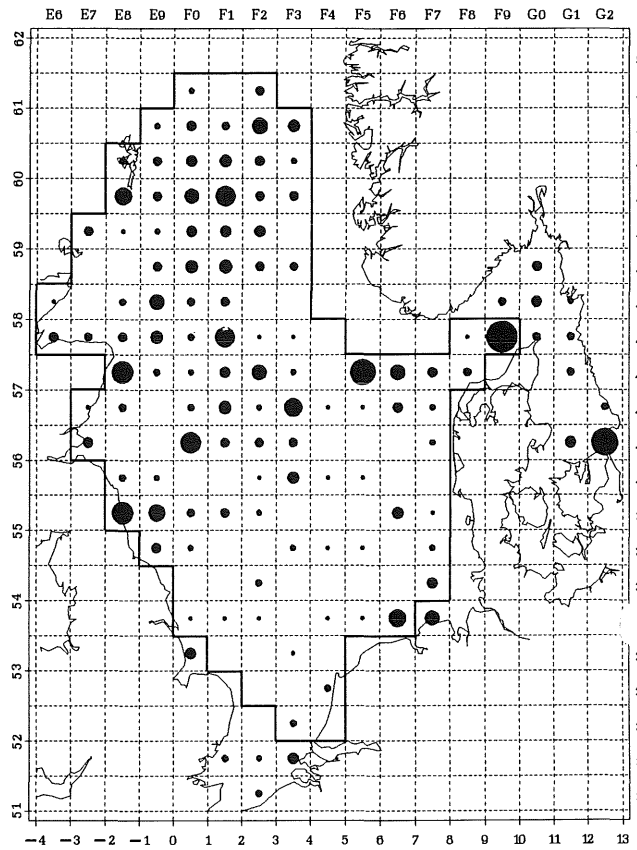


Figure 4.19 Cod: number per hour, age-group 1.

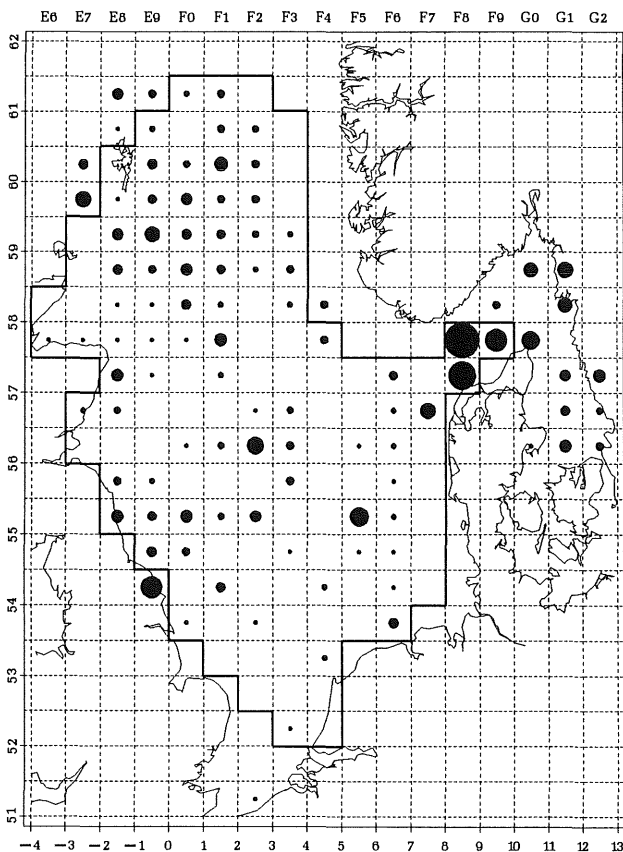
Cod, Age group 2 1992 quarter 1  
 Max mean catch number per rectangle: 71



Cod, Age group 2 1992 quarter 2  
 Max mean catch number per rectangle: 61



Cod, Age group 2 1992 quarter 3  
 Max mean catch number per rectangle: 76



Cod, Age group 2 1992 quarter 4  
 Max mean catch number per rectangle: 74

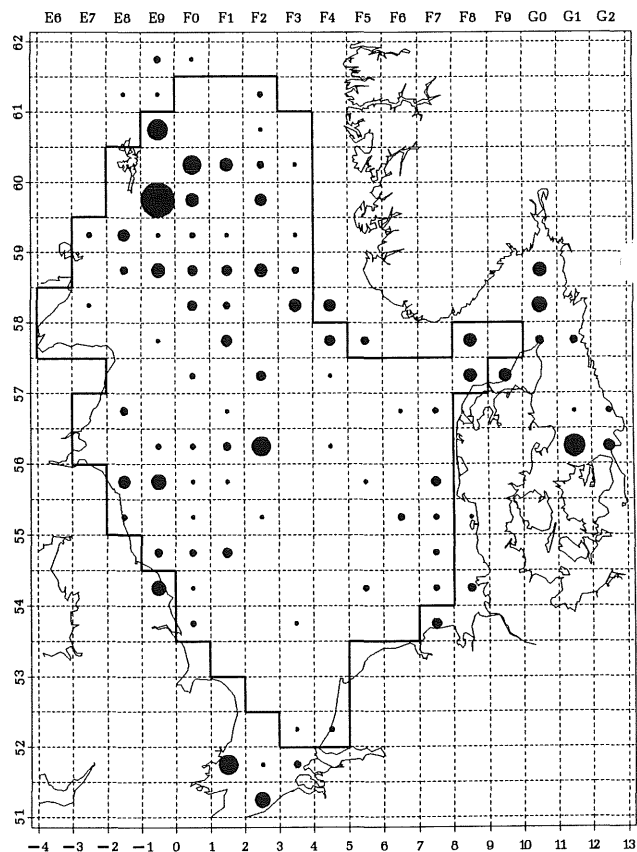
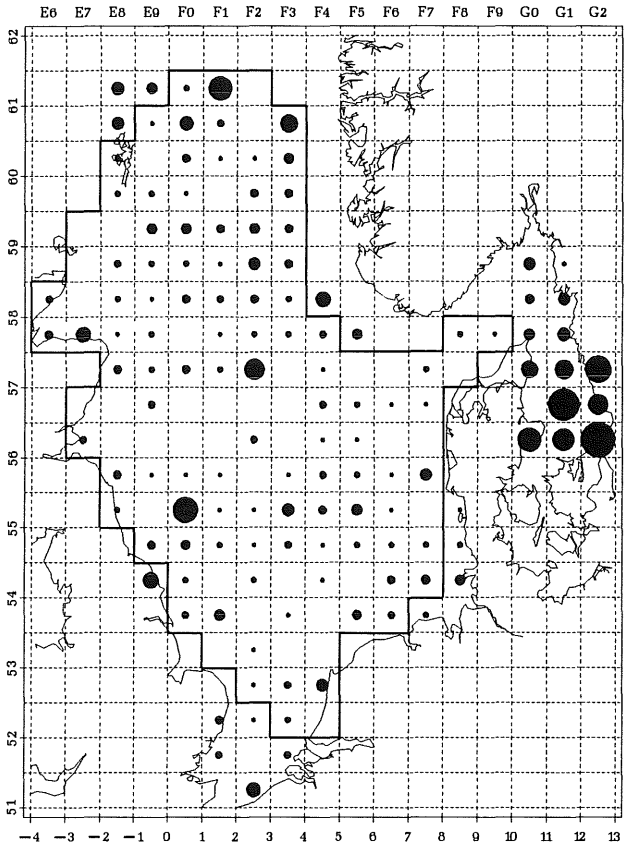
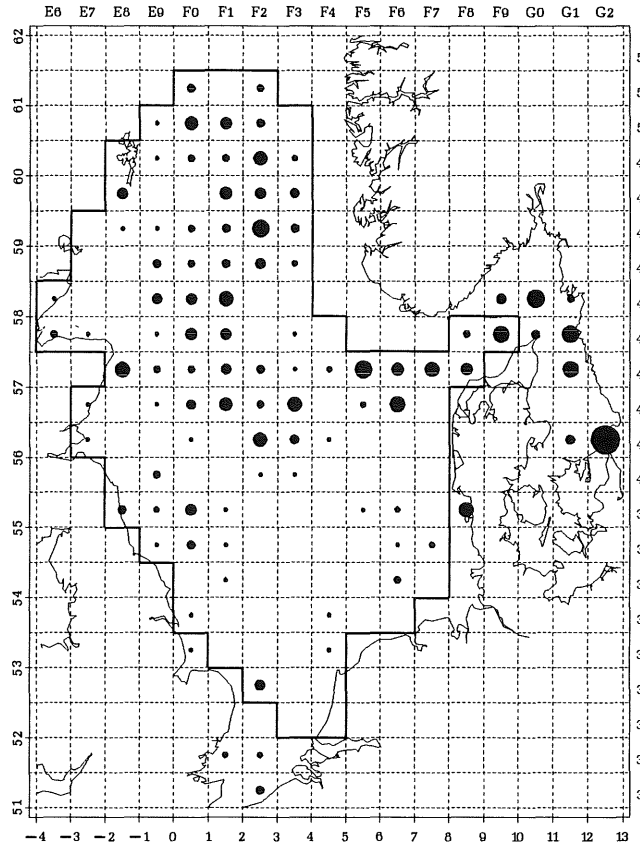


Figure 4.20 Cod: number per hour, age-group 2.

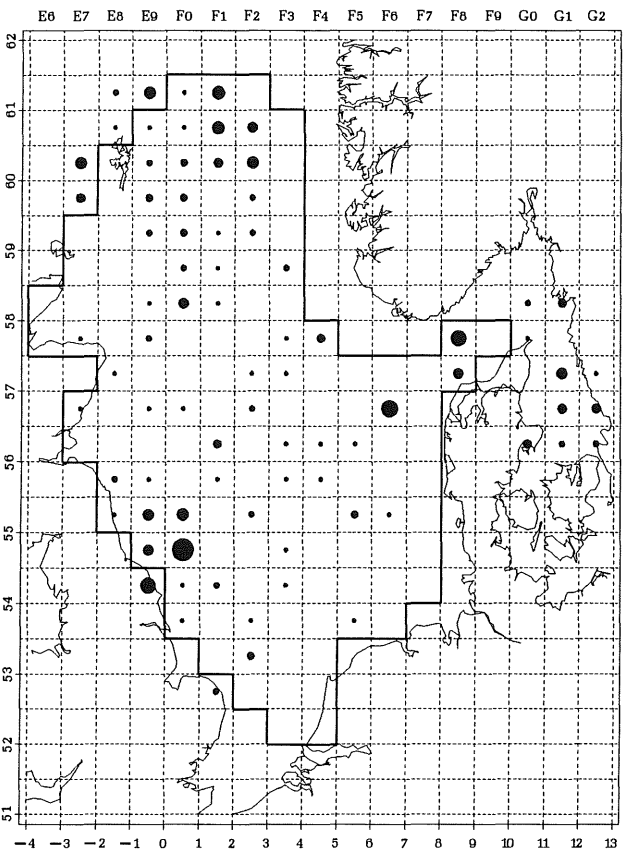
Cod, Age group 3+ 1992 quarter 1  
 Max mean catch number per rectangle: 69



Cod, Age group 3+ 1992 quarter 2  
 Max mean catch number per rectangle: 46



Cod, Age group 3+ 1992 quarter 3  
 Max mean catch number per rectangle: 27



Cod, Age group 3+ 1992 quarter 4  
 Max mean catch number per rectangle: 57

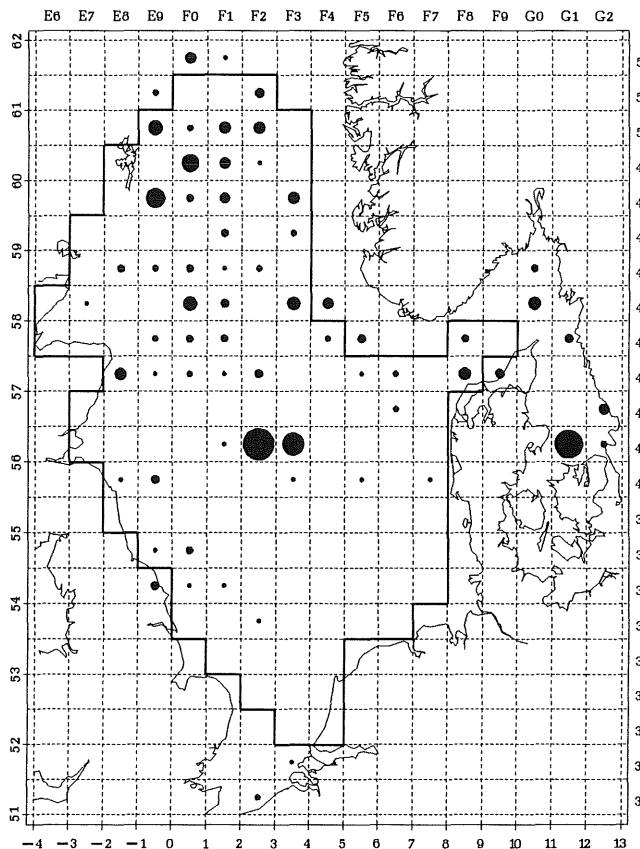
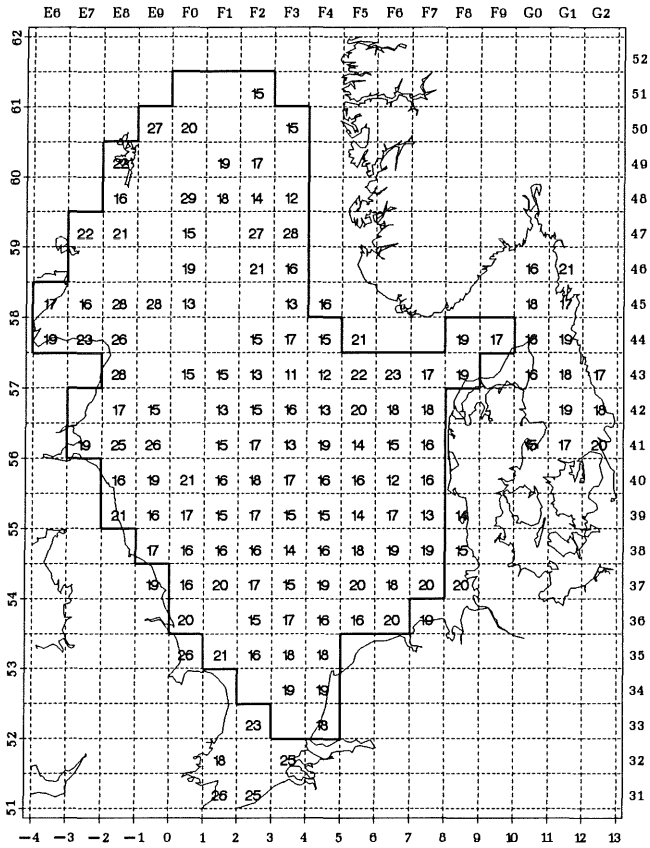
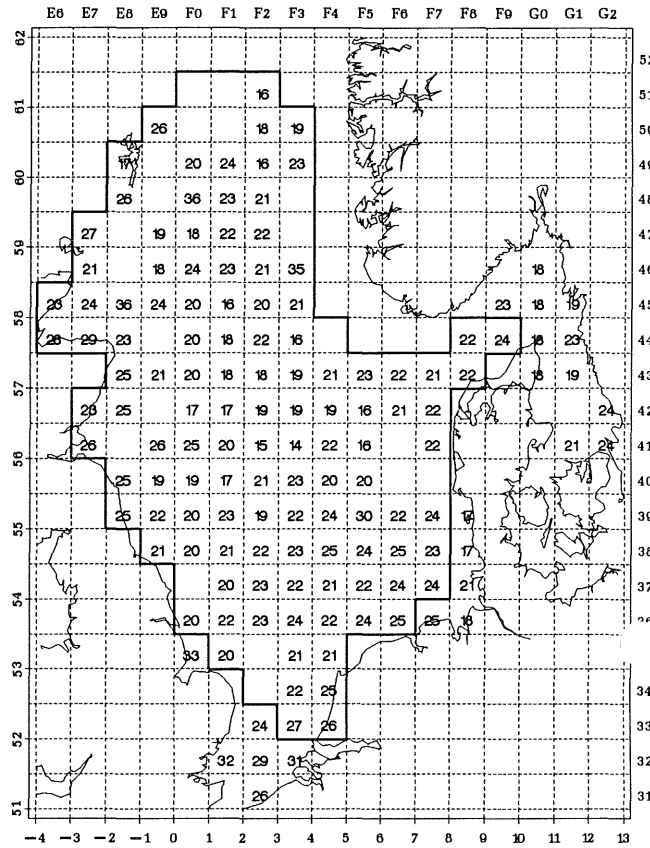


Figure 4.21 Cod: number per hour, age-group 3+.

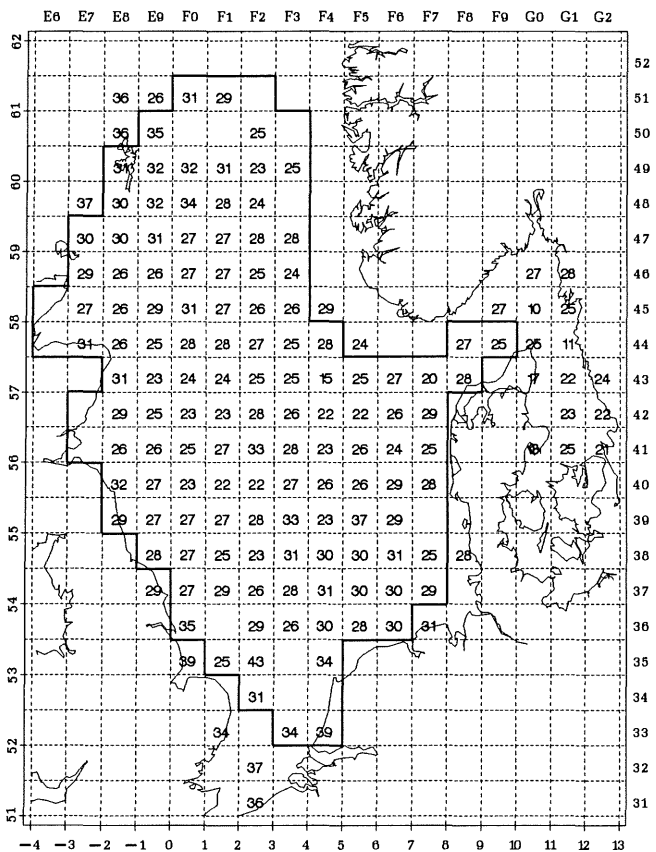
Cod, Age group 1 1992 quarter 1



Cod, Age group 1 1992 quarter 2



Cod, Age group 1 1992 quarter 3



Cod, Age group 1 1992 quarter 4

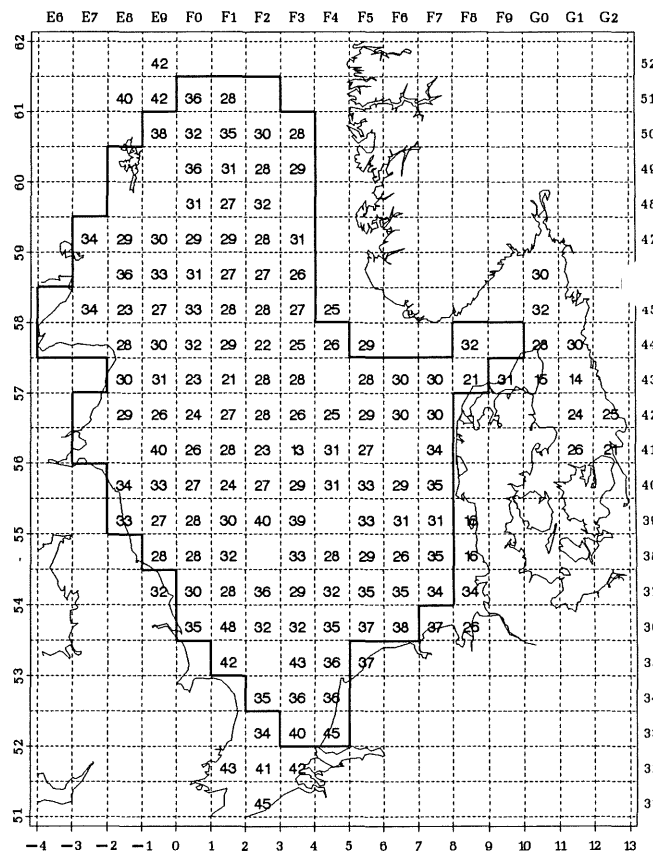
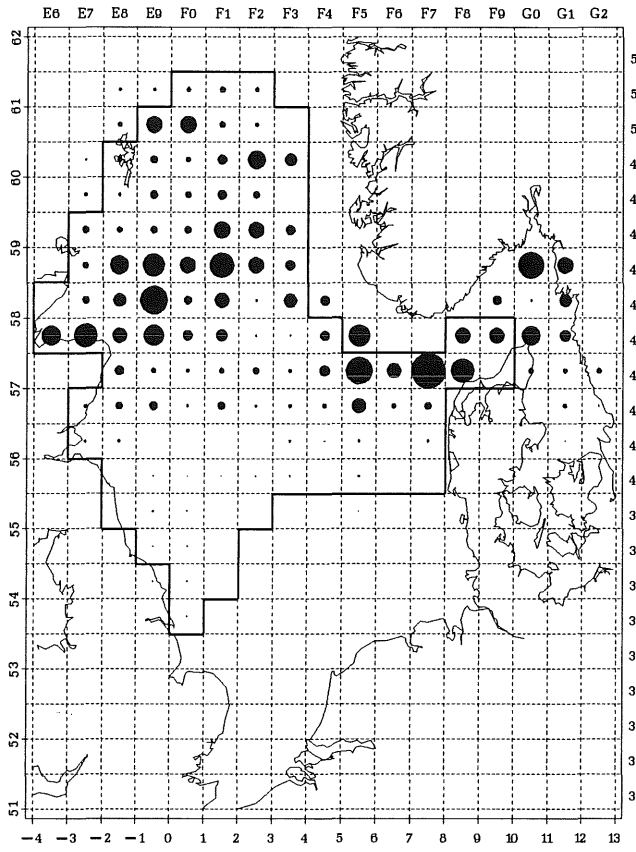


Figure 4.22 Cod: mean length (cm below), age-group 1.



Haddock, Age group 0 1992 quarter 3  
 Max mean catch number per recangle: 29181



Haddock, Age group 0 1992 quarter 4  
 Max mean catch number per recangle: 22943

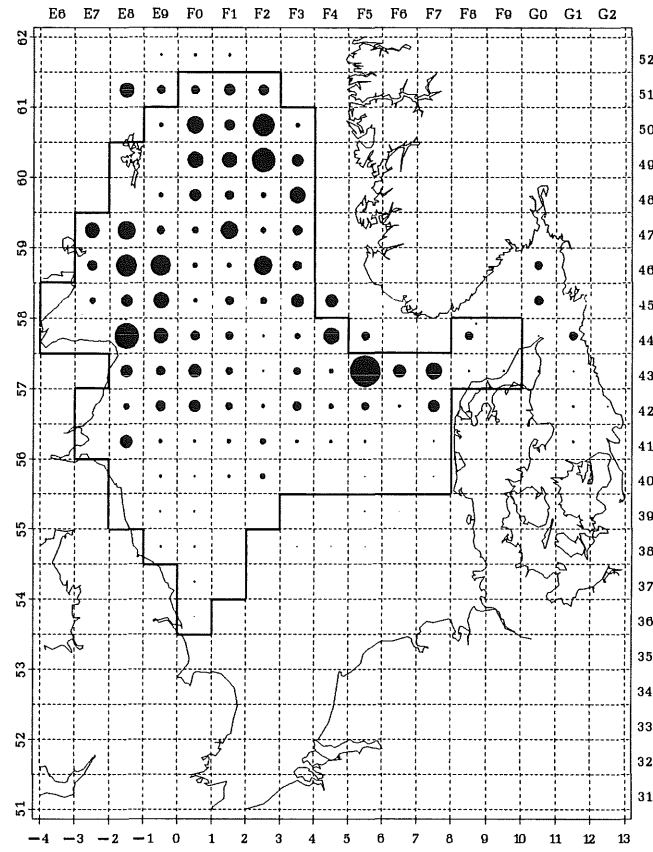
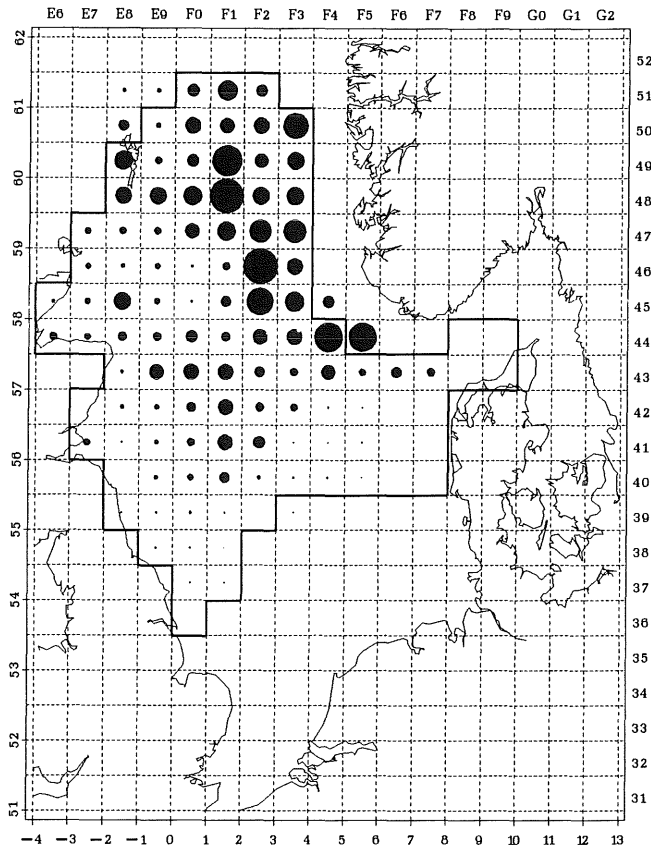
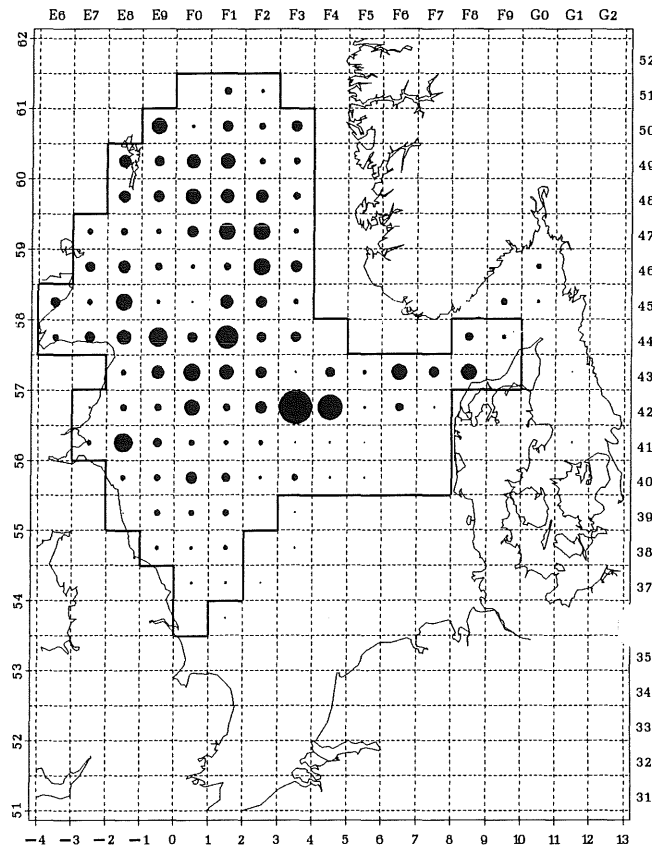


Figure 4.23 Haddock: number per hour, age-group 0.

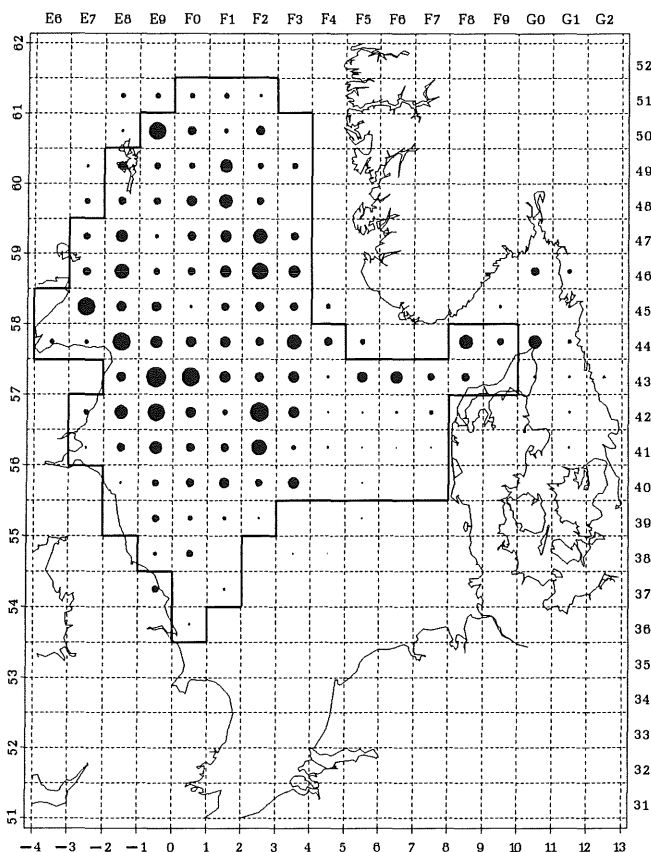
Haddock, Age group 1 1992 quarter 1  
 Max mean catch number per rectangle: 8807



Haddock, Age group 1 1992 quarter 2  
 Max mean catch number per rectangle: 7978



Haddock, Age group 1 1992 quarter 3  
 Max mean catch number per rectangle: 2746



Haddock, Age group 1 1992 quarter 4  
 Max mean catch number per rectangle: 5663

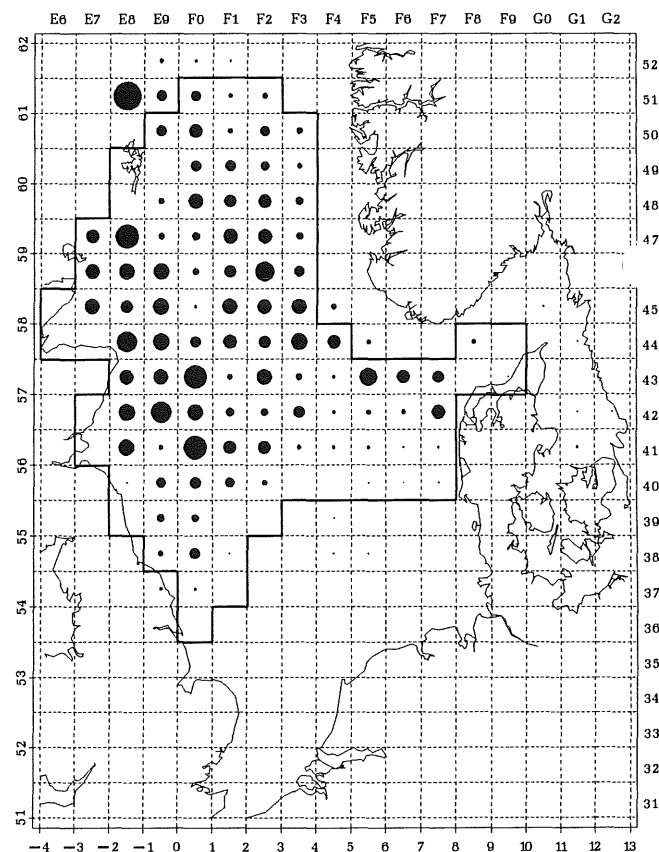
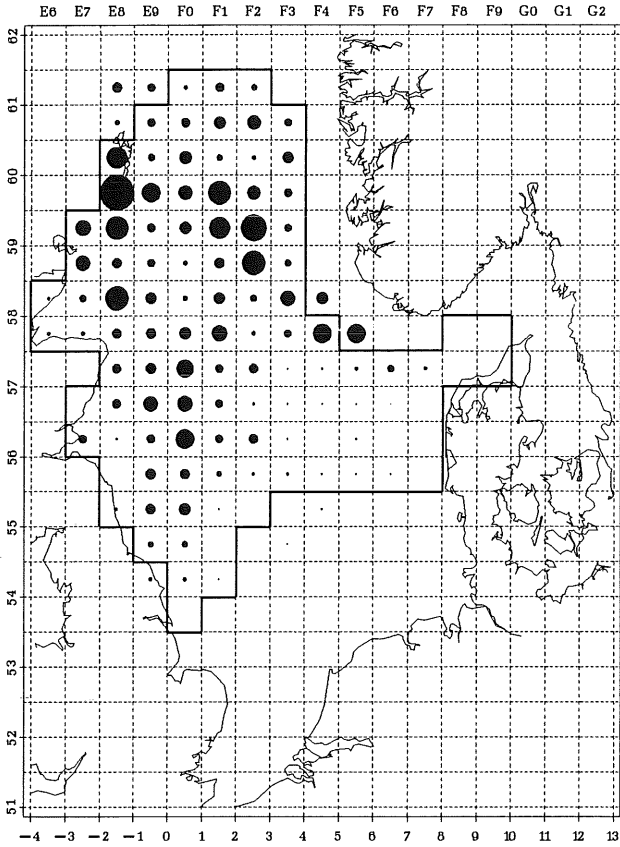
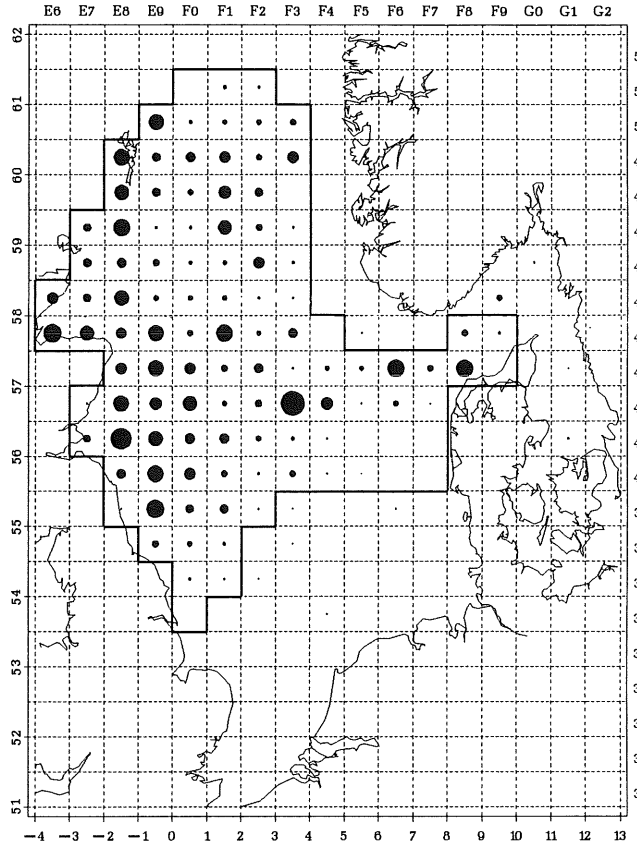


Figure 4.24 Haddock: number per hour, age-group 1.

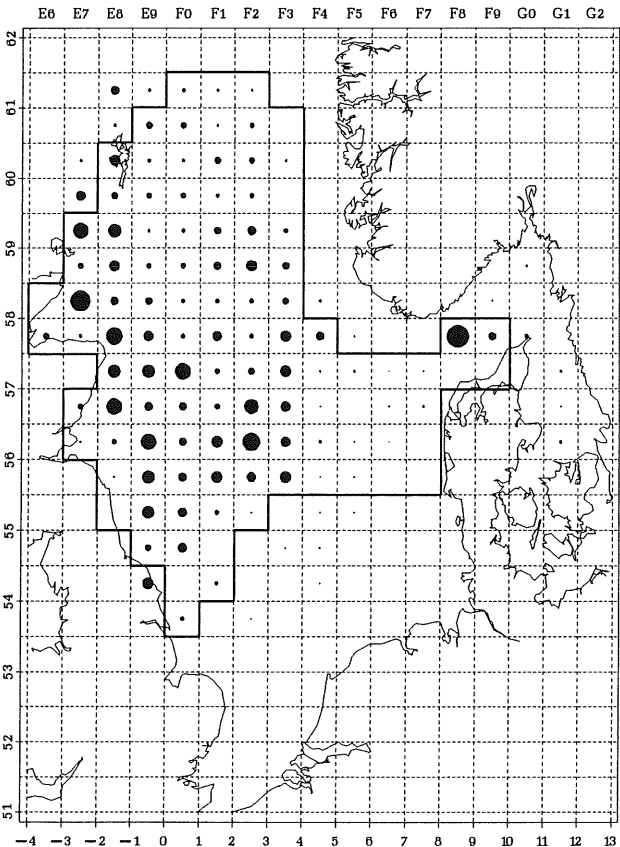
Haddock, Age group 2 1992 quarter 1  
 Max mean catch number per recangle: 3639



Haddock, Age group 2 1992 quarter 2  
 Max mean catch number per recangle: 1724



Haddock, Age group 2 1992 quarter 3  
 Max mean catch number per recangle: 1420



Haddock, Age group 2 1992 quarter 4  
 Max mean catch number per recangle: 1188

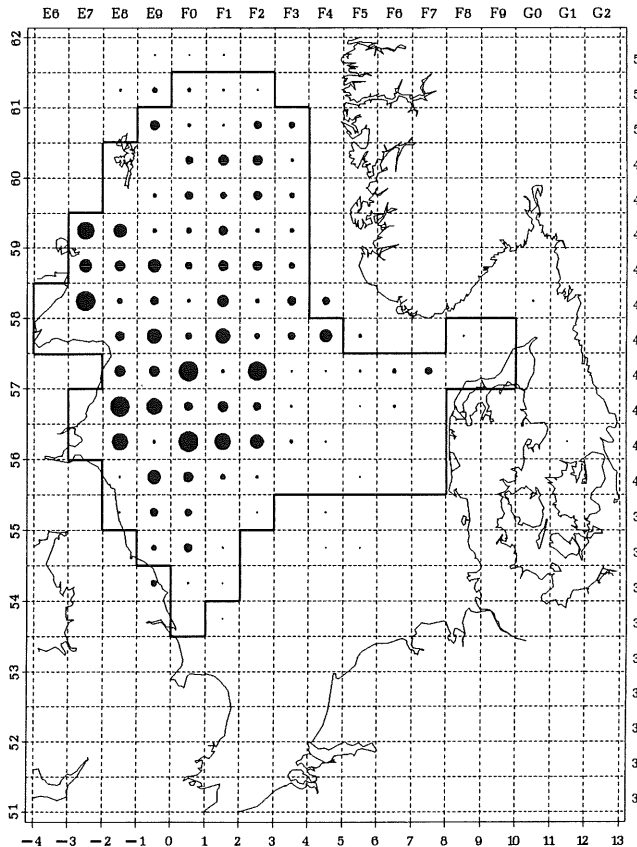
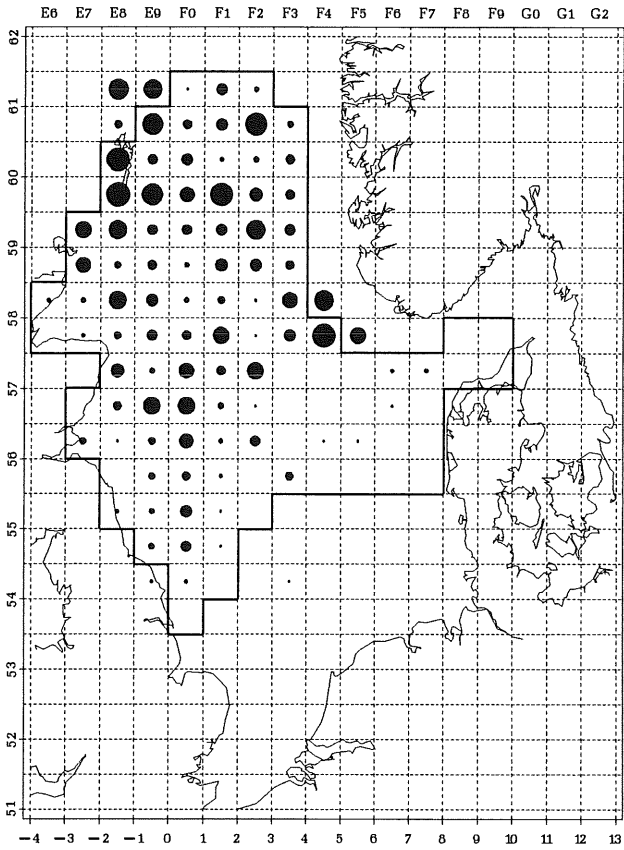
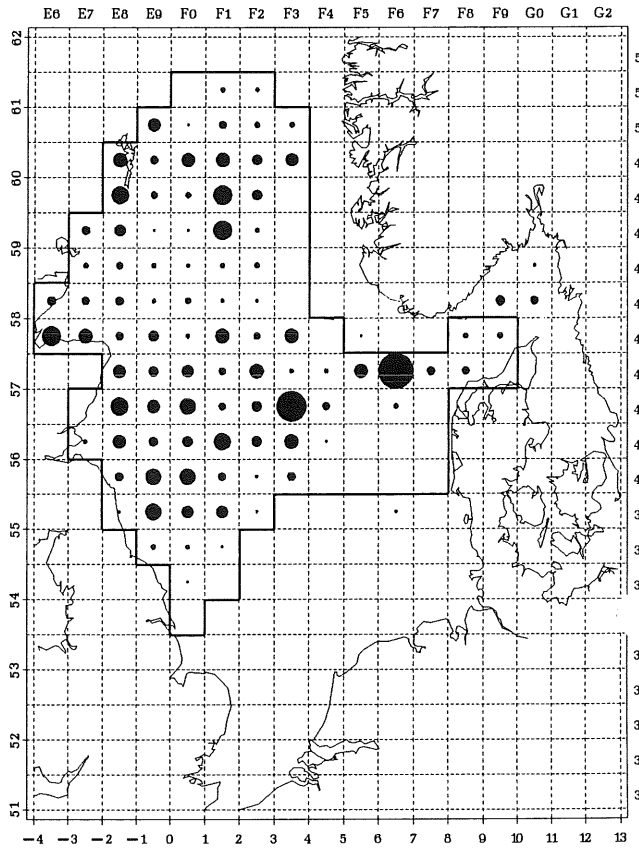


Figure 4.25 Haddock: number per hour, age-group 2.

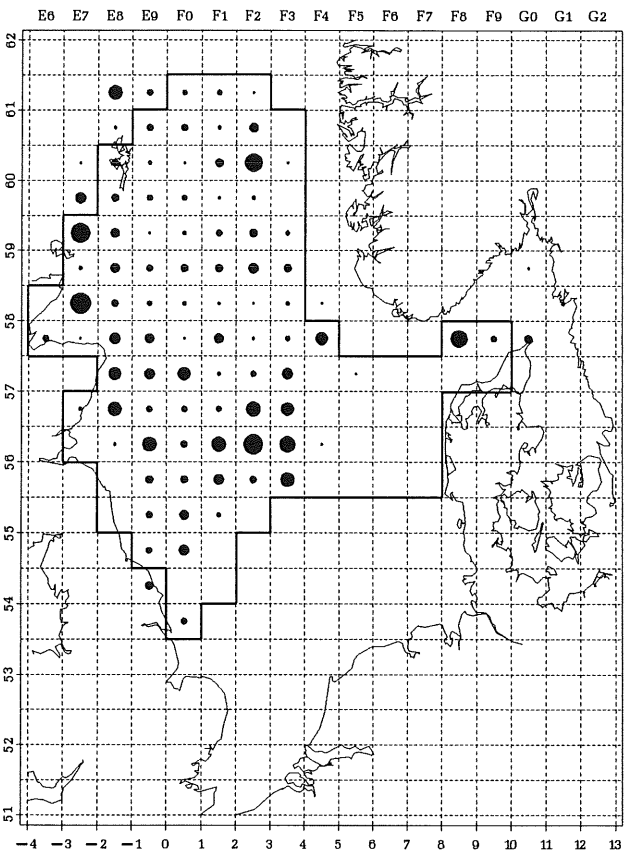
Haddock, Age group 3+ 1992 quarter 1  
Max mean catch number per recangle: 127



Haddock, Age group 3+ 1992 quarter 2  
Max mean catch number per recangle: 268



Haddock, Age group 3+ 1992 quarter 3  
Max mean catch number per recangle: 93



Haddock, Age group 3+ 1992 quarter 4  
Max mean catch number per recangle: 84

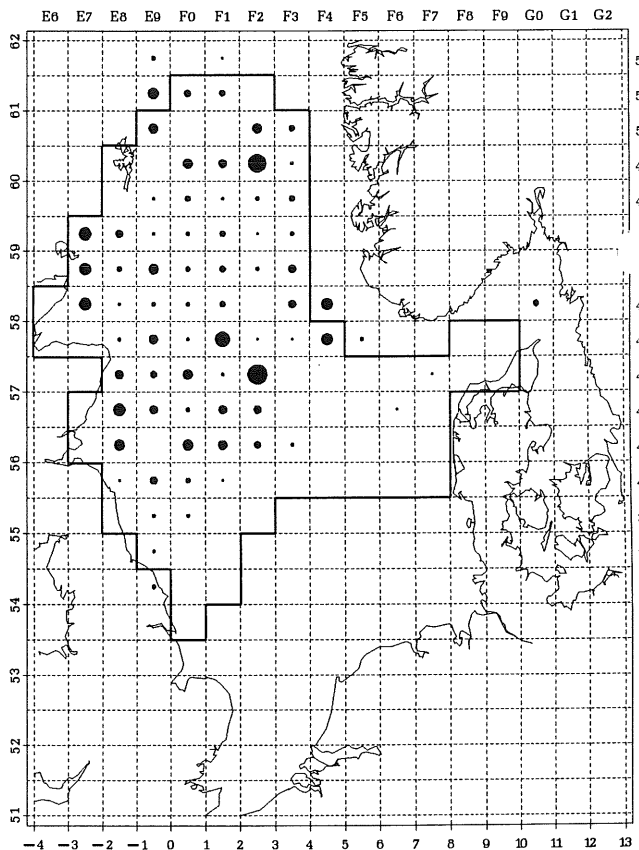
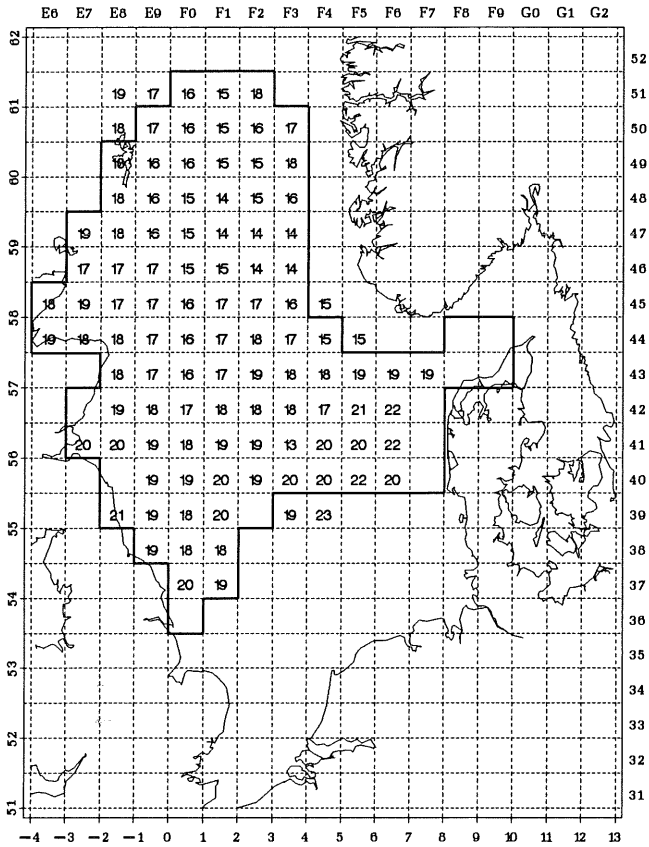
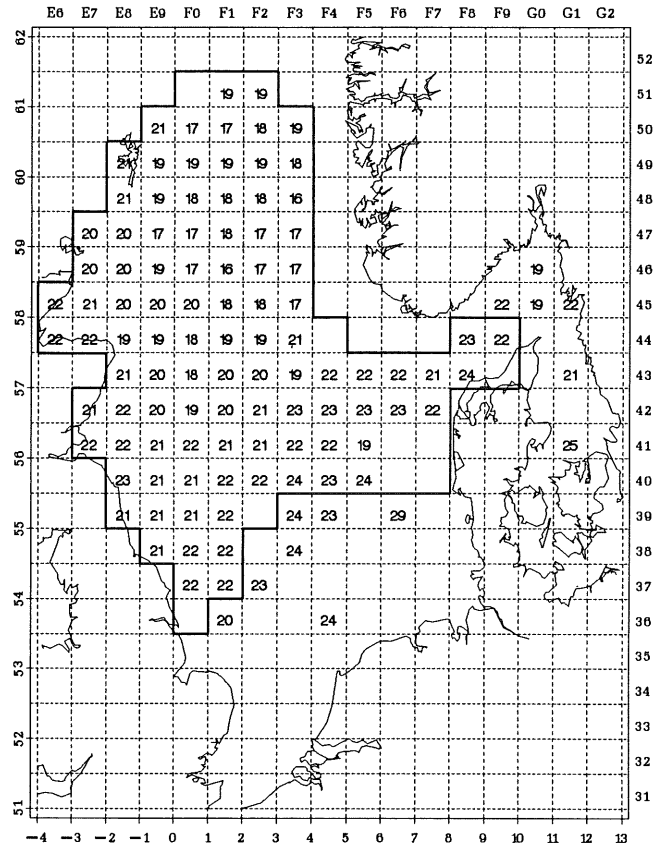


Figure 4.26 Haddock: number per hour, age-group 3+.

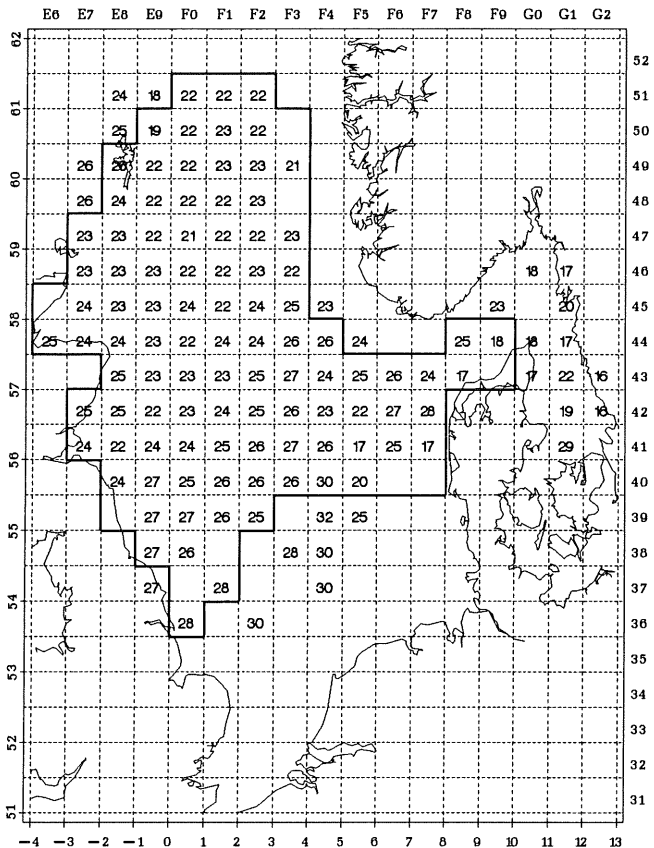
Haddock, Age group 1 1992 quarter 1



Haddock, Age group 1 1992 quarter 2



Haddock, Age group 1 1992 quarter 3



Haddock, Age group 1 1992 quarter 4

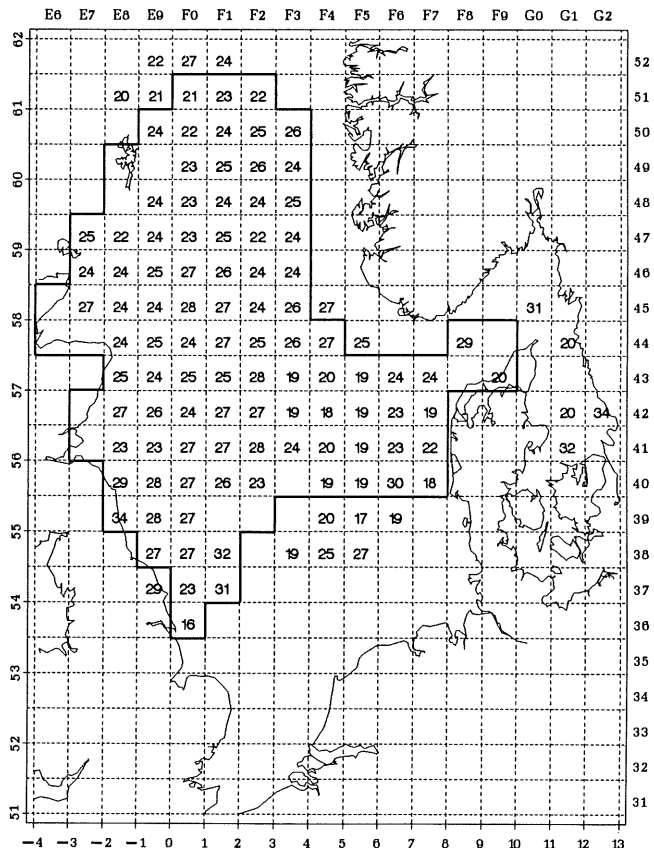
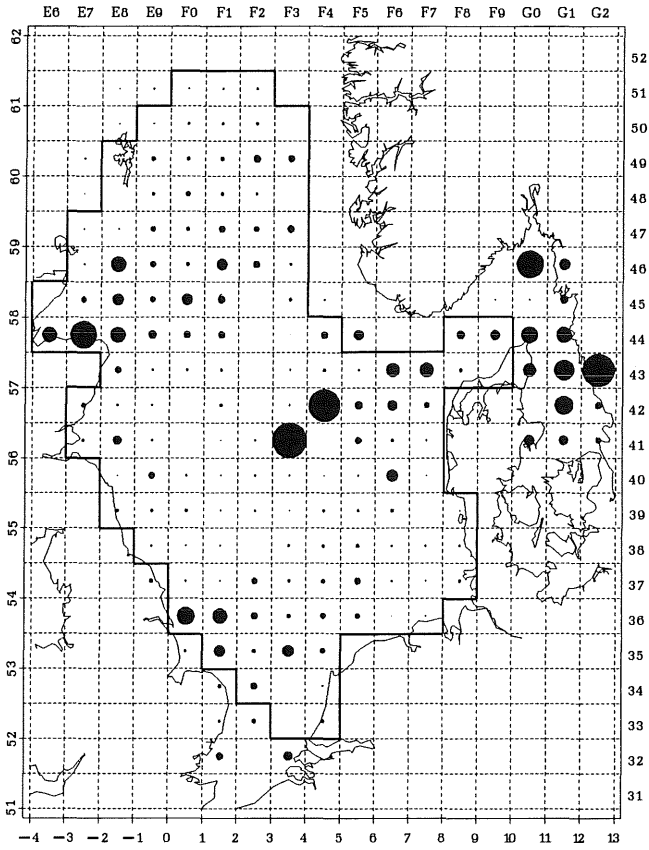


Figure 4.27 Haddock: mean length (cm below), age-group 1.

Whiting, Age group 0 1992 quarter 3  
Max mean catch number per recangle: 33840



Whiting, Age group 0 1992 quarter 4  
Max mean catch number per recangle: 30532

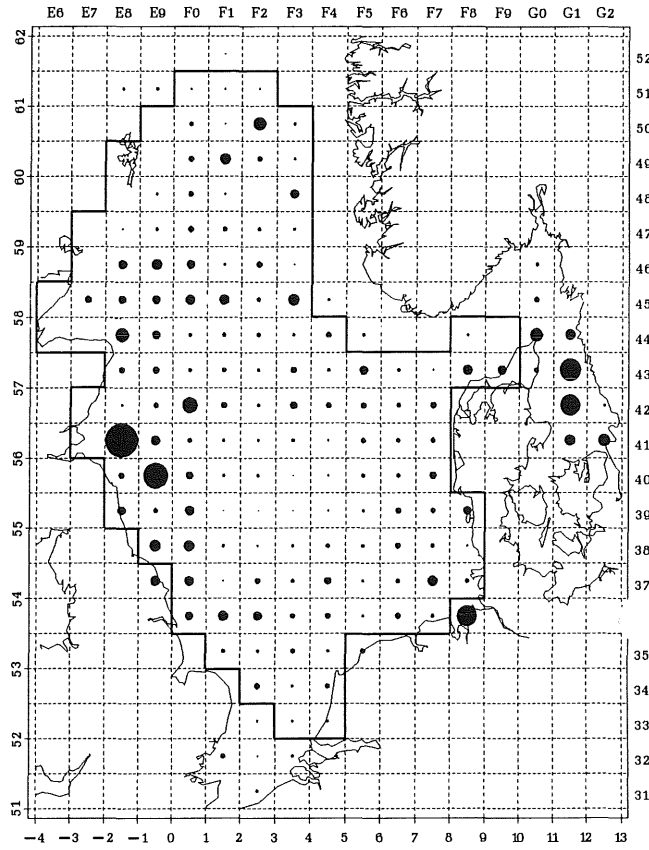
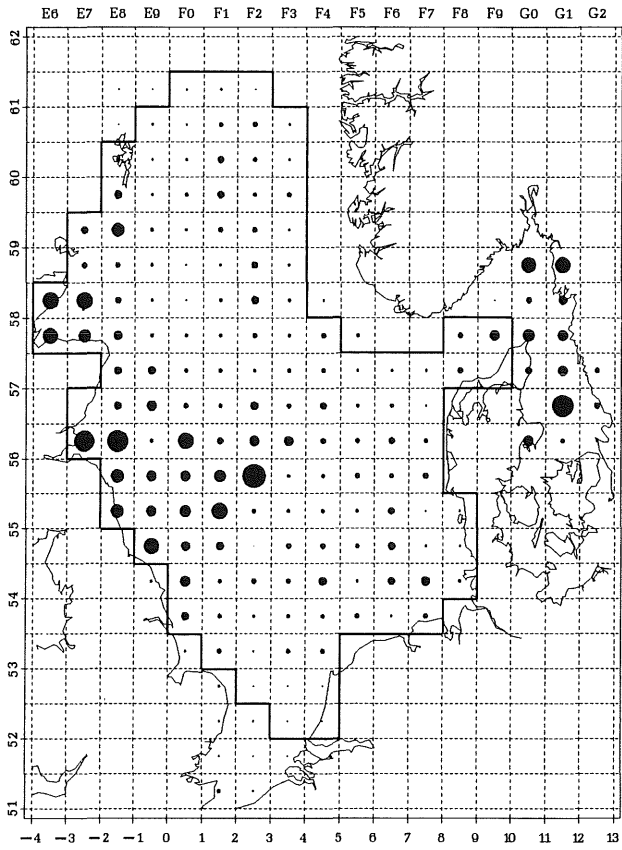
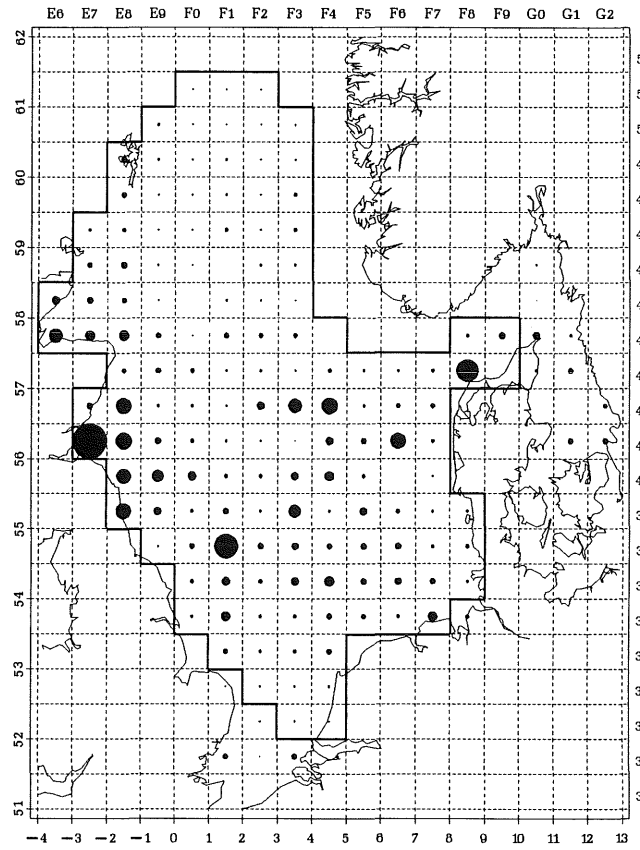


Figure 4.28 Whiting: number per hour, age-group 0.

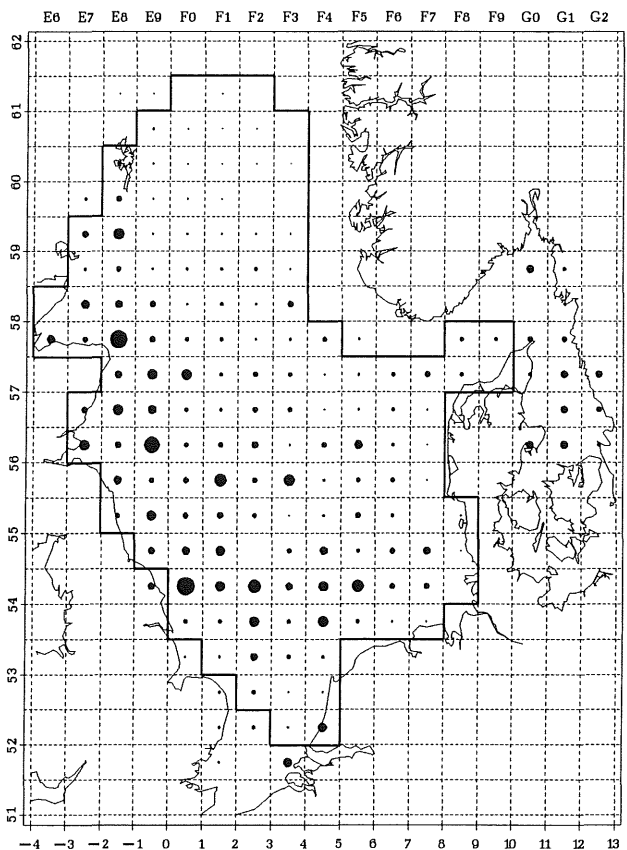
Whiting, Age group 1 1992 quarter 1  
 Max mean catch number per recangle: 10106



Whiting, Age group 1 1992 quarter 2  
 Max mean catch number per recangle: 22013



Whiting, Age group 1 1992 quarter 3  
 Max mean catch number per recangle: 5641



Whiting, Age group 1 1992 quarter 4  
 Max mean catch number per recangle: 8810

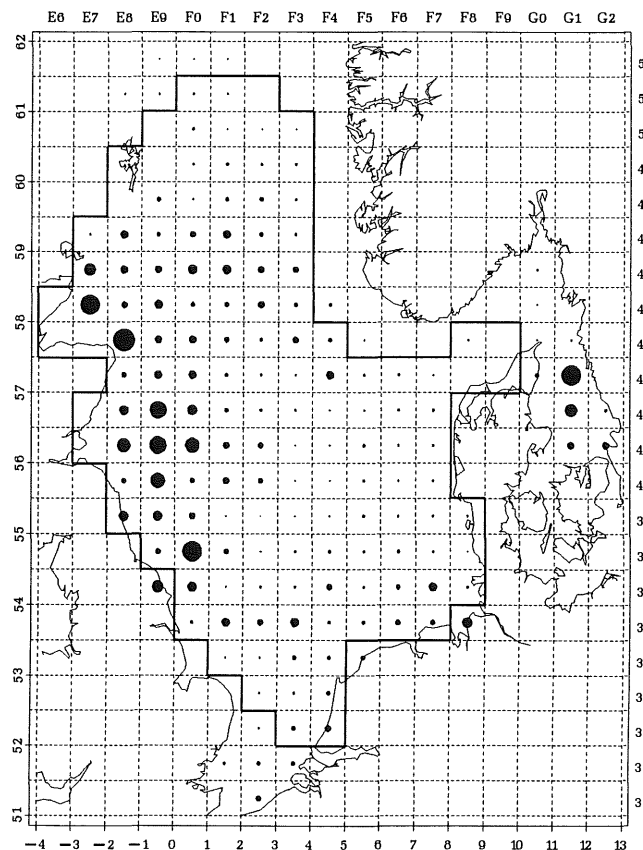
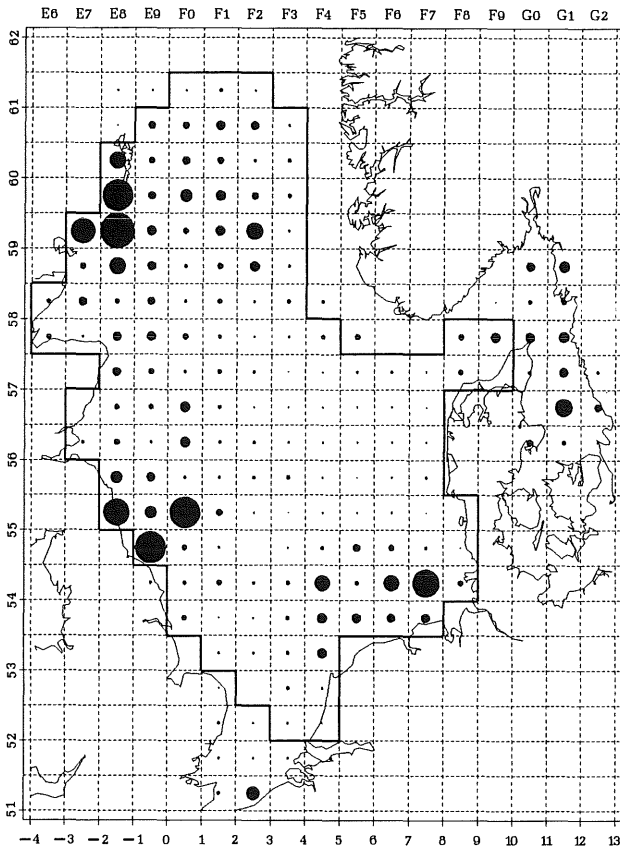
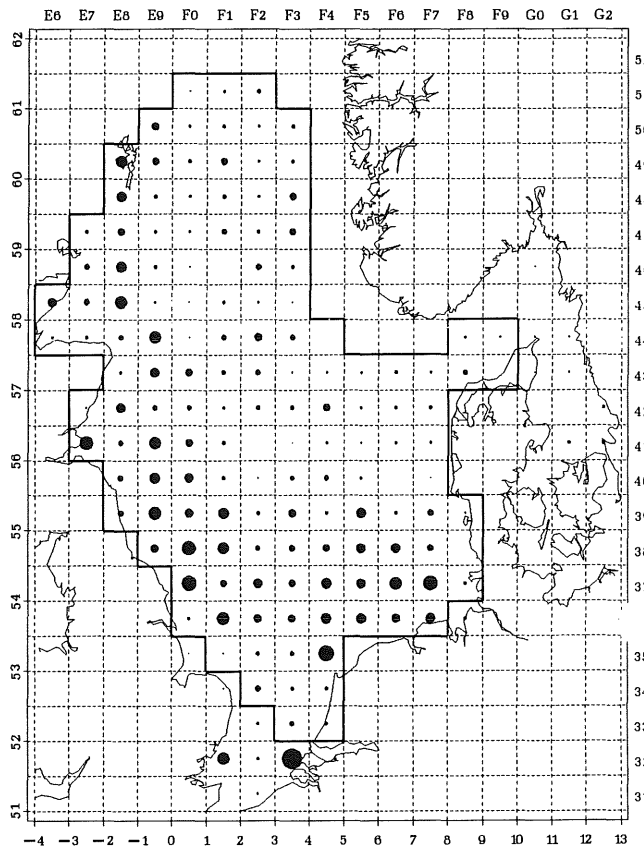


Figure 4.29 Whiting: number per hour, age-group 1.

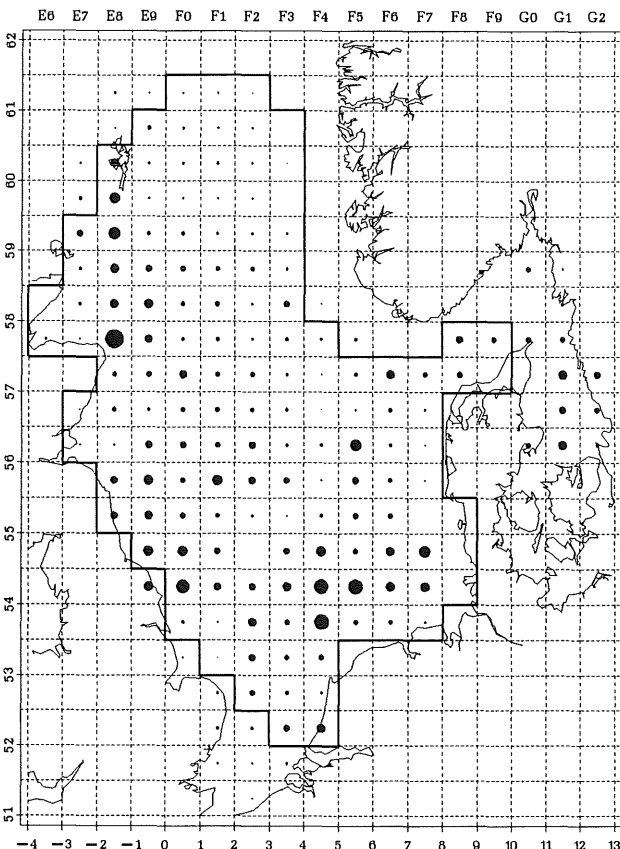
Whiting, Age group 2 1992 quarter 1  
 Max mean catch number per recangle: 10762



Whiting, Age group 2 1992 quarter 2  
 Max mean catch number per recangle: 3631



Whiting, Age group 2 1992 quarter 3  
 Max mean catch number per recangle: 2985



Whiting, Age group 2 1992 quarter 4  
 Max mean catch number per recangle: 4865

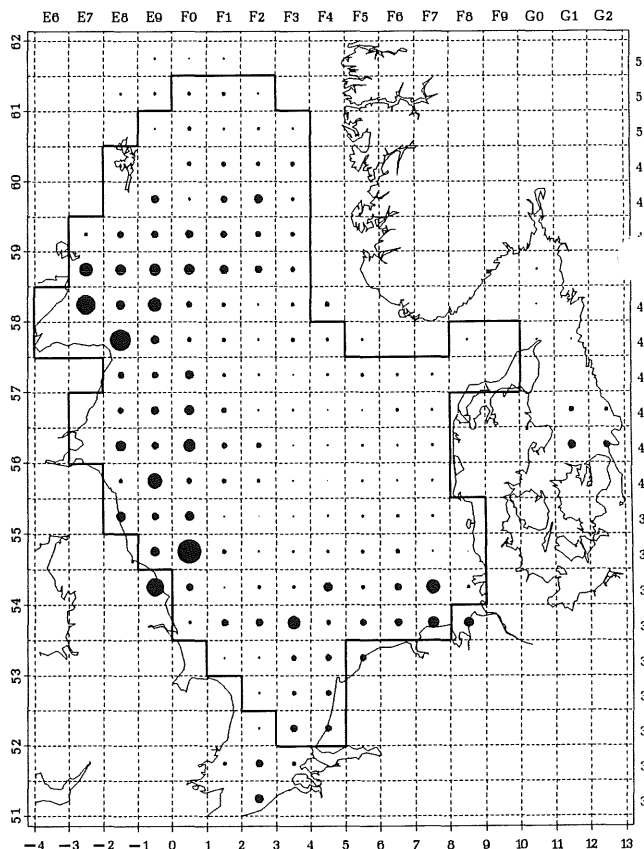
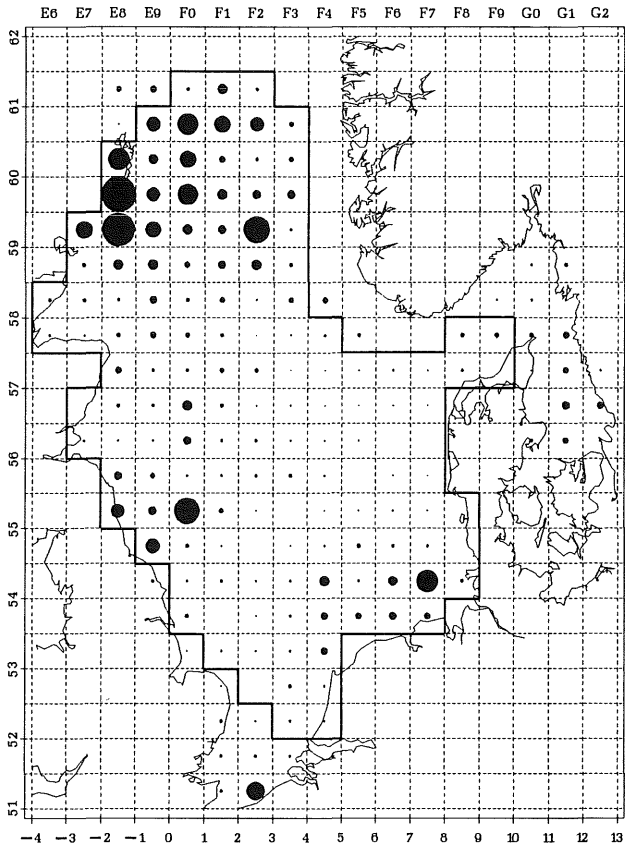


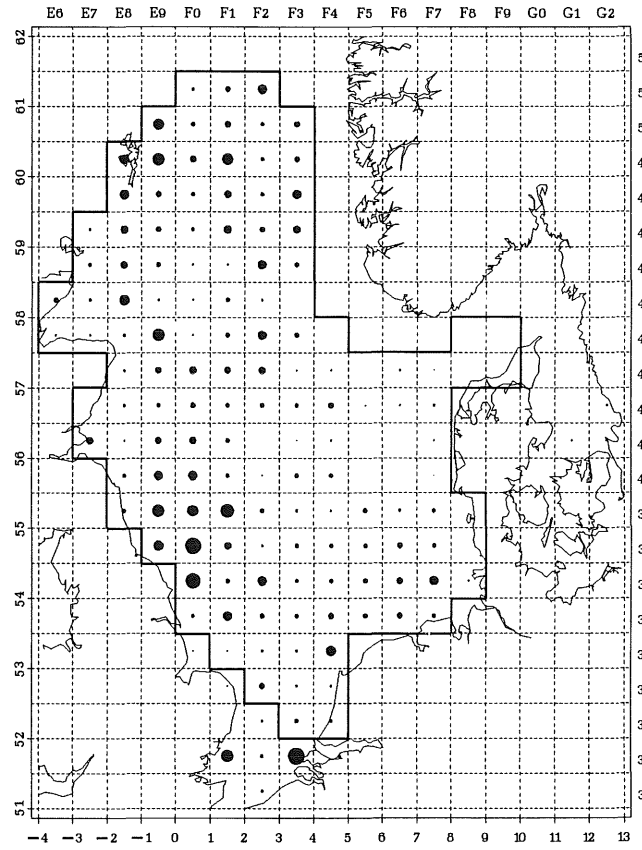
Figure 4.30 Whiting: number per hour, age-group 2.



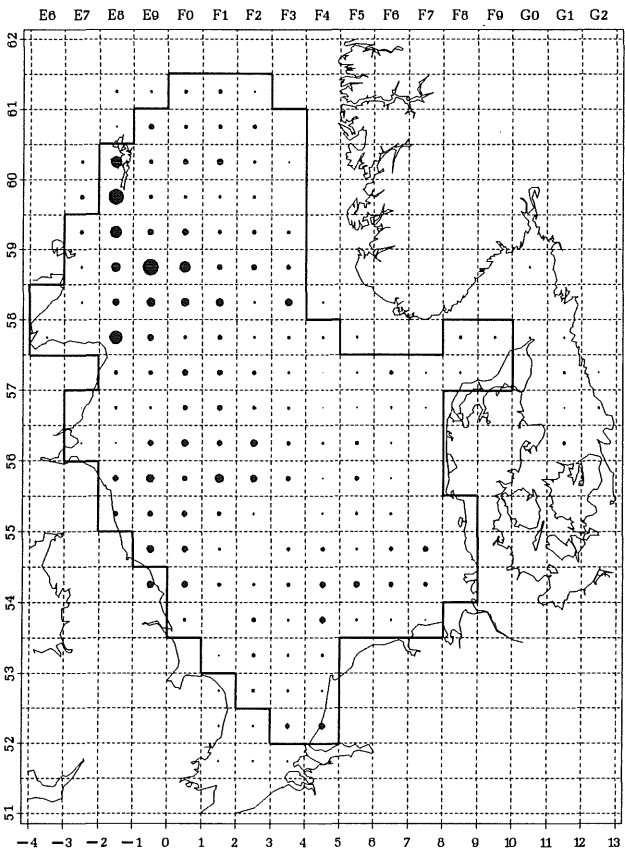
Whiting, Age group 3+ 1992 quarter 1  
 Max mean catch number per recangle: 7861



Whiting, Age group 3+ 1992 quarter 2  
 Max mean catch number per recangle: 1733



Whiting, Age group 3+ 1992 quarter 3  
 Max mean catch number per recangle: 1568



Whiting, Age group 3+ 1992 quarter 4  
 Max mean catch number per recangle: 2170

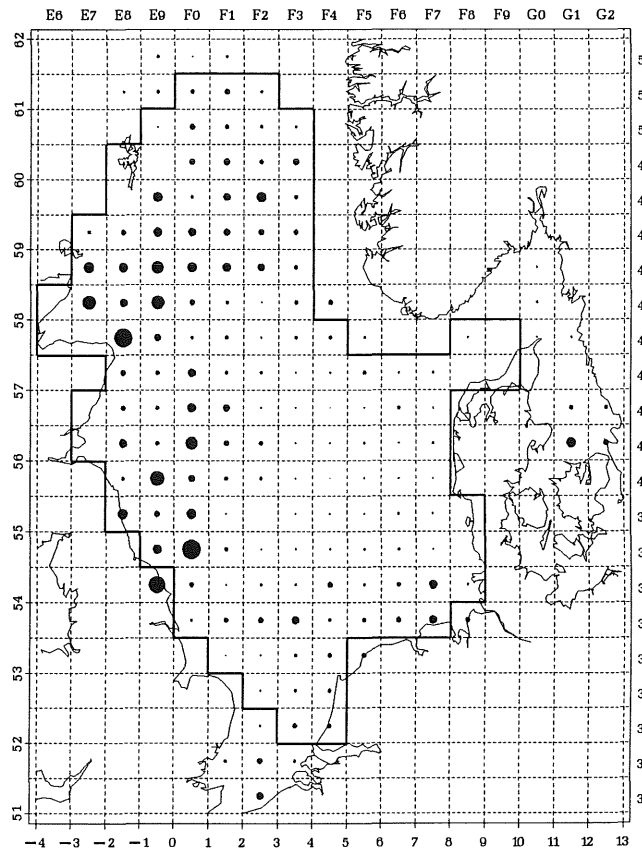
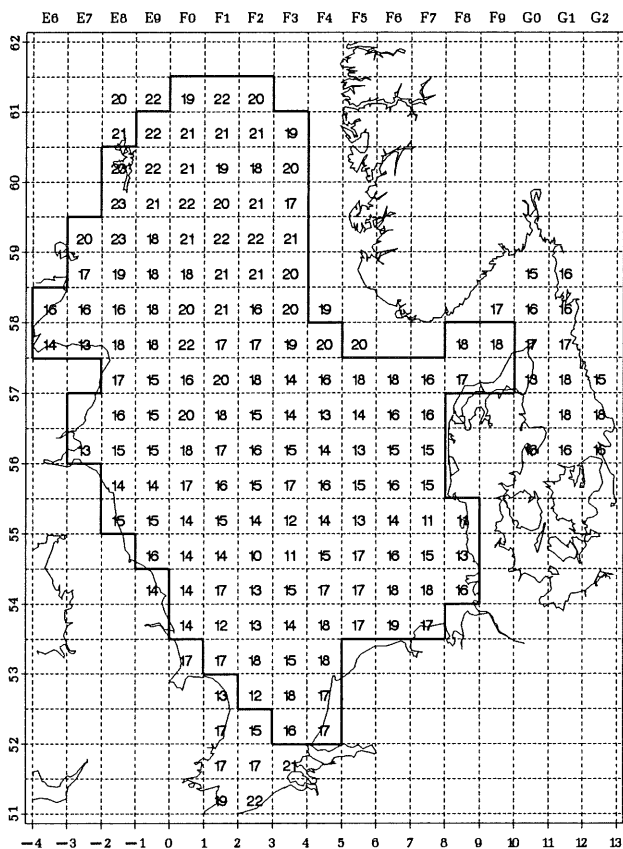
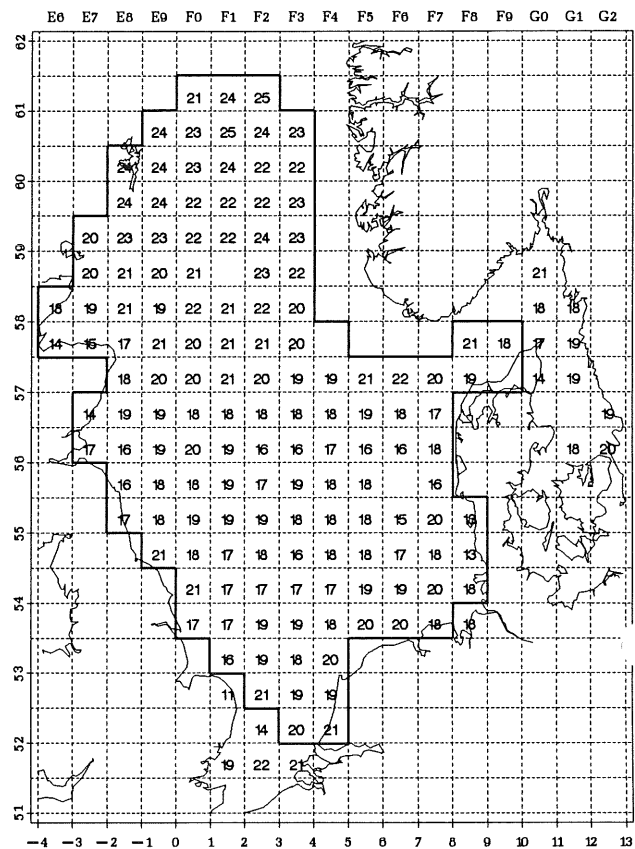


Figure 4.31 Whiting: number per hour, age-group 3+.

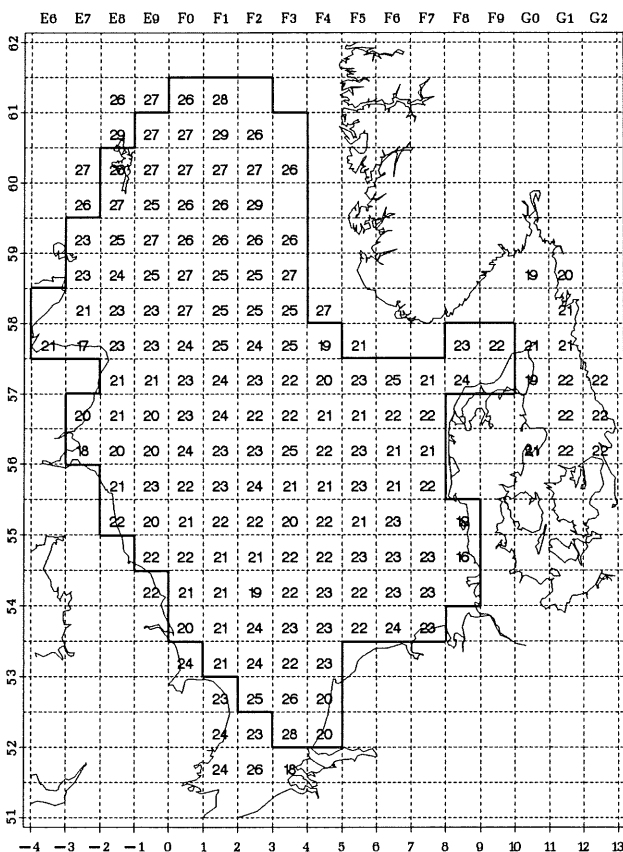
Whiting, Age group 1 1992 quarter 1



Whiting, Age group 1 1992 quarter 2



Whiting, Age group 1 1992 quarter 3



Whiting, Age group 1 1992 quarter 4

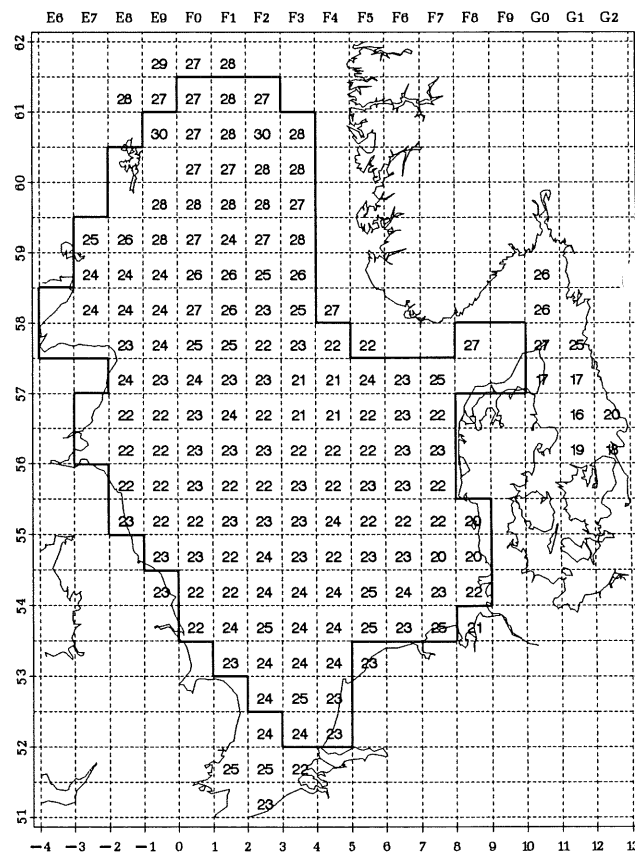
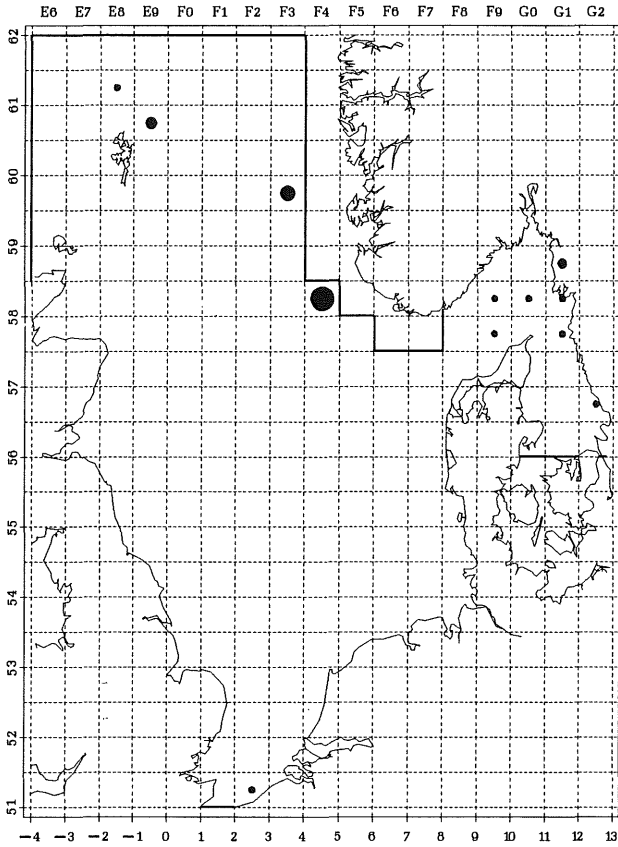
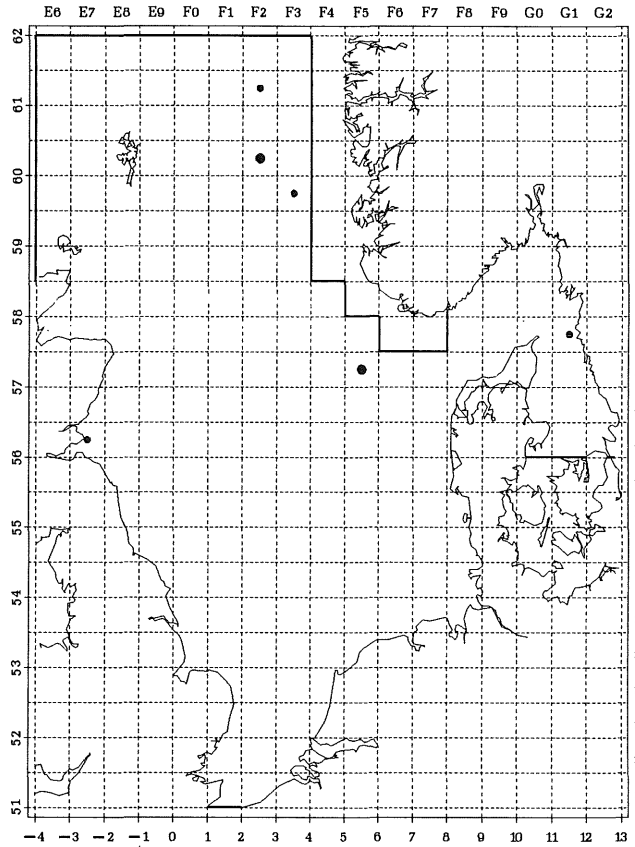


Figure 4.32 Whiting: mean length (cm below), age-group 1.

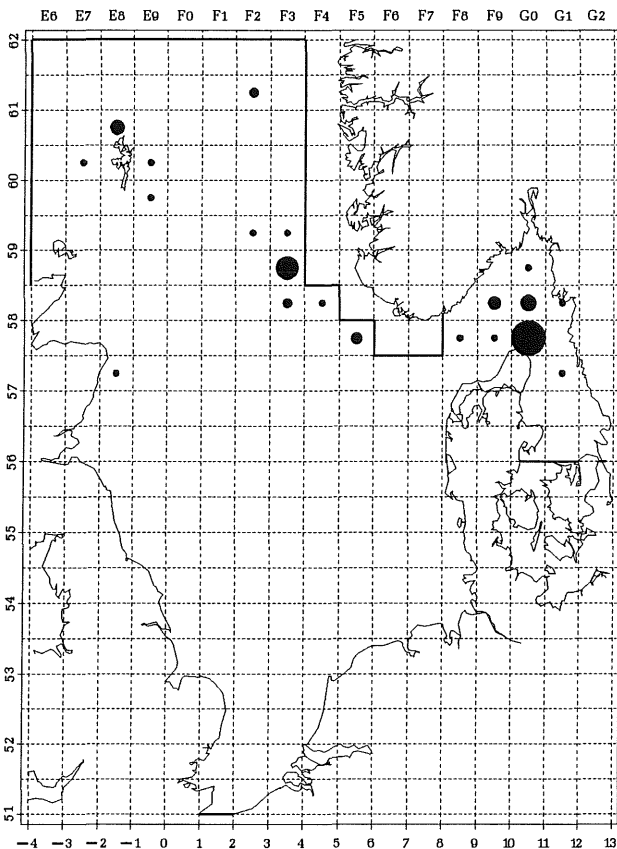
Saithe, Age group 2 1992 quarter 1  
 Max mean catch number per recangle: 13



Saithe, Age group 2 1992 quarter 2  
 Max mean catch number per recangle: 2



Saithe, Age group 2 1992 quarter 3  
 Max mean catch number per recangle: 28



Saithe, Age group 2 1992 quarter 4  
 Max mean catch number per recangle: 9

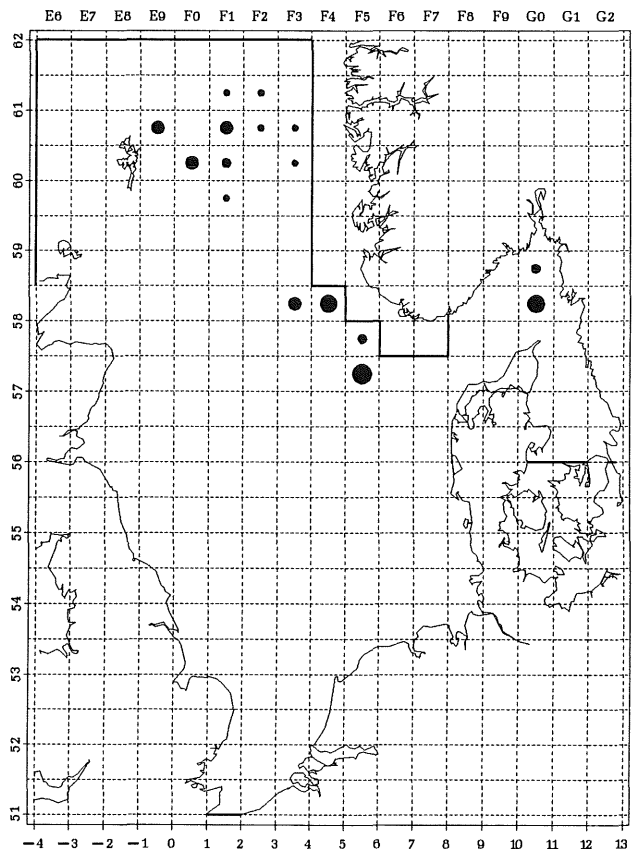
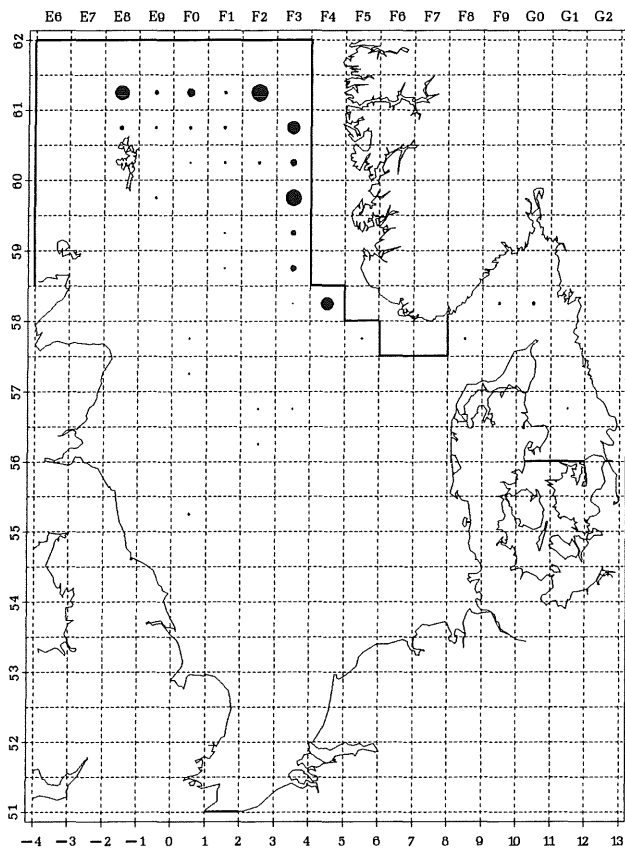
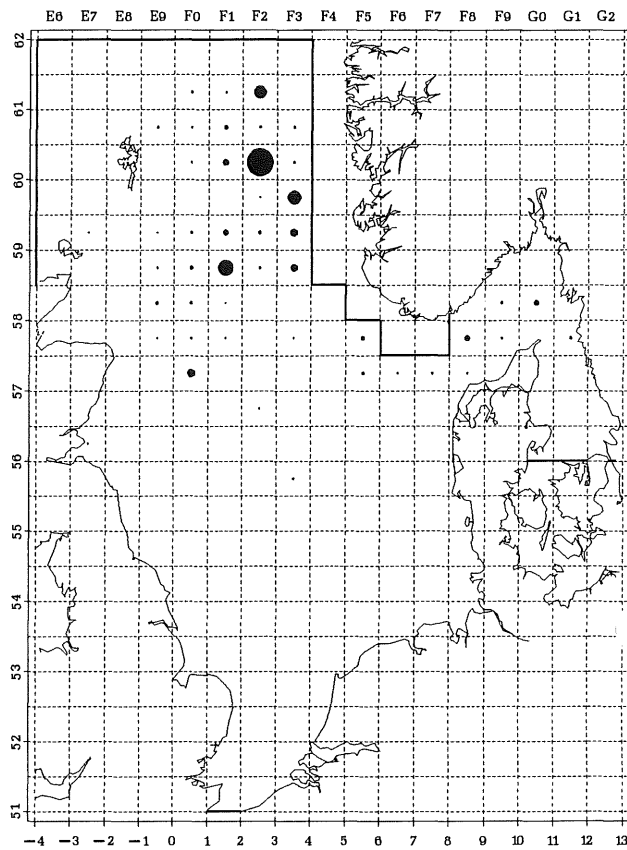


Figure 4.33 Saithe: number per hour, age-group 2.

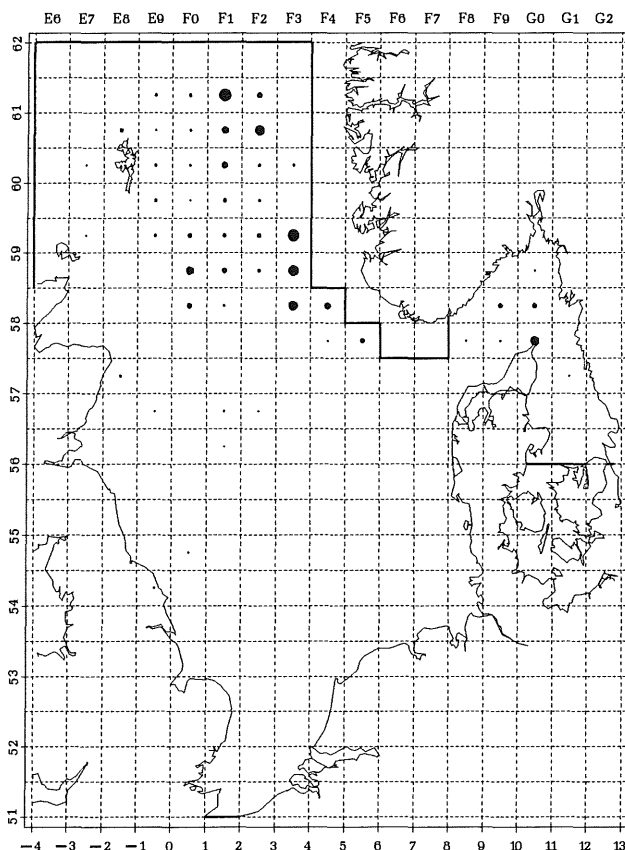
Saithe, Age group 3+ 1992 quarter 1  
 Max mean catch number per recangle: 233



Saithe, Age group 3+ 1992 quarter 2  
 Max mean catch number per recangle: 624



Saithe, Age group 3+ 1992 quarter 3  
 Max mean catch number per recangle: 122



Saithe, Age group 3+ 1992 quarter 4  
 Max mean catch number per recangle: 1032

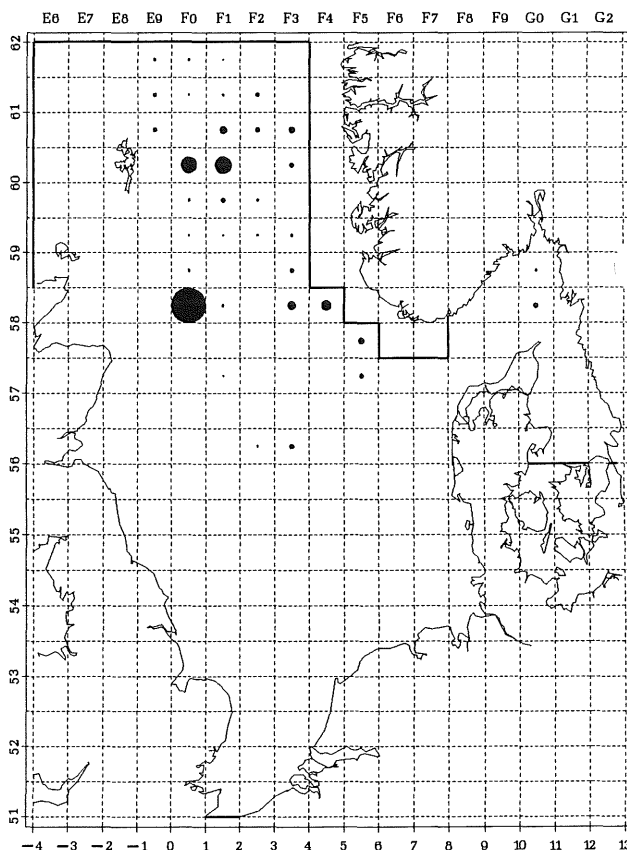
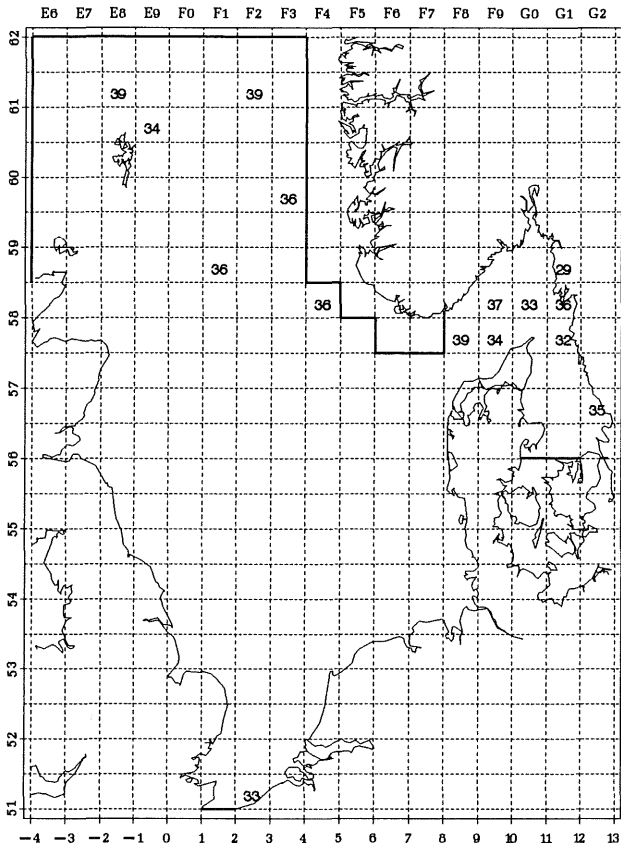
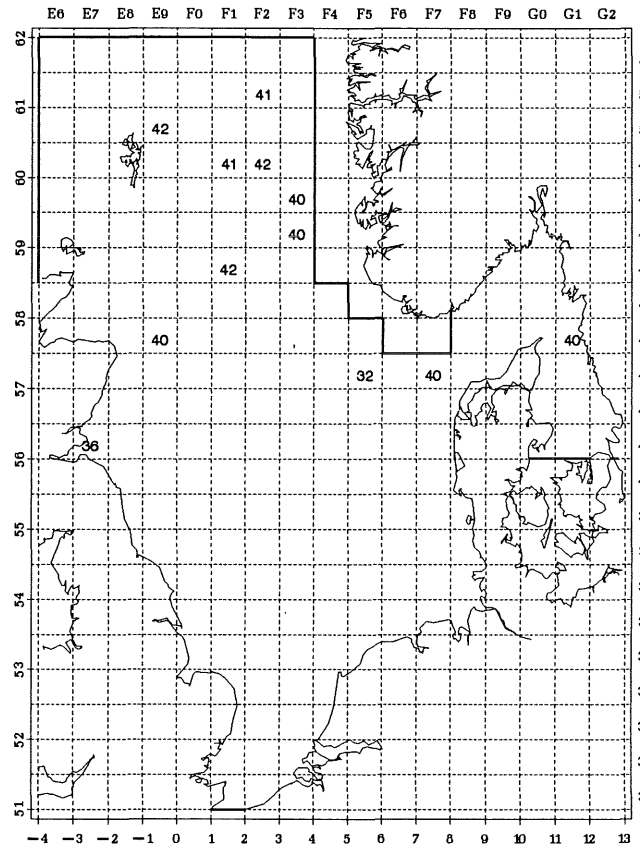


Figure 4.34 Saithe: number per hour, age-group 3+.

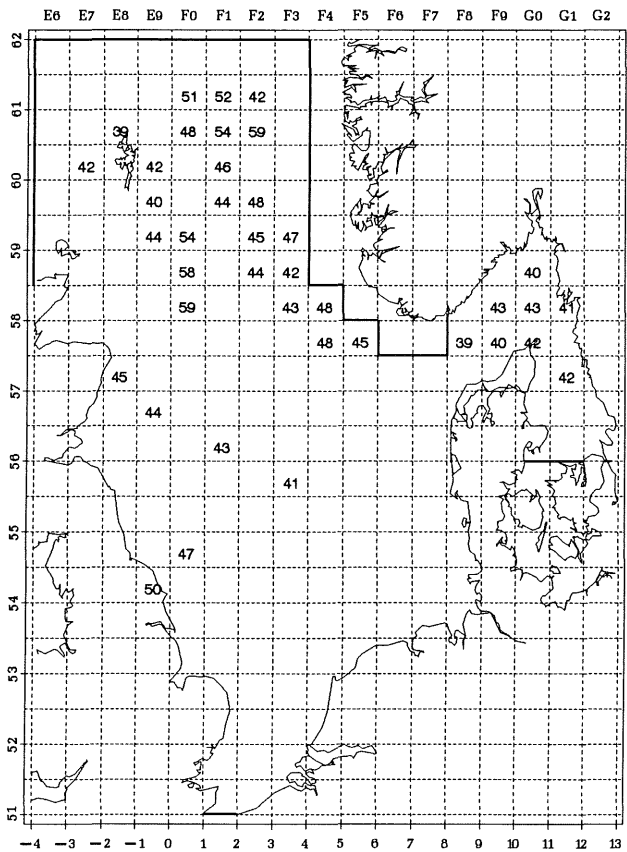
Saithe, Age group 2 1992 quarter 1



Saithe, Age group 2 1992 quarter 2



Saithe, Age group 2 1992 quarter 3



Saithe, Age group 2 1992 quarter 4

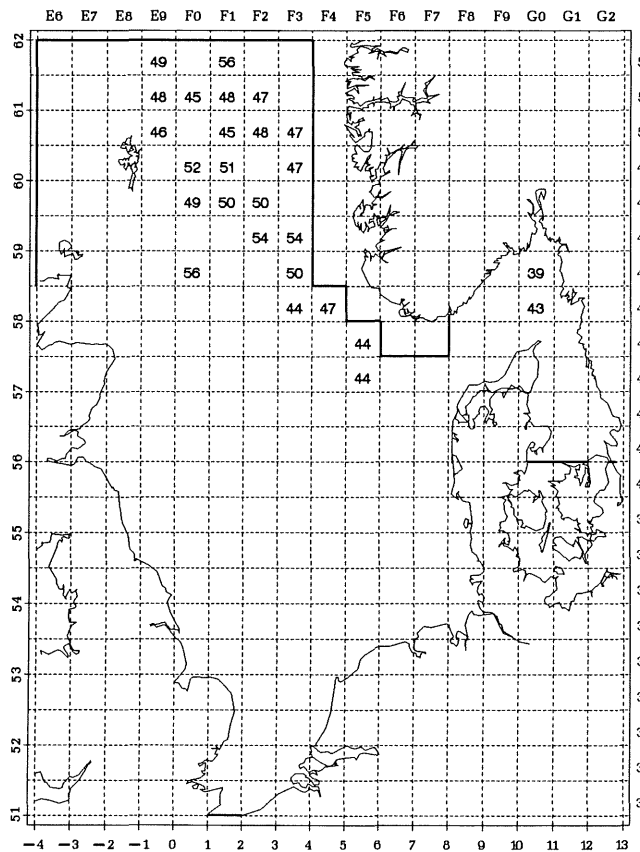
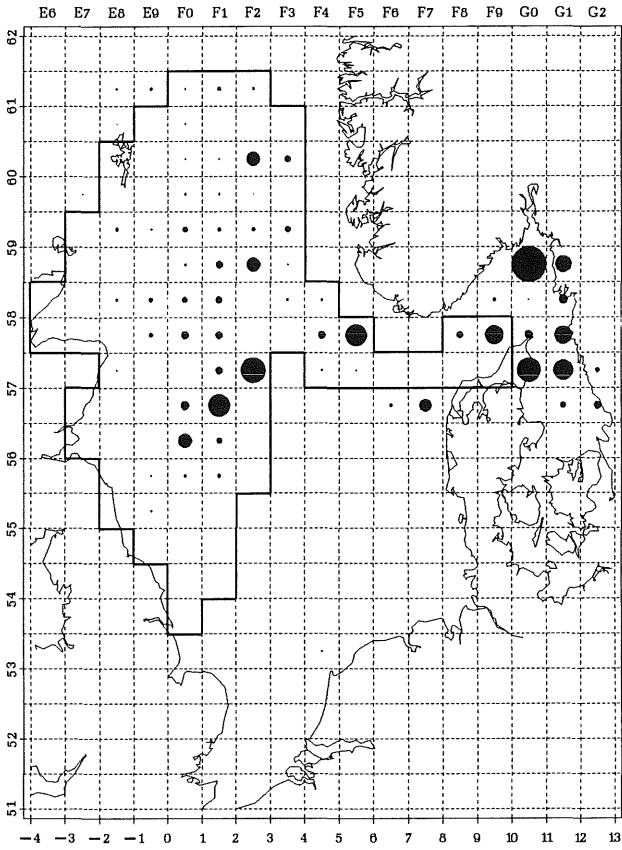


Figure 4.35 Saithe: mean length (cm below), age-group 2.

Norway pout, Age group 0 1992 quarter 3  
 Max mean catch number per recangle: 89661



Norway pout, Age group 0 1992 quarter 4  
 Max mean catch number per recangle: 42524

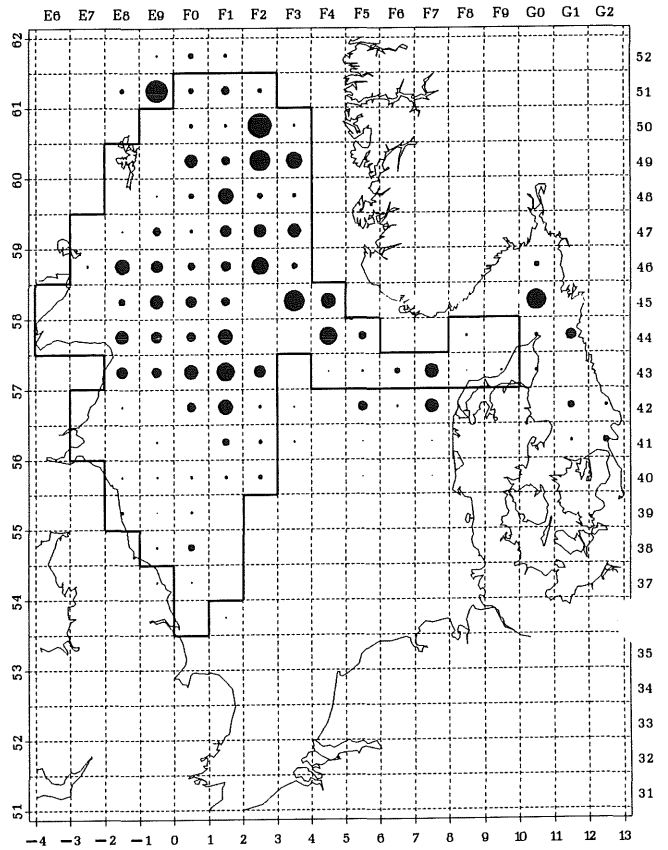
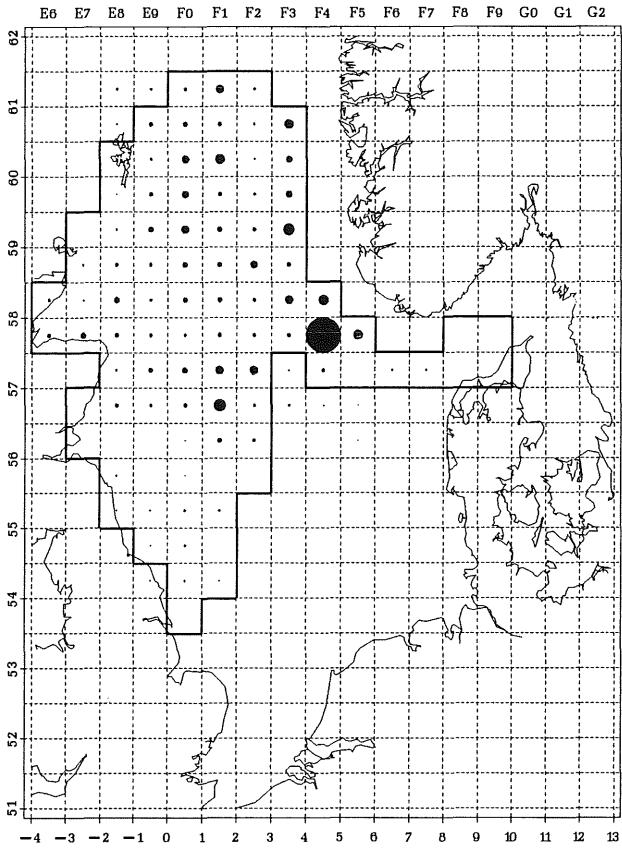
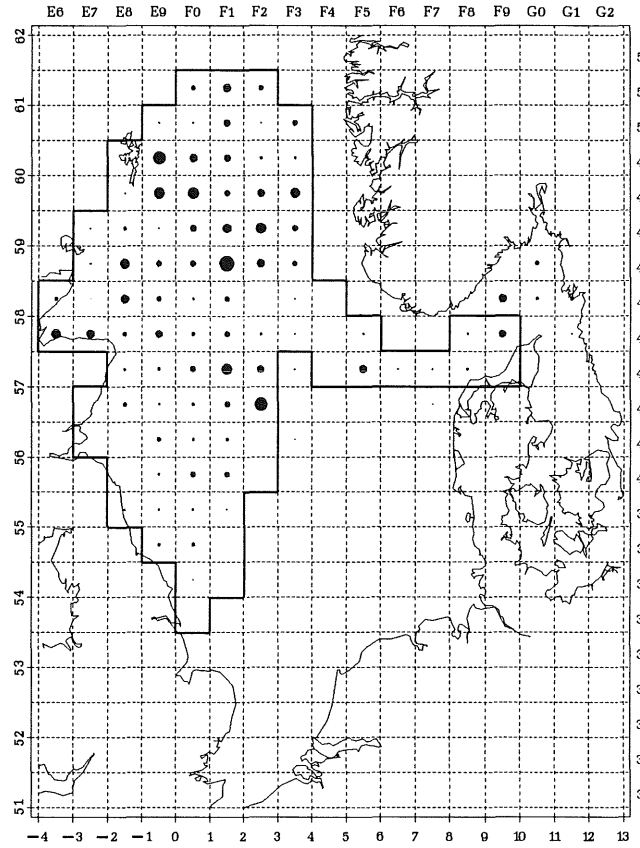


Figure 4.36 Norway pout: number per hour, age-group 0.

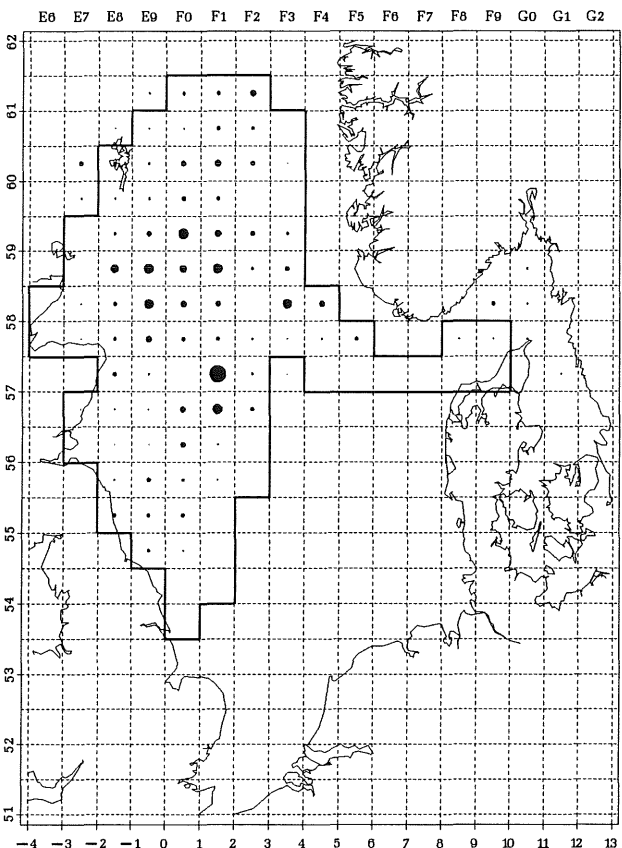
Norway pout, Age group 1 1992 quarter 1  
 Max mean catch number per recangle: 301325



Norway pout, Age group 1 1992 quarter 2  
 Max mean catch number per recangle: 55688



Norway pout, Age group 1 1992 quarter 3  
 Max mean catch number per recangle: 67232



Norway pout, Age group 1 1992 quarter 4  
 Max mean catch number per recangle: 49381

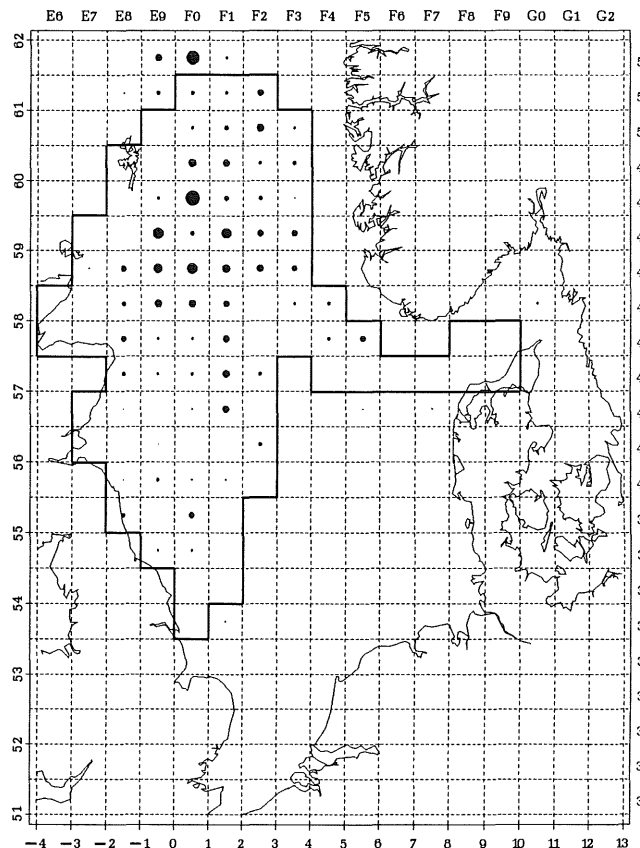
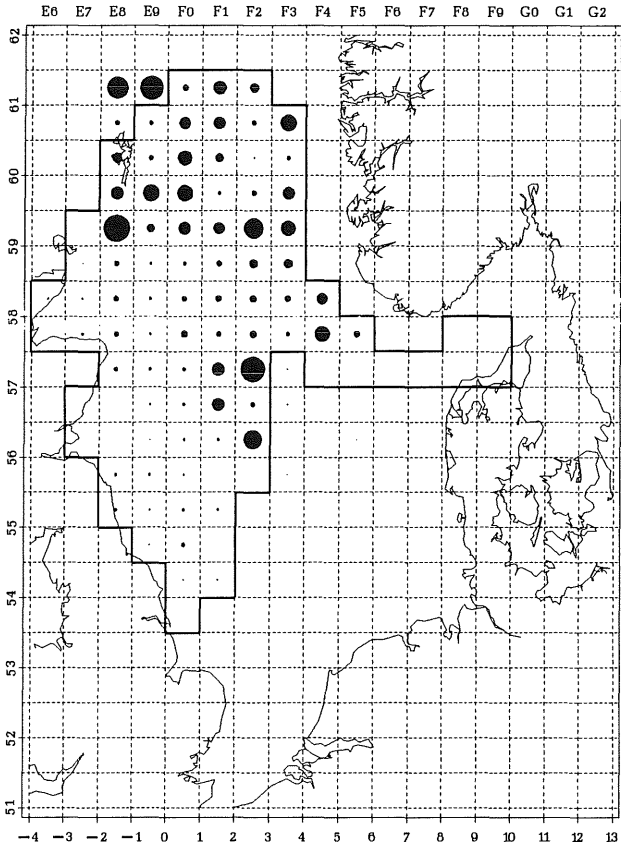
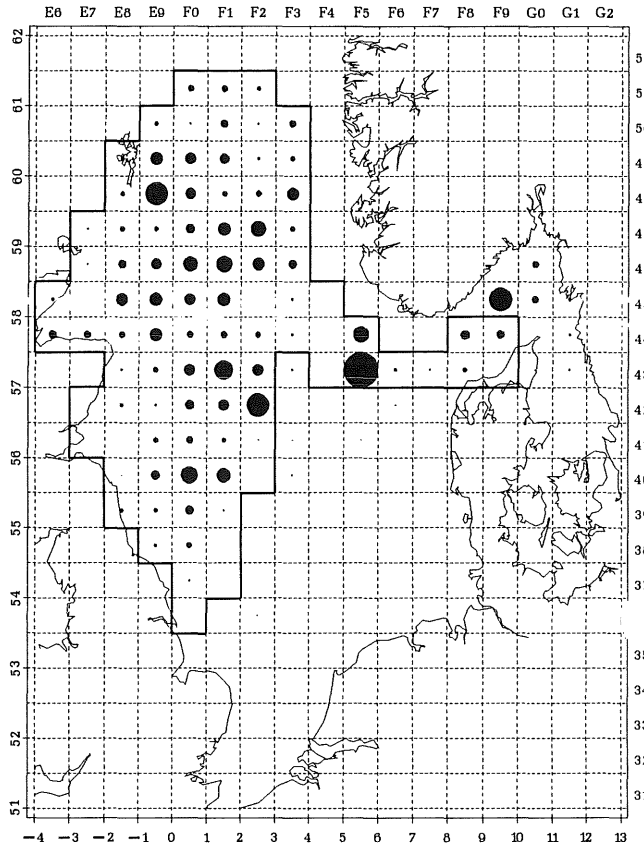


Figure 4.37 Norway pout: number per hour, age-group 1.

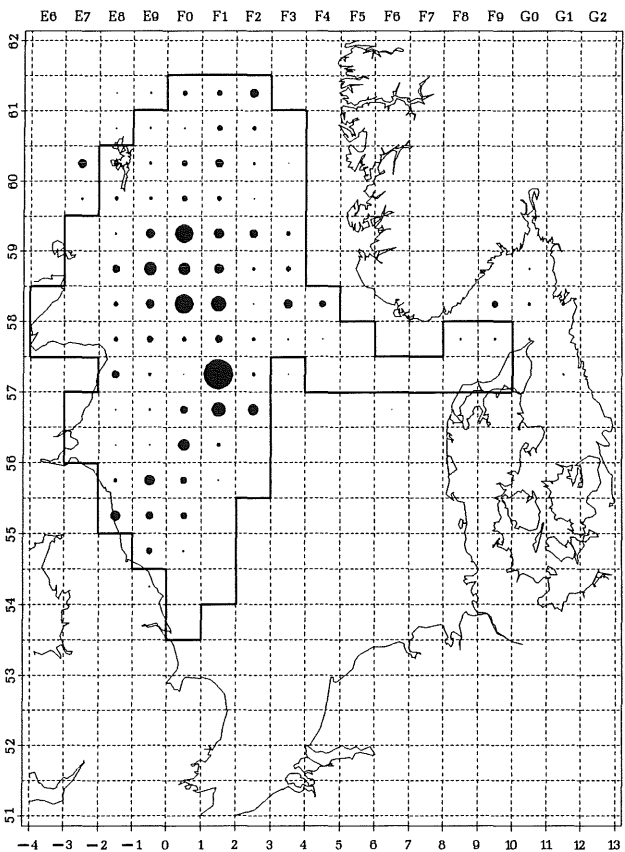
Norway pout, Age group 2 1992 quarter 1  
 Max mean catch number per recangle: 9615



Norway pout, Age group 2 1992 quarter 2  
 Max mean catch number per recangle: 16700



Norway pout, Age group 2 1992 quarter 3  
 Max mean catch number per recangle: 11719



Norway pout, Age group 2 1992 quarter 4  
 Max mean catch number per recangle: 3385

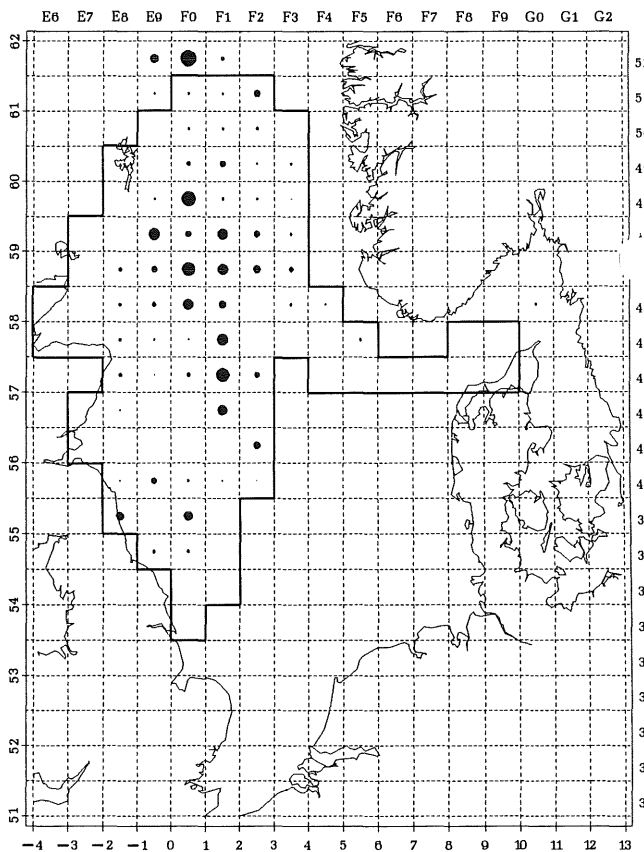
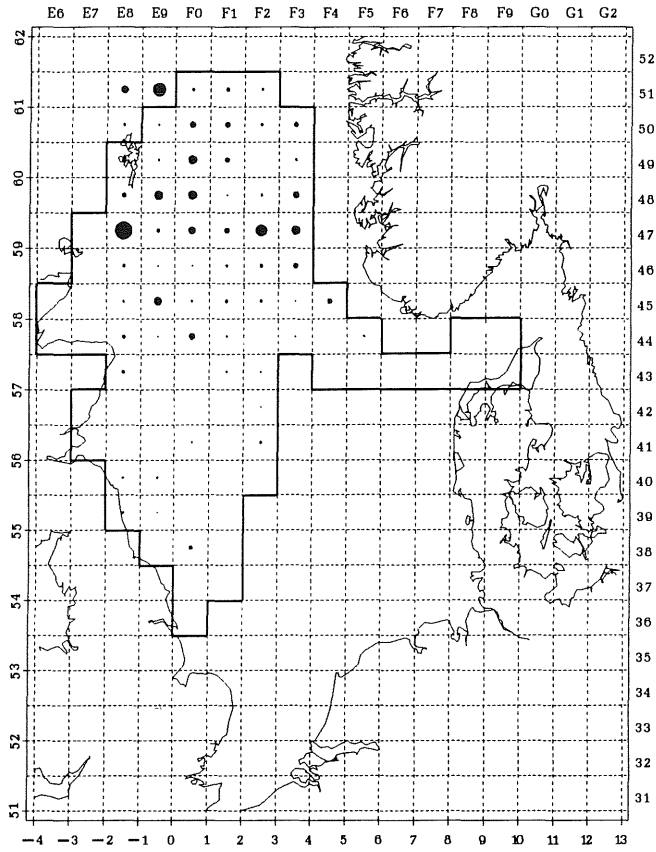


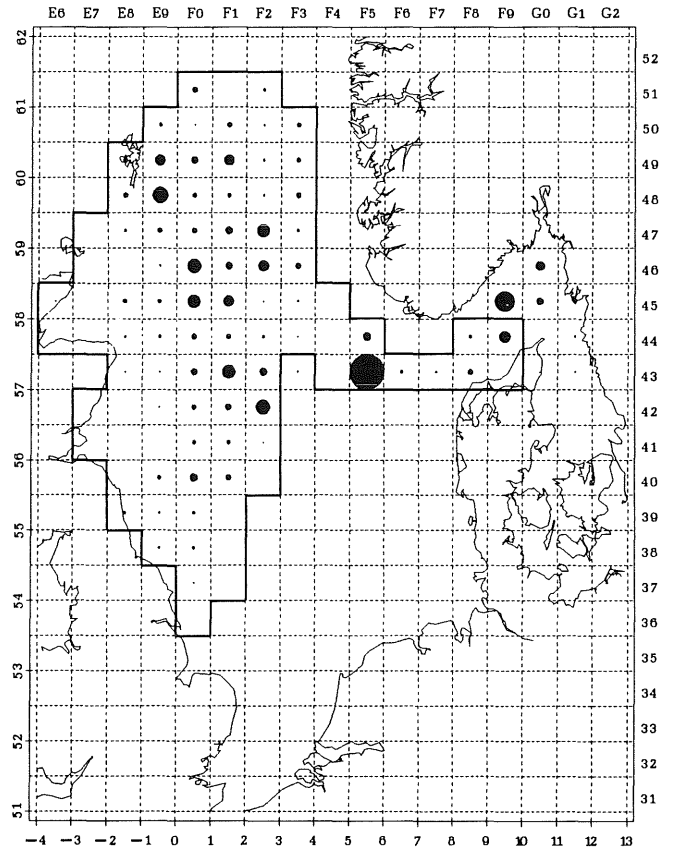
Figure 4.38 Norway pout: number per hour, age-group 2.



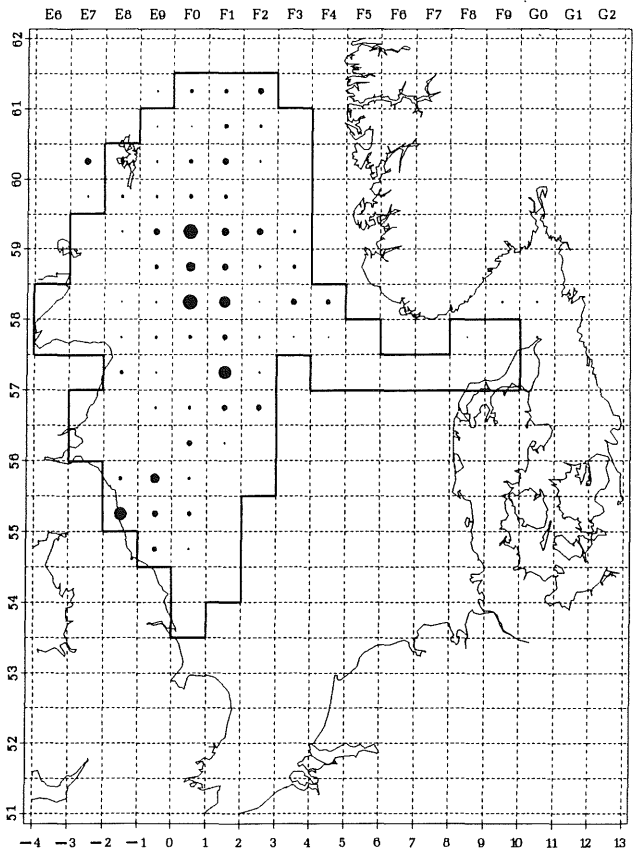
Norway pout, Age group 3+ 1992 quarter 1  
 Max mean catch number per rectangle: 764



Norway pout, Age group 3+ 1992 quarter 2  
 Max mean catch number per rectangle: 3233



Norway pout, Age group 3+ 1992 quarter 3  
 Max mean catch number per rectangle: 549



Norway pout, Age group 3+ 1992 quarter 4  
 Max mean catch number per rectangle: 47

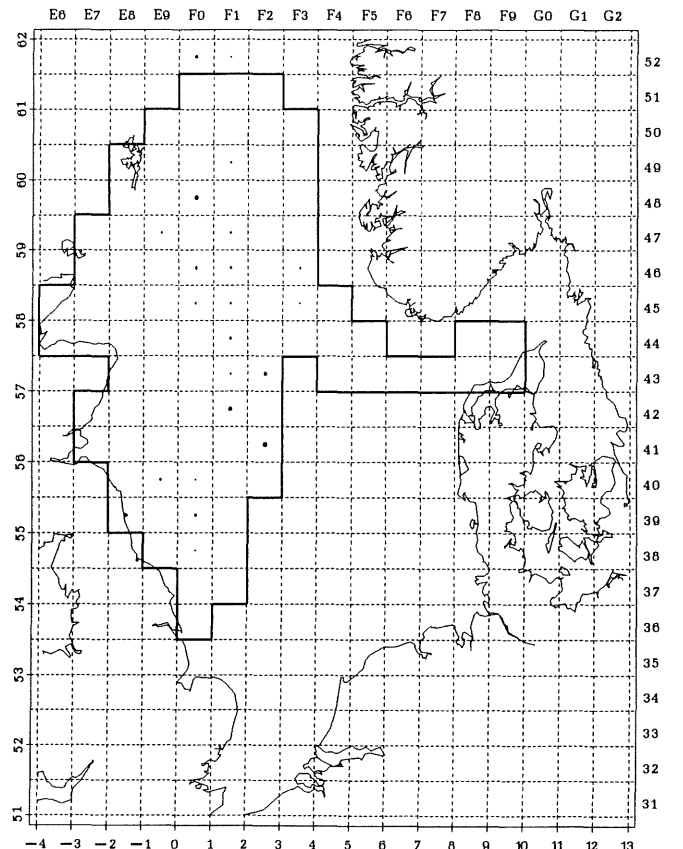
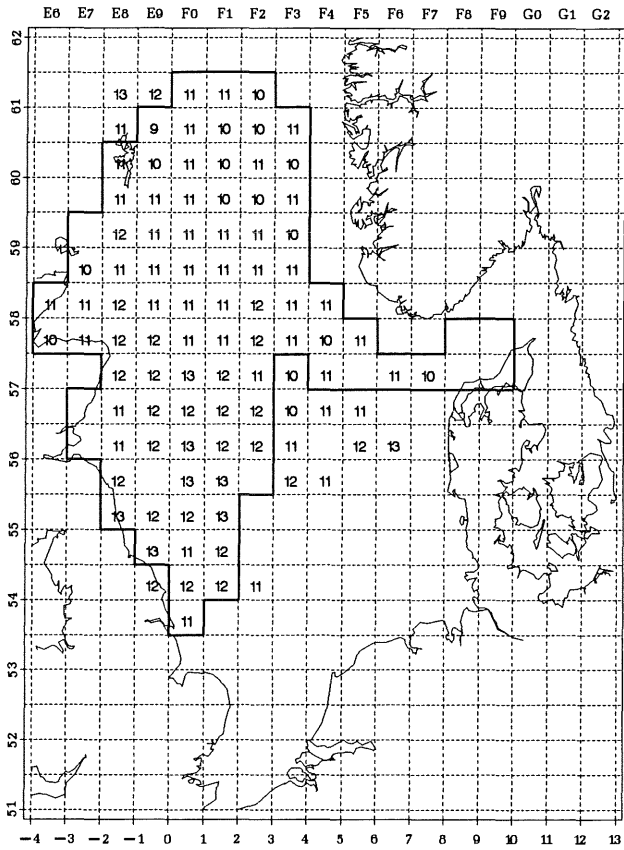
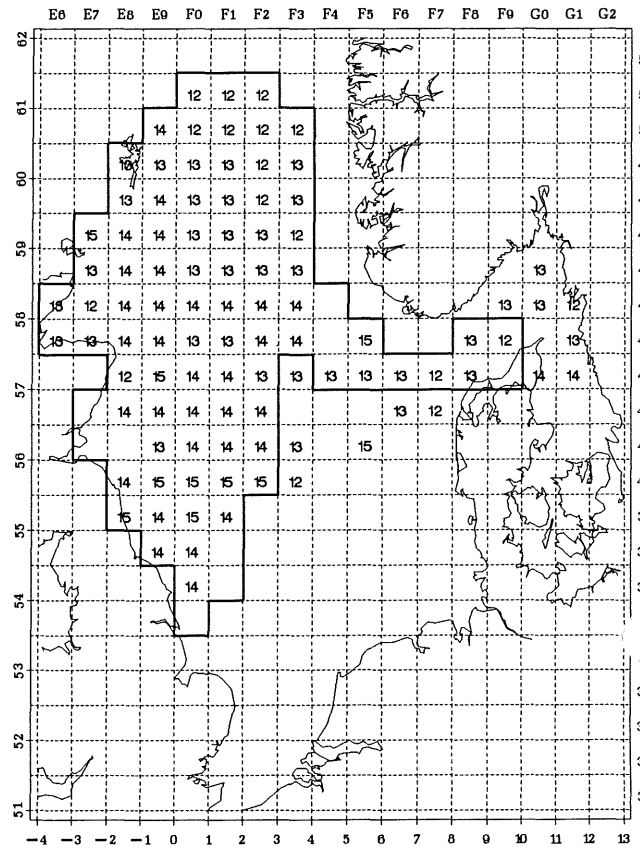


Figure 4.39 Norway pout: number per hour, age-group 3+.

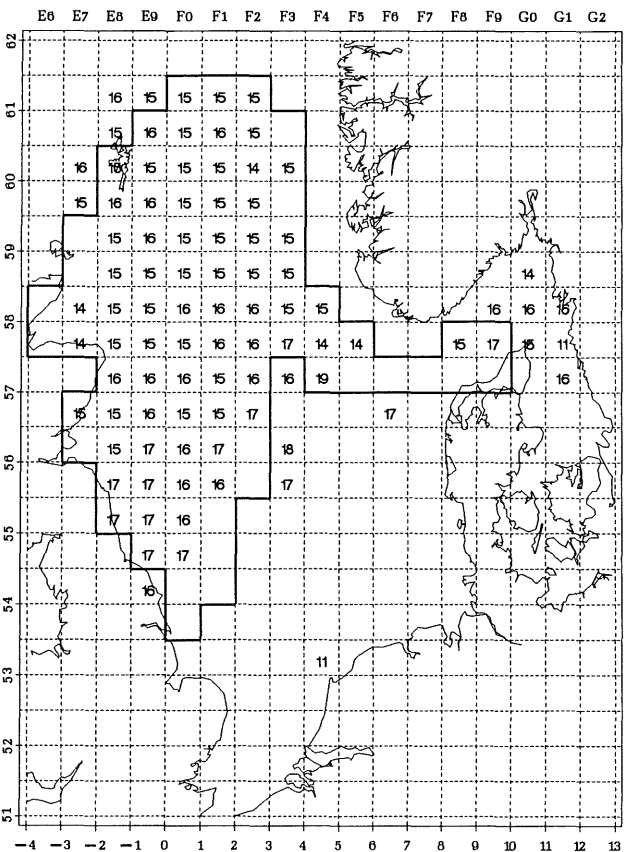
Norway pout, Age group 1 1992 quarter 1



Norway pout, Age group 1 1992 quarter 2



Norway pout, Age group 1 1992 quarter 3



Norway pout, Age group 1 1992 quarter 4

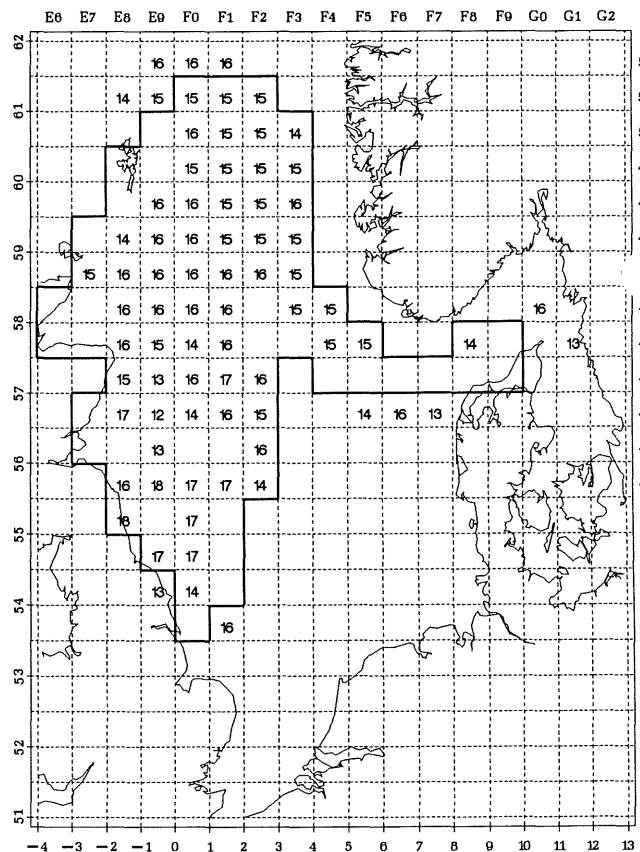


Figure 4.40 Norway pout: mean length (cm below), age-group 1.

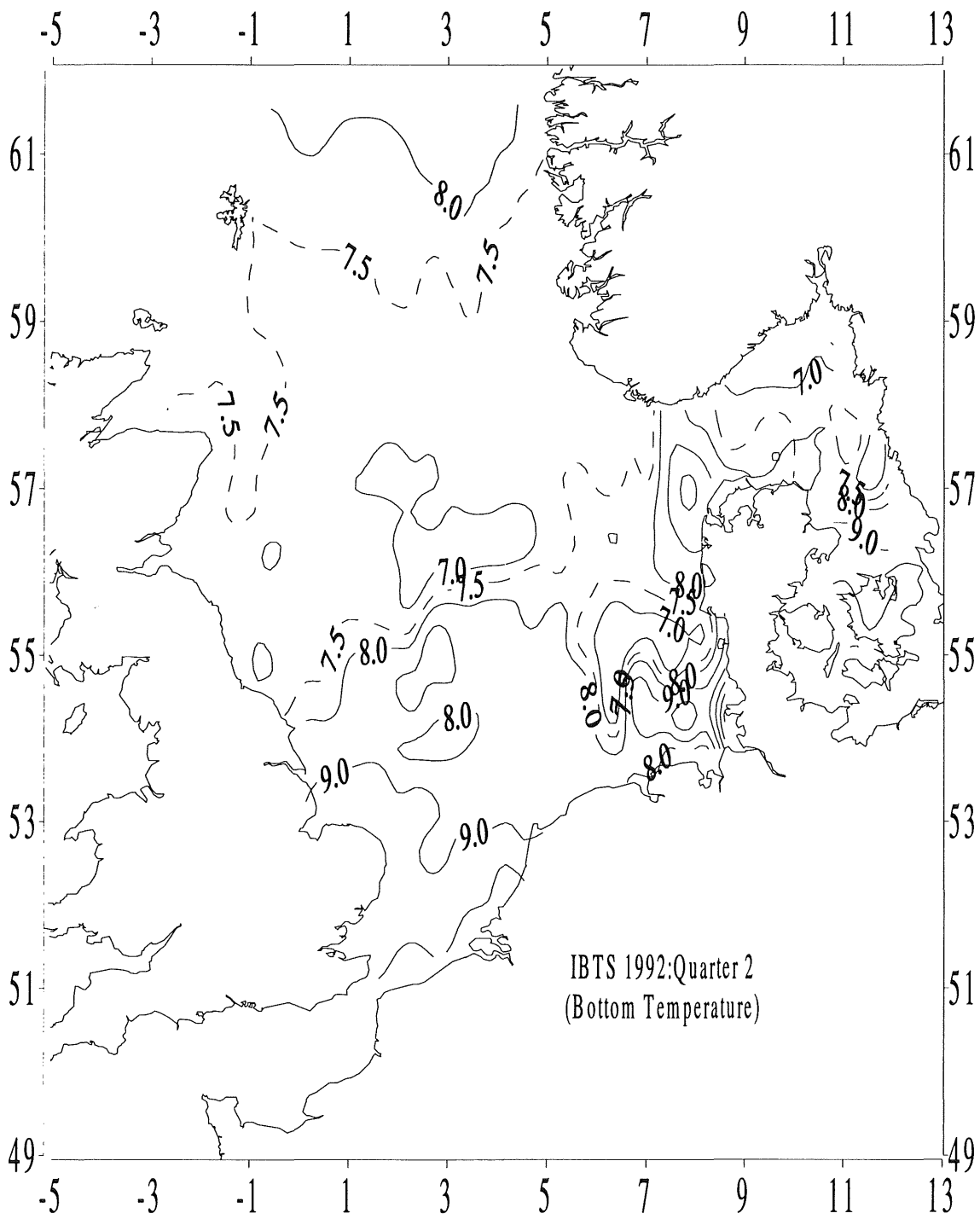


Figure 5.1

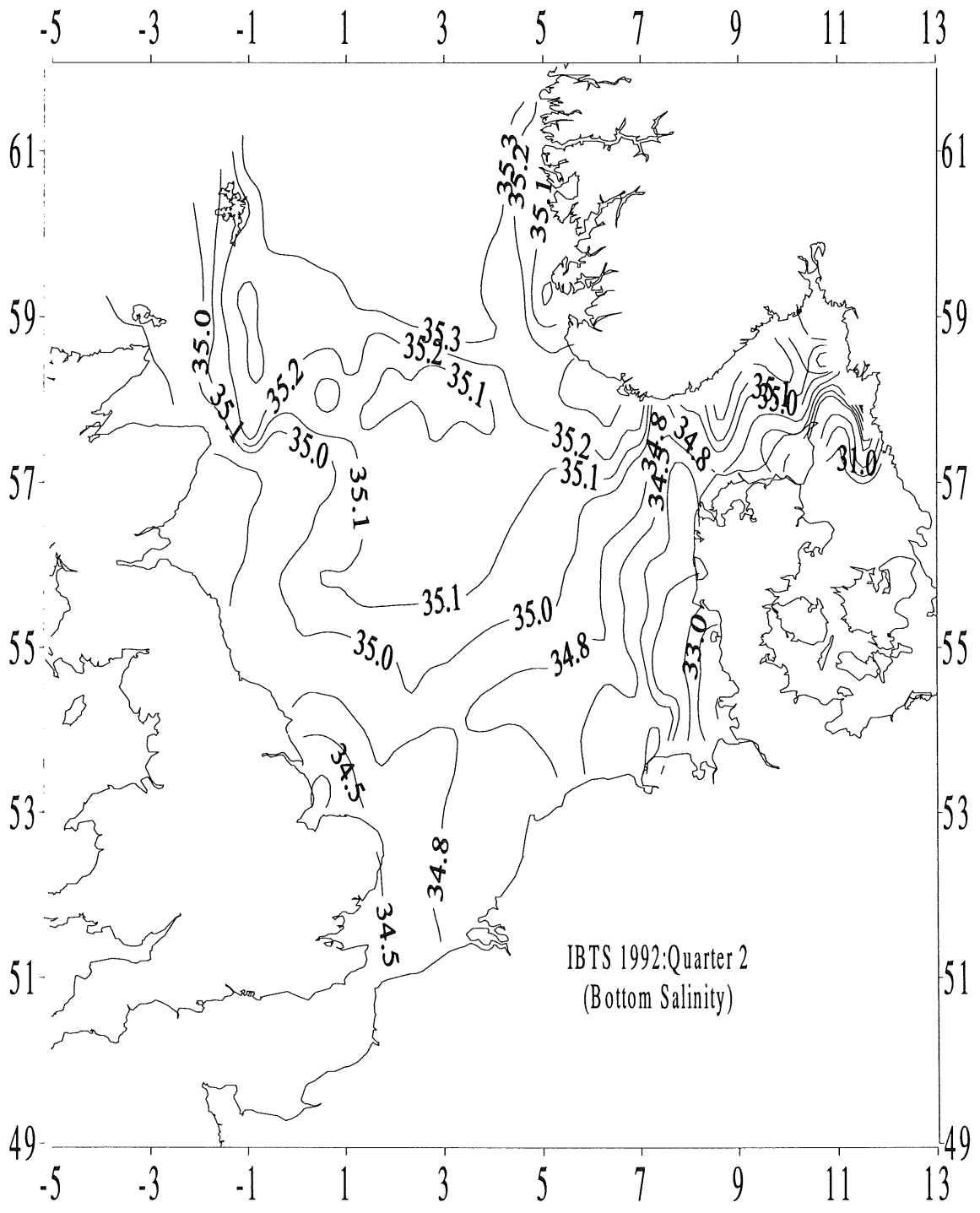


Figure 5.2

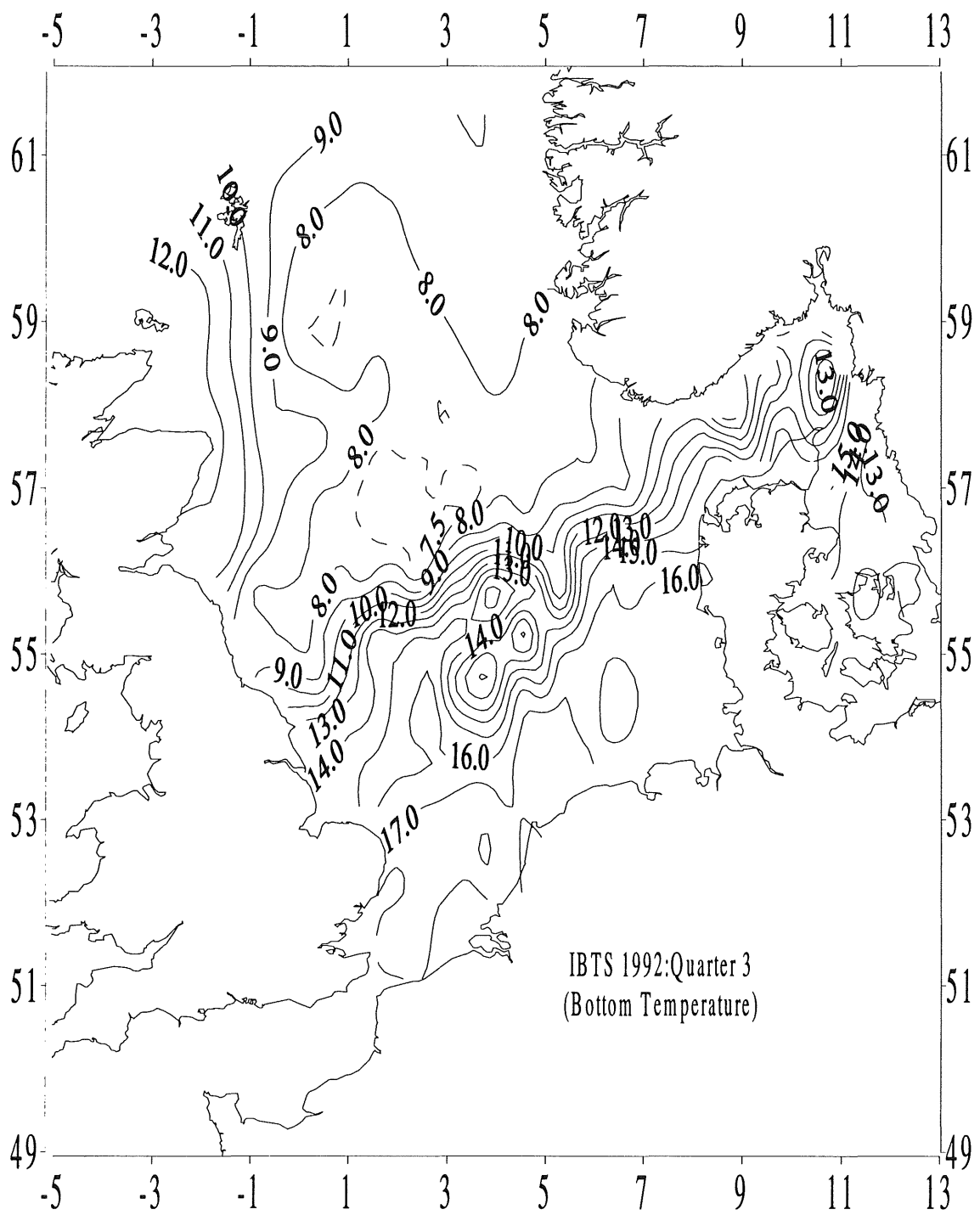


Figure 5.3

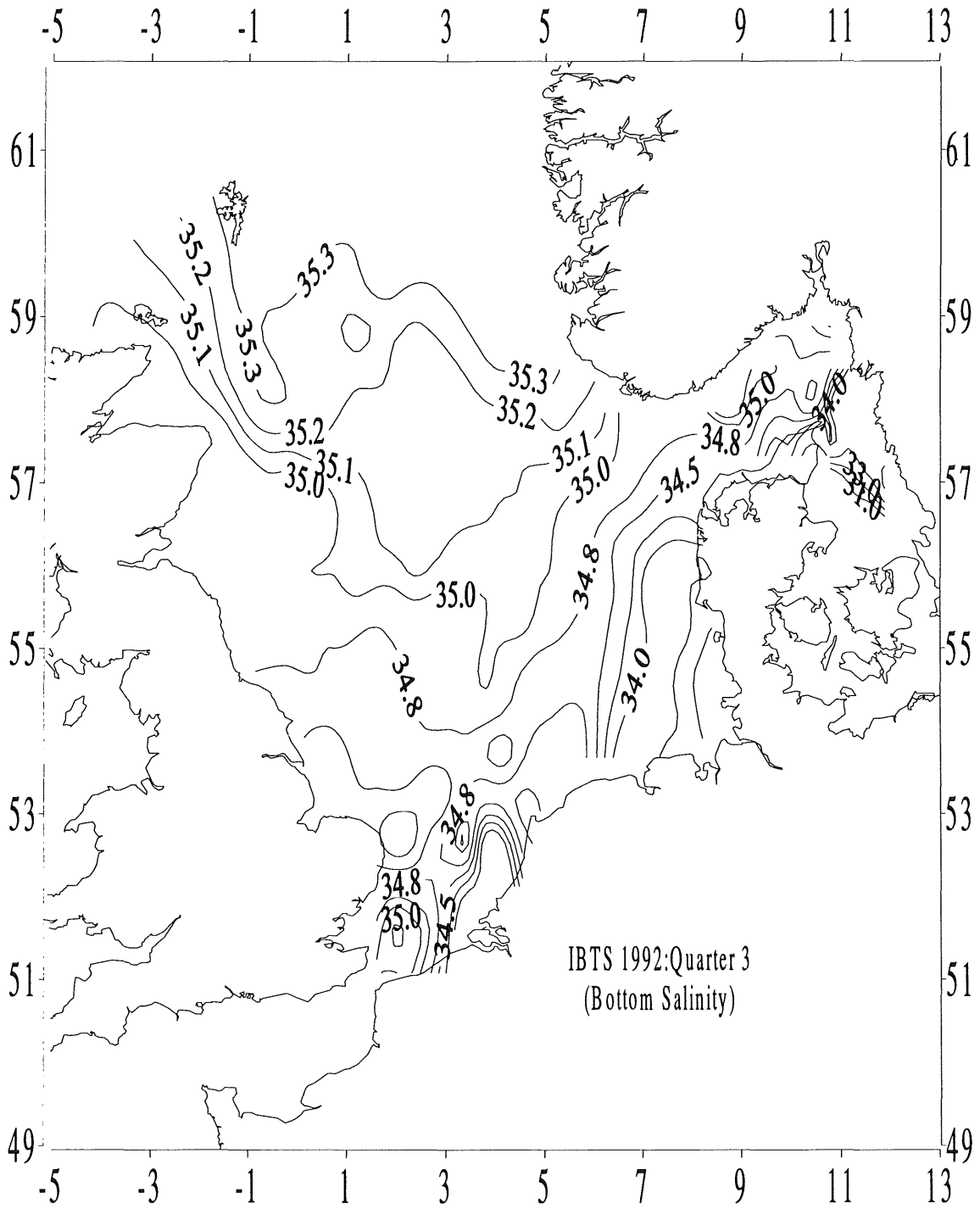


Figure 5.4

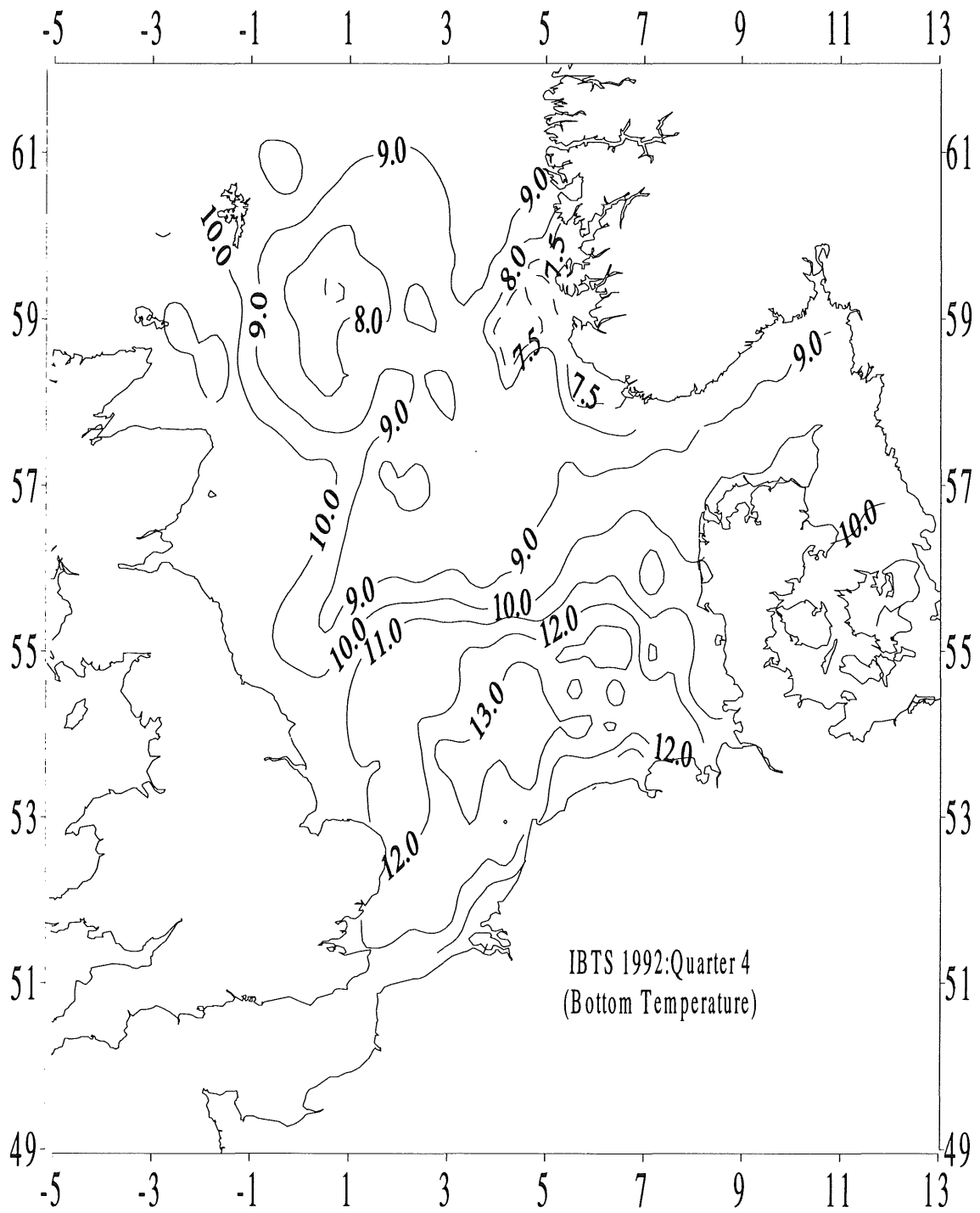


Figure 5.5

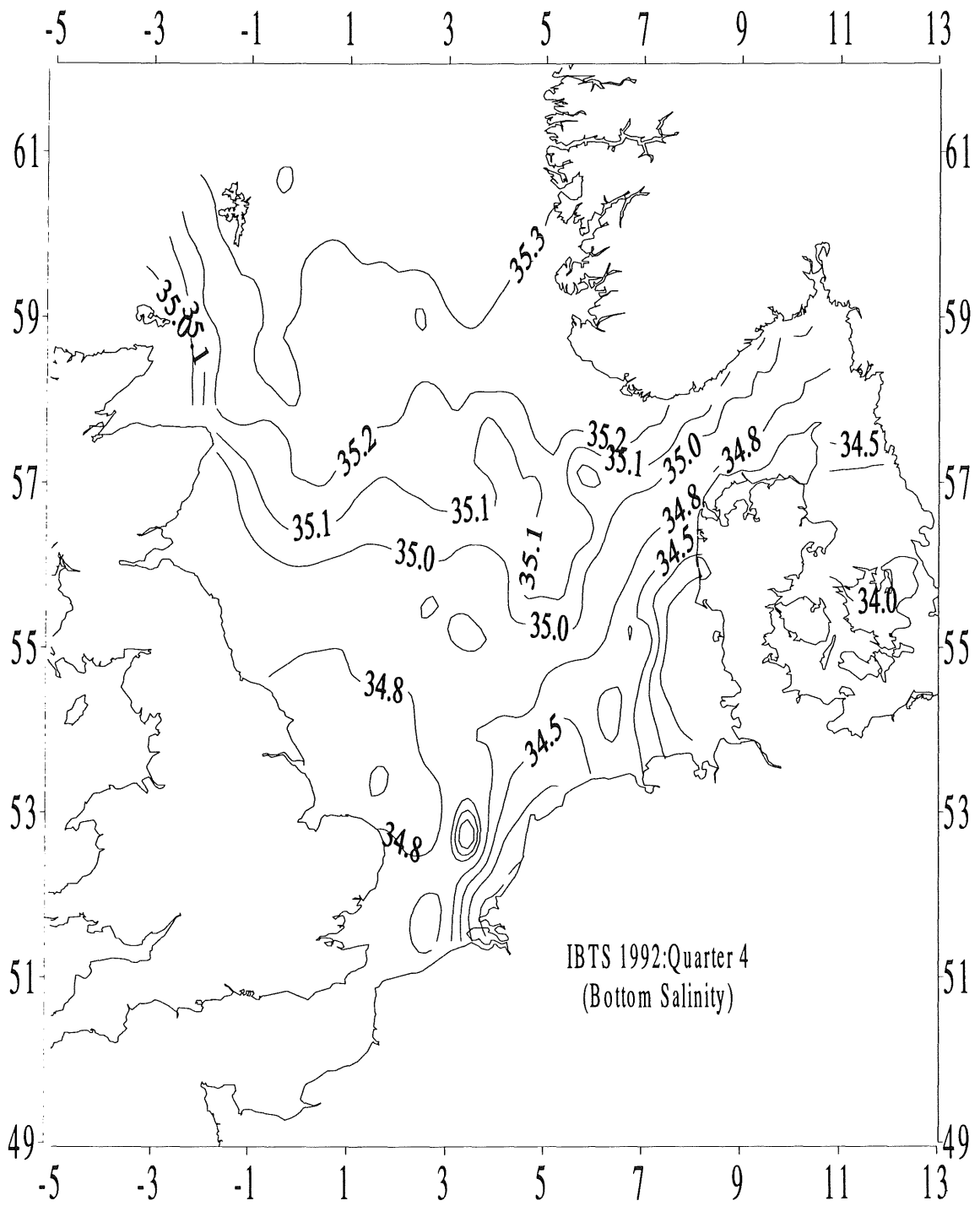


Figure 5.6





