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Results from Bottom Trawl Survey on Flemish Cap of July 2004

by

José Miguel Casas and Diana González Troncoso  
Instituto Español de Oceanografía, Cabo Estay – Canido 36200 Vigo, Spain  
mikel.casas@vi.ieo.es

**Abstract**

A stratified random bottom trawl survey on Flemish Cap was carried out from June 25<sup>th</sup> to August 2<sup>nd</sup> 2004. This year, the area surveyed was extended up to depths of 800 fathoms (1400 meters) following the same procedures as in previous years and increasing the number of hauls planned (195). The survey was carried out by the *R/V Vizconde de Eza* and the last eleven days of the surveys were used to make 61 paired hauls with the *R/V Cornide de Saavedra* and to conclude the comparative fishing trial for calibration initiated in 2003 between the former vessel and the new one. A total of 124 valid hauls were made by the vessel *R/V Vizconde de Eza* with the usual survey gear (Lofoten) up to 730 meters depth. Survey results including abundance indices of the main commercial species and age distributions for cod, redfish, American plaice and Greenland halibut are presented. The general indexes for this year are estimated taken into account the traditional swept area (strata 1-19, up to depths of 730 m.) and the total area surveyed (strata 1-34, up to depths of 1400 m.).

From the comparative fishing trial carried out during 2003 and 2004, the correction factors for the main species were estimated and the indexes from 1988 to 2002 were corrected to the scale of the new vessel. In the same way the corrected abundance at age indices was presented for cod, American plaice, redfish and Greenland halibut.

**Introduction**

The survey on Flemish Cap was carried out on board *R/V Vizconde de Eza* in 2004. A total of 177 valid bottom trawls were made up to a depth of 1400 m (800 fathoms) (Fig. 1). The survey covered all strata of the bank adequately with the exception of the strata 26 and 27 and the area corresponding with the Beothuk knoll in the southeast and southwest of the bank respectively. A synoptic sheet of the survey with vessel and gear characteristics is shown in Table 1. This was the 17<sup>th</sup> survey of the series initiated by the EU in 1988. All surveys had a stratified random design following NAFO specifications (Doubleday, 1981). Dates of the previous surveys were:

Year	Vessel	Valid tows	Dates	Year	Vessel	Valid tows	Dates
1988	Cornide de Saavedra	115	8/7 – 22/7	1997	Cornide de Saavedra	117	16/7 – 1/8
1989	Cryos	116	12/7 – 1/8	1998	Cornide de Saavedra	119	17/7 – 2/8
1990	Ignat Pavlyuchenkov	113	18/7 – 6/8	1999	Cornide de Saavedra	117	2/7 – 20/7
1991	Cornide de Saavedra	117	24/6 – 11/7	2000	Cornide de Saavedra	120	10/7 – 28/7
1992	Cornide de Saavedra	117	29/6 – 18/7	2001	Cornide de Saavedra	120	3/7 – 20/7
1993	Cornide de Saavedra	101	23/6 – 8/7	2002	Cornide de Saavedra	120	30/6 – 17/7
1994	Cornide de Saavedra	116	6/7 – 23/7	2003	Vizconde de Eza	114	2/6 – 27/7
1995	Cornide de Saavedra	121	2/7 – 19/7	2004	Vizconde de Eza	177*	25/6 – 2/8
1996	Cornide de Saavedra	117	28/6 – 14/7				

\* 124 valid tows were carried out in depths lesser than 400 fathoms.

## Material and Methods

As in the last year, the *R/V Vizconde de Eza* carried out the survey following the same procedures as in previous years, the same bottom trawl net Lofoten, with a cod-end mesh size of 35 mm, as well as all other details of its use (Saborido-Rey and Vazquez, 2003). Also, this year concluded the comparative fishing trials initiated in 2003 with the former *R/V Cornide de Saavedra* in order to establish a link between the two sets of survey data and to develop conversion factors between the two vessels. With the comparative fishing trials concluded and the conversion factors estimated, the indices from *R/V Cornide de Saavedra* were transformed to the *R/V Vizconde de Eza* scale make them comparable.

The methodological aspects and results of the calibration are presented in SCR 05/\_ (González and Casas, 2005).

## Results

Following the agreement of the NAFO Standing Committee on Fisheries Science (STACFIS), on preferring mean number or weight per tow over other survey indices, most tables in the report are presented in that way. Details on changes were presented in last year report (Saborido-Rey and Vazquez, 2003)

Mean catch per tow (Kg) of main species in past surveys are:

Survey	Cod	American plaice	Redfish	Greenland halibut	Roughhead grenadier	Shrimp
1988	50.78	19.95	234.19	8.61	2.50	7.14
1989	141.82	17.47	202.11	5.56	1.08	2.86
1990	73.82	14.90	157.62	7.21	1.06	4.34
1991	50.05	12.54	95.69	10.16	1.66	14.50
1992	33.22	10.76	161.91	10.85	1.96	31.28
1993	75.81	9.78	90.29	8.12	3.76	15.03
1994	32.91	10.23	202.10	9.99	2.46	4.95
1995	12.06	8.44	108.98	13.52	1.94	9.33
1996	11.21	5.10	148.80	14.42	1.69	13.56
1997	12.39	3.76	206.19	20.02	1.49	9.58
1998	6.20	4.27	88.08	30.13	2.10	52.19
1999	3.55	3.21	122.67	26.37	1.55	32.00
2000	3.81	2.00	221.33	21.09	1.30	24.52
2001	3.35	2.99	96.18	17.25	2.59	35.21
2002	3.10	2.55	150.85	15.05	1.51	49.96
2003	1.98	2.84	116.66	7.73	2.92	26.75
2004* <sub>(1-19)</sub>	5.06	4.38	311.62	15.28	4.47	25.03
2004 <sub>(1-34)</sub>	3.32	2.88	204.71	23.15	14.03	16.49

\*Mean catch per tow for the comparable area and depths in the historical series.

These survey indices are also presented in Table 2, and even they belong to different species and pelagic vs. demersal character and the transformation to the new scale only was carried out for the main species, a global index is presented for each year, which minimum occurred in 2001. Redfish shows the highest annual variability, probably due to its pelagic habitat, making accessibility to bottom gears more changeable than in the case of demersal or benthic species. Cod reached its minimum biomass in 2003. The relative high values founded in 2004 for American plaice and grenadiers are probably due to the occasional increasing of catchability. Greenland halibut biomass maintained a continuous biomass increase to reach a maximum in 1998; since then the biomass decreased up to minimum historical value in 2003. In 2004 the biomass increases, reaching the level of 2002. Shrimp catches in 1998 and 2002 were the highest, but interpretation of survey results needs to take into account changes occurred in cod-end mesh size.

Excluding redfish, the whole period could be divided in two in regards to species composition: Cod, American plaice and skates dominating the first half, prior to 1995, and Greenland halibut, the second half. For cod, 1995 was the spawning year for the first extremely weak recruitment; for American plaice, it had been 1991..

## Cod

Mean catch per tow by strata and its standard error are presented in Table 3. These indices are compared with results of previous surveys in Table 5. Total biomass calculated by the swept area method and compared with Russian survey results are:

Year	EU (1)	Russia: (2)	(3)	Year	EU (1)	Russia: (2)	(3)
1983		23,070		1995	9,695	8,260	-
1984		31,210		1996	9,013	730	-
1985		28,070		1997	9,966	-	-
1986		26,060		1998	4,986	-	-
1987		10,150	21,600	1999	2,854	-	-
1988	40,839	7,720	34,200	2000	3,062		-
1989	114,050	36,520	78,300	2001	2,695	784	-
1990	59,362	3,920	15,200	2002	2,496	694	-
1991	40,248	6,740	8,200	2003	1,593		- tons
1992	26,719	2,490	2,400	2004	4,071		
1993	60,963	8,990	9,700				
1994	26,463	-	-				

1) Biomass estimated from bottom trawl survey. 2) Biomass estimated from bottom trawl survey (Kiseleva and Vaskov 1994; Kiseleva 1996, 1997; Vaskov and Igashov, 2003). 3) Biomass estimated of bottom trawlable plus pelagic biomass (Borovkov *et al.* 1993; Kiseleva and Vaskov 1994).

The mean frequency at age per tow ('000) is shown in the table below.

age	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	6.05	24.38	2.86	160.45	88.95	5.07	3.75	1.77	0.04	0.05	0.03	0.01	0.22	0.59		0.85	
2	99.36	13.43	15.35	32.60	52.13	172.05	5.14	14.80	3.88	0.19	0.10	0.10	0.02	2.48	1.65	0.07	4.18
3	61.55	113.53	6.37	21.02	6.94	38.67	34.51	1.66	8.28	4.32	0.12	0.14	0.41	0.02	0.80	0.78	0.03
4	16.72	67.91	21.08	2.64	2.97	1.37	6.34	4.84	1.11	5.97	1.56	0.15	0.25	0.15	0.04	0.17	0.72
5	1.81	25.40	19.69	8.40	0.48	1.64	0.16	1.15	2.99	0.49	1.95	0.89	0.12	0.10	0.09	0.03	0.18
6	0.26	1.66	5.59	2.15	1.74	0.21	0.08	0.04	0.24	1.18	0.10	0.55	0.55	0.02	0.04	0.05	0.01
7	0.28	0.18	0.42	0.37	0.30	0.61	0.01	0.03	0.01	0.03	0.18	0.02	0.21	0.18	0.03	0.01	0.01
8	0.09	0.16	0.18	0.08	0.02	0.11	0.14		0.01			0.01	0.01	0.12	0.12	0.01	0.00
9		0.01	0.10	0.04				0.03			0.01		0.02	0.01	0.04	0.05	0.01
10		0.01	0.03	0.00			0.01	0.01						0.01		0.03	0.02
11				0.01	0.01									0.01	0.01		
12										0.01			0.01				
13																	
14													0.01				
total	186.13	246.66	71.67	227.78	153.53	219.72	50.14	24.33	16.56	12.23	4.05	1.87	1.83	3.67	2.81	2.04	5.16

The 1990 year-class was the most abundant observed at age 1, but its level was not maintained in the following years, after recruitment. This may indicate that its abundance was overestimated in the 1991 survey. The abundance of the 1991 year-class, although recording a maximum at age 2, decreased quickly as a consequence of the intense fishery on ages 2 and 3 during 1993 and 1994. Later year-classes, from 1992 onwards (ages 12 or less in 2004), were weak, weaker than the ones observed in the previous period. The 1995 to 1999 year-classes (ages 9 to 5 in 2004) failed almost completely and, according to the results of the last surveys, the same failure appears to have occurred to the 2001 and 2003 year-classes (age 3 and 1 respectively in 2004). The 2000 and 2002 year classes abundance, although low in the historical series, was estimated to above average in the last 10 years.

Tables 6, 7 and 4 show mean length frequency per tow, the age-length key and mean frequency at age per tow and stratum respectively. Catch per tow distribution is presented in Figure 2.

### American plaice

Mean catch per tow by strata is presented in Table 8. These indices are compared with results of previous surveys in Table 10. Total biomass calculated by the swept area method and compared with Russian survey results is shown in the following table:

Year	EU	Russia (1)	Year	EU	Russia (1)
1983		8,900	1994	8,227	
1984		7,500	1995	6,785	
1985		7,800	1996	4,098	
1986		20,200	1997	3,026	
1987		9,300	1998	3,437	
1988	16,046	6,500	1999	2,585	
1989	14,047	5,000	2000	1,606	
1990	11,983	1,200	2001	2,404	548
1991	10,087	14,400	2002	2,049	1,398
1992	8,656	1,200	2003	2,286	
1993	7,861	2,700	2004	3,525	

1) Rikhter *et al.* 1991; Borovkov *et al.* 1992, 1993, 1994; Vaskov and Igashov, 2003.

The mean frequency at age per tow is presented in the following table. The 1986 and 1990 year-classes, ages 16 and 12 in 2002, were the most abundant cohorts in the period, but no good recruitment was observed since then. Fish aged 6 or more roughly correspond with fishable biomass. The abundance of this group (f 6+) decreased along the period except in 1992, when an increase was recorded as the consequence of the income of the abundant 1986 year-class.

age	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1		0.05	0.01	0.05					0.01	0.01		0.01	0.02			0.01	
2	0.50	0.70	0.53	0.44	1.06	0.01	0.05	0.04	0.04	0.02	0.03		0.03	0.05		0.01	0.14
3	2.34	10.40	1.14	1.50	0.99	1.92	0.06	0.14	0.15	0.14	0.04	0.03	0.01	0.06	0.04	0.04	0.35
4	1.63	2.33	10.41	2.70	1.33	1.35	2.65	0.92	0.32	0.03	0.06	0.08	0.10	0.07	0.08	0.12	0.09
5	5.26	5.43	1.40	6.65	2.41	0.97	1.29	2.65	0.73	0.15	0.09	0.10	0.13	0.13	0.02	0.10	0.10
6	7.94	5.42	4.19	3.04	5.93	0.52	1.09	1.70	2.07	0.52	0.33	0.10	0.19	0.07	0.11	0.07	0.13
7	6.23	5.15	2.91	3.34	1.59	5.14	1.21	1.71	1.11	1.50	0.77	0.30	0.15	0.14	0.08	0.06	0.13
8	6.79	3.02	2.77	2.57	1.87	0.56	4.26	1.13	0.68	0.34	1.12	0.59	0.19	0.33	0.16	0.17	0.16
9	2.18	1.00	1.68	1.06	1.03	0.97	0.40	1.91	0.50	0.51	0.65	0.63	0.49	0.54	0.20	0.36	0.31
10	0.57	0.43	0.78	0.37	0.47	0.46	0.81	0.20	0.78	0.36	0.44	0.32	0.53	0.72	0.24	0.29	0.39
11	0.12	0.05	0.14	0.01	0.22	0.32	0.28	0.22	0.18	0.61	0.37	0.42	0.28	0.60	0.37	0.53	0.35
12	0.20	0.02	0.02	0.07	0.12	0.38	0.28	0.18	0.10	0.16	0.36	0.26	0.23	0.52	0.28	0.60	0.74
13	0.16		0.04		0.02	0.45	0.31	0.18	0.10	0.03	0.11	0.15	0.09	0.24	0.31	0.35	0.53
14	0.06		0.02			1.33	0.65	0.36	0.13	0.12	0.14	0.15	0.07	0.20	0.18	0.33	0.50
15	0.07					0.04	0.61	0.27	0.09	0.06	0.07	0.07	0.06	0.14	0.16	0.18	0.41
16+	0.05					0.05	0.01	0.04	0.03	0.14	0.13	0.12	0.07	0.12	0.23	0.20	0.65
Total	34.09	34.01	26.05	21.79	17.05	14.47	13.96	11.66	7.02	4.69	4.73	3.32	2.65	3.94	2.45	3.44	4.99
freq. 6+	24.36	15.09	12.55	10.45	11.26	10.23	9.92	7.91	5.77	4.34	4.51	3.10	2.35	3.62	2.31	3.16	4.31

Global indices of the table, such as total number by tow and frequency 6+, have declined over the whole period, reaching their lowest level in 2002: more than 10 times lower than in 1988-1990. Data in the table above indicates two periods for recruitment, and a change from an upper abundance level to a lower one. The 1991 year-class was the first weak cohort. The relative high values founded in 2003 and 2004 for American plaice, mainly in the ages older than 9 years old, are probably due to the occasional increasing of catchability in 2003 and 2004 survey.

Tables 11, 12 and 9 show mean length frequency per tow, the age-length key and mean frequency at age per tow respectively. Catch per tow distribution is presented in Figure 3.

## Redfish

All redfish catches were classified by species. The group name *juvenile* contains those individuals of small size for which routine classification was not possible. The 15 cm maximum length is a good reference for this group, but it was never used as a criterion. The skill required to identify the species increased over time, so the group *juvenile* is not a uniform defined group, but it is maintained for practical reasons.

Mean catch per tow by strata are presented in Tables 13, 15, 19 and 21 for *Sebastes marinus*, *S. mentella*, *S. fasciatus* and the *juvenile* group respectively. The following table summarize the results by species in the historical series.

Year	<i>Sebastes:</i>	<i>Sebastes spp.</i>			total
	<i>marinus</i>	<i>mentella</i>	<i>fasciatus</i>	juvenile	
1988	22.67		211.52		234.19
1989	33.96		168.15		202.11
1990	20.83	107.80		28.99	157.62
1991	6.05	74.05	8.40	7.19	95.69
1992	6.10	106.20	7.85	41.75	161.91
1993	5.96	26.41	6.44	51.49	90.29
1994	49.14	52.84	11.57	88.55	202.10
1995	13.37	87.75	7.44	0.42	108.98
1996	16.70	115.21	16.30	0.59	148.80
1997	95.90	82.95	25.84	1.49	206.19
1998	9.50	67.08	9.52	1.98	88.08
1999	13.95	96.51	11.76	0.46	122.67
2000	66.39	132.16	19.10	3.67	221.33
2001	12.74	57.11	17.05	9.27	96.18
2002	14.49	60.63	34.27	41.46	150.85
2003	49.88	35.79	18.69	12.30	116.66
2004	106.17	57.24	94.71	53.54	311.62

Tables 14, 16, 20 and 22 show mean length frequency by tow for the four groups. Age-length keys and mean frequency at age by tow for *S. mentella* are presented in Tables 18 and 17 respectively. Catches per tow distributions of the three species are presented in Figures 4, 5 and 6.

More details and results are presented by Avila de Melo et al. in SCR/05--

## Greenland halibut

Mean catch per tow by strata and its standard error are presented in Table 23. These indices are compared with results of previous surveys in Table 27 and summarised as follow:

Year	EU	Year	EU	
1988	8.62	1997	20.02	
1989	5.56	1998	30.13	
1990	7.21	1999	26.37	
1991	10.16	2000	21.09	
1992	10.85	2001	17.25	
1993	8.12	2002	15.05	
1994	9.99	2003	7.73	
1995	13.52	2004	15.28	Kg/tow
1996	14.42			

Mean length frequency by tow, age-length keys and mean frequency at age per tow are presented in Tables 24, 26 and 25, respectively. Catch per tow distribution is presented in Figure 7. Mean frequency at age per tow ('000) in the historical series was calculated as follows:

age	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	1.63	2.08	1.80	1.72	12.48	5.88	3.30	2.74	1.06	3.73	8.08	4.10	2.19	2.20
2	0.26	1.57	1.58	1.28	2.51	7.96	3.81	2.12	0.72	0.31	1.41	2.95	1.01	3.34
3	0.31	0.56	0.94	1.71	2.27	2.46	6.40	7.69	3.00	0.60	1.82	2.80	0.61	4.42
4	1.41	1.29	0.84	1.81	1.90	3.02	6.67	11.05	10.39	2.11	0.97	1.67	1.52	1.98
5	2.64	2.29	1.28	1.91	2.47	4.23	6.74	12.32	13.57	6.89	2.77	3.87	2.46	7.33
6	1.58	2.77	1.94	2.97	5.17	5.76	8.23	11.26	12.64	14.34	7.55	5.54	2.95	7.62
7	2.75	2.42	2.03	2.66	3.92	2.50	5.07	7.76	5.44	5.46	6.71	5.80	1.91	2.56
8	0.64	1.30	1.55	1.45	2.10	1.61	2.09	2.67	1.81	2.28	3.43	1.16	0.48	0.62
9	0.57	0.60	0.96	0.78	1.29	0.43	0.67	0.76	0.35	0.45	0.17	0.14	0.13	0.30
10	0.45	0.33	0.26	0.29	0.27	0.08	0.21	0.21	0.10	0.11	0.05	0.06	0.10	0.13
11	0.18	0.17	0.13	0.11	0.07	0.03	0.03	0.03	0.01	0.05	0.01	0.02	0.02	0.08
12	0.01	0.08	0.05	0.06	0.02	0.03	0.02	0.01	0.00			0.01	0.00	0.05
13		0.02	0.02	0.02			0.02	0.02	0.00					0.01
14		0.01	0.01		0.00	0.00			0.01					0.00
15	0.02					0.01	0.01							
16+	0.01						0.01							0.00
total	12.47	15.49	13.40	16.77	34.47	34.02	43.29	58.63	49.10	36.34	32.96	28.12	13.38	30.65
freq. 10+	0.67	0.62	0.48	0.47	0.36	0.15	0.30	0.27	0.12	0.17	0.05	0.09	0.12	0.28

The tables 28 and 29 also show the abundance and biomass by age, corresponding at age greater or equal than five years in order to compare with XSA results.

### Shrimp

Casas *et al.* (2004) presented detailed results.

### Roughhead grenadier (*Macrourus berglax*)

Mean catch per tow along this survey series was:

Year	EU
1988	2.50
1989	1.08
1990	1.06
1991	1.66
1992	1.96
1993	3.76
1994	2.46
1995	1.94
1996	1.69
1997	1.49
1998	2.10
1999	1.55
2000	1.30
2001	2.59
2002	1.51
2003	2.92
2004	4.47

Detailed results are presented by Murua SCR/05\_\_.

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**Table 1** – Technical data of the 2004 survey.

Procedure	Specification
Vessel	R/V Vizconde de Eza
GT	1 400 t
Power	1 800 HP
Mean trawling speed	3.5 knots
Trawling time	30 minutes effective time
Fishing gear	type Lofoten
footrope / handrope	31.20 / 17.70 m
footgear	27 steel bobbins of 35 cm
vertical opening	3.0 m (SCANMAR)
warps	100 meters, 45 mm, 200 Kg/100m
trawl doors	polyvalent, 850 Kg
wire length	1.6 × depth echo sounder + 430 m.
mesh size in cod-end	35 mm
Type of survey	Stratified sampling
Station selection procedure	Random
Criterion to change position of a selected tow	- unsuitable bottom for trawling according to ecosounder register. - Information on gear damage from previous surveys.
Criterion to reject data from tow	- tears in cod-end - severe tears in the gear - less than 20 minutes tow - bad behaviour of the gear
Daily period for fishing	6.00 to 22.00 hours
Species for sampling	All fish, squid and shrimp
Species for age determination	Cod, American plaice, redfish ( <i>Sebastes mentella</i> ), Greenland halibut and Roughhead grenadier ( <i>Macrourus berglax</i> ).



**Table 2** – Mean catch per tow for several species or groups of species in 1988-2004 surveys (Kg) in depths lesser than 400 fathoms.

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Rajidae	5.59	2.41	3.51	5.05	4.7	7.76	4.36	2.82	2.55	2.29	2.46	2	1.43	2.78	1.92	5.73	7.76
<i>Synaphobranchus sp.</i>	0.27	0.11	0.05	0.1	0.09	0.13	0.01	0.02	0	0.01	0.05	0	0	0.03	0.01	0.03	0.11
<i>Urophycis sp.</i>	0.8	0.21	0.21	0.32	0.09	0.21	0.27	0.1	0.1	0.04	0.28	0.31	0.21	0.49	0.16	0.68	0.83
<i>Antimora sp.</i>	0.49	0.38	0.35	0.7	0.9	1.02	0.99	0.24	0.23	0.29	0.61	0.36	0.33	0.83	0.43	0.38	1.44
Macrouridae	3.84	1.81	1.52	2.8	3.22	8.08	4.02	3.24	2.91	2.85	3.52	2.9	2.25	3.83	2.54	4.59	6.11
<i>Notacanthus sp.</i>	0.62	0.51	0.08	0.59	0.56	0.92	0.57	0.43	0.22	0.36	0.21	0.08	0.12	0.13	0.08	0.03	0.18
<i>Illex sp.</i>	0.01	0.01	2.05	1.44	0.08	0	0.26	0	0.11	0.08	0.09	0.02	0	0.01	0.01	0.28	0.59
Anarhichadidae	9.94	9.31	10.1	12.56	11.31	17.85	19.45	23.9	25.57	17.45	13.66	6.94	5.56	7.29	6.5	7.44	13.17
Witch flounder	1.13	0.42	0.52	0.96	1.02	1.3	0.98	0.88	0.63	0.4	0.3	0.47	0.51	0.57	0.26	1.05	1.95
Greenland halibut	8.61	5.56	7.21	10.16	10.85	8.12	9.99	13.52	14.42	20.02	30.13	26.37	21.09	17.25	15.05	7.73	15.28
Zoarcidae	0.7	1.42	1.5	2.46	1.69	4.32	2.33	2.71	2.12	2.15	2.56	1.11	0.97	1.55	1.01	2.57	4.58
Cod	50.78	141.82	73.82	50.05	33.22	75.81	32.91	12.06	11.21	12.39	6.20	3.55	3.81	3.35	3.10	1.98	5.06
American plaice	19.95	17.47	14.90	12.54	10.76	9.78	10.23	8.44	5.10	3.76	4.27	3.21	2.00	2.99	2.55	2.84	4.38
Redfish	234.19	202.11	157.62	95.69	161.91	90.29	202.10	108.98	148.80	206.19	88.08	122.67	221.33	96.18	150.85	116.66	311.62
Shrimp*	7.14	2.86	4.34	14.50	31.28	15.03	4.95	9.33	13.56	9.58	52.19	32.00	24.52	35.21	49.96	26.75	25.03
Others	0.79	0.26	1.42	0.83	0.53	0	0.59	0.49	0.86	0.73	1.38	0.77	1.98	1.8	1.16	7.03	3.39
Total	344.07	386.41	277.78	209.92	271.69	240.61	293.42	186.67	227.52	277.86	204.61	202.00	284.12	172.49	234.43	178.74	398.10

(\*) Values affected by mesh size cod-end: 40 mm in 1994, 25 mm in 1998 and 30 mm in 1999.



**Table 5** – Cod mean catch per tow (Kg) by strata in 1988-2004 surveys.

strata	depth in fathoms	year																
		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	70- 80	51.62	24.91	31.67	214.33	2.90	19.79	83.11	59.97	38.62	9.32	4.81	3.81	9.57	3.31	18.31	6.64	72.16
2	81-100	158.97	161.67	32.32	85.91	80.67	141.64	128.21	47.61	62.50	32.08	29.75	23.52	11.60	7.68	11.53	1.60	24.89
3	101-140	93.43	214.78	45.84	51.39	177.06	176.28	127.32	23.96	22.01	23.66	14.67	3.05	7.51	4.82	9.41	1.88	0.19
4	"	118.03	182.67	97.70	109.36	129.88	534.46	71.11	28.12	40.26	32.32	5.26	0.97	16.72	18.43	2.50	5.13	5.51
5	"	39.78	199.81	158.89	198.86	85.31	127.41	17.26	23.78	17.49	21.47	18.20	4.77	7.92	4.85	2.74	5.66	0.28
6	"	85.49	179.66	87.50	40.50	25.21	111.67	37.36	34.64	16.42	28.44	16.22	9.93	13.53	19.83	13.88	0.64	3.86
7	141-200	35.50	255.88	62.90	40.53	15.09	98.24	13.67	1.95	0.87	17.05	1.24	0.82	0.09	0.20	0.38	1.71	0.29
8	"	181.45	333.89	342.16	103.75	47.72	161.79	73.45	7.08	1.90	32.71	1.56	0.47	1.48	2.50	0.76	2.26	0.09
9	"	7.68	219.91	270.98	7.87	5.98	41.69	10.00	0.37	4.30	7.28		0.80	1.72		0.58	15.72	
10	"	18.47	67.60	64.58	21.51	4.51	12.92	6.98	0.80	0.64	4.16	2.74	1.41	1.47	1.11	0.03	0.33	
11	"	40.80	215.27	66.37	29.10	3.66	27.33	9.47	1.28	0.67	5.06	2.86	4.16	1.72	2.84	0.30	0.93	0.46
12	201-300	6.57	48.37	31.84	2.47			0.47										1.39
13	"	0.44	133.59	39.93	4.94													
14	"	2.33	24.43	14.00	2.85	1.46	4.81											0.00
15		14.74	166.25	46.32	2.13													0.35
16	301-400		1.35															
17			0.31				0.14											
18		0.13					0.18											
19			3.19															
total		50.78	141.95	75.71	50.05	33.22	76.08	32.91	12.05	11.21	12.39	6.20	3.55	3.81	3.35	3.10	1.98	5.06
s.e.		7.19	15.18	10.23	8.34	7.26	21.63	9.16	2.57	1.81	2.14	0.80	0.56	0.74	0.47	0.49	0.34	0.97

s.e.: standard error

**Table 6** – Cod mean length frequency ('000) per tow in the 2004 survey.

length		length		length		length	
6-8	0.02	33-35	0.18	57-59	0.20	81-83	0.01
12-14		36-38	1.24	60-62	0.18	84-86	0.00
15-17		39-41	1.86	63-65	0.12	87-89	0.01
18-20		42-44	0.79	66-68	0.09	90-92	0.01
21-23		45-47	0.05	69-71	0.06	93-95	0.01
24-26		48-50	0.01	72-74	0.03	96-98	0.00
27-29	0.01	51-53	0.07	75-77	0.03	99- 101	0.01
30-32	0.05	54-56	0.15	78-80	0.01		

**Table 7** – Cod age-length key in 2004.

Length cm	age																total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	
6-8																	2
9-11																	
12-14																	
15-17	1																1
18-20																	
21-23	1																1
24-26																	
27-29		1															1
30-32		2															2
33-35		21															21
36-38		114															114
39-41		186															188
42-44		81															81
45-47		15		1													16
48-50			2	2													4
51-53			4	14													18
54-56			3	27													30
57-59				53													53
60-62				41	2												43
63-65				34	6												40
66-68				11	17												28
69-71				4	14												18
72-74					7												7
75-77					4												4
78-80						1											1
81-83					1		2										3
84-86						1		1									2
87-89							2	1									3
90-92										1							1
93-95										1							1
96-98											1						1
99-101									1								1
102-104										1							1
total	2	420	9	187	51	2	4	2	1	3	1						686

**Table 8** – American plaice mean catch per tow by strata and its standard error in the 2004 survey.

strata	area	tow	mean catch per tow
	sq. miles	number	(Kg)
1	342	5	52.62
2	838	13	11.52
3	628	7	8.9
4	348	5	13.21
5	703	8	1.27
6	496	6	0.61
7	822	9	1.24
8	646	7	1.08
9	314	3	2.99
10	951	12	0.58
11	806	10	1.03
12	670	8	
13	249	2	
14	602	7	
15	666	8	
16	634	7	
17	216	2	
18	210	2	
19	414	3	
total	10555	124	4.38
s.error			0.92

**Table 9** – American plaice mean frequency at age per tow in the 2004 survey.

age	strata											total	mean weight g	mean length cm	
	1	2	3	4	5	6	7	8	9	10	11				
1															
2	0.12	0.16	0.27	0.53	0.26	0.26	0.24			0.18	0.42	0.15	113	22.1	
3	0.61	0.75	0.92	2.72	0.90	0.50	0.13			0.03	0.36	0.35	183	26.1	
4	0.84	0.13	0.25	0.49	0.04	0.13	0.05			0.07	0.05	0.09	306	30.7	
5	1.77	0.13	0.08	0.30	0.06		0.05			0.06	0.05	0.10	457	35.1	
6	2.65	0.14	0.08	0.34	0.06		0.06			0.07	0.07	0.13	565	37.5	
7	2.76	0.14	0.06	0.34	0.11		0.02	0.00		0.03	0.05	0.13	593	38.0	
8	3.38	0.25	0.06	0.26	0.11	0.00	0.03	0.02	0.00	0.03	0.05	0.16	691	40.0	
9	6.41	0.50	0.13	0.49	0.21	0.00	0.08	0.02	0.00	0.04	0.10	0.31	710	40.3	
10	8.56	0.56	0.19	0.49	0.22	0.00	0.10	0.04	0.00	0.06	0.15	0.39	754	41.2	
11	7.33	0.61	0.23	0.57	0.13	0.03	0.11	0.02	0.04	0.06	0.13	0.35	785	41.7	
12	14.81	1.32	0.59	1.43	0.28	0.03	0.21	0.10	0.21	0.11	0.23	0.74	837	42.5	
13	8.56	1.28	0.71	1.36	0.17	0.03	0.18	0.14	0.38	0.07	0.15	0.53	998	44.7	
14	7.45	1.33	0.86	1.40	0.17	0.03	0.14	0.16	0.29	0.07	0.11	0.50	1092	46.2	
15	4.49	1.33	0.92	1.51	0.07	0.08	0.14	0.14	0.33	0.06	0.07	0.41	1240	48.2	
16+	4.84	2.37	2.05	3.02	0.09	0.16	0.21	0.22	0.88	0.10	0.10	0.65	1490	51.5	

**Table 10** – American plaice mean catch per tow (Kg) by strata in 1988-2004 surveys.

strata	depth in fathoms	year																
		1988	1989	1990	1991	1992	1993	1984	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	70- 80	50.09	38.38	19.40	41.37	27.24	41.42	25.40	85.58	56.10	14.64	5.99	14.30	13.24	40.02	5.41	49.58	52.62
2	81-100	44.54	56.42	21.52	41.71	26.84	19.84	18.76	20.91	14.78	11.60	24.86	28.34	15.30	13.07	19.76	11.36	11.52
3	101-140	28.57	23.35	34.86	26.06	13.18	9.27	6.80	5.27	3.52	10.34	5.95	2.04	0.44	1.93	1.55	0.36	8.9
4	"	82.92	17.43	30.81	12.07	21.00	21.56	32.19	18.46	10.12	7.65	12.92	2.03	3.77	3.24	4.85		13.21
5	"	48.53	57.74	34.15	26.26	15.64	24.10	22.95	10.26	9.32	11.55	13.88	1.37	1.05	2.08	3.55	1.53	1.27
6	"	12.68	29.90	25.22	13.28	15.91	8.07	21.39	3.24	0.84	0.36	0.93	1.05	0.65	0.97	1.65	0.77	0.61
7	141-200	18.74	8.47	13.38	6.21	10.20	5.09	5.04	3.97	1.15	1.32	0.75	0.29	0.23	0.45	0.84	0.48	1.24
8	"	8.49	3.33	5.35	5.08	14.78	9.90	3.47	2.67	1.15	2.49	3.35	0.04		0.93	0.87	0.28	1.08
9	"	4.29	6.83	14.34		15.59	8.57	0.81	20.91	2.31	1.48					0.05	0.38	2.99
10	"	32.07	20.56	27.62	18.06	19.40	20.14	30.86	9.78	5.72	3.96	0.49	1.00	0.61	1.31	0.49	0.75	0.58
11	"	19.30	19.02	21.44	6.53	6.07	4.75	4.93	1.79	1.09	0.52	0.48	0.61	0.36	0.44	0.95	0.47	1.03
12	201-300	0.17	0.36	0.88	0.33	0.21	0.29	0.65	0.23	0.63	0.13					0.08		0.22
13	"	0.11		1.08					0.13									
14	"	0.16	0.19	0.13	8.49	0.63	0.12	0.52	0.31	0.09		0.09	0.21					
15	"	0.44	1.95	0.05	1.91	0.75	2.16	0.79	1.35	0.44	0.13	0.13						0.12
16	301-400	0.12			0.07	0.19	0.27	0.12										
17	"																	
18	"																	
19	"				0.47	0.11	0.17	0.08	0.32									
total		19.95	17.47	14.90	12.55	10.76	9.79	10.23	8.44	5.09	3.76	4.27	3.21	2.00	2.99	2.55	2.86	4.38
s.e.		2.29	2.55	1.59	1.47	1.19	1.29	1.71	1.35	1.13	0.88	0.93	1.08	0.41	0.53	0.91	0.93	0.92

**Table 11** – American plaice mean length frequency per tow in the 2004 survey.

length	male	female	length	male	female	length	male	female	length	male	female
12-13			24-25	0.12	0.02	36-37	0.48	0.02	48-49		0.24
14-15			26-27	0.07	0.09	38-39	0.47	0.04	50-51	0.01	0.42
16-17	0.01	0.01	28-29	0.02	0.07	40-41	0.49	0.09	52-53		0.51
18-19		0.01	30-31	0.08	0.01	42-43	0.50	0.06	54-55		0.26
20-21	0.01	0.02	32-33	0.07		44-45	0.17	0.16	56-57		0.07
22-23	0.02	0.06	34-35	0.14	0.01	46-47	0.05	0.11	58-59	0.01	0.02

**Table 12** – American plaice age-length key in 2004.**MALE**

Length cm	age																total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	
12-13																	
14-15																	
16-17		1															1
18-19																	
20-21		2															2
22-23		2	3														5
24-25		4	11	1													16
26-27			9														9
28-29				1													1
30-31			1	4	3	3	1										12
32-33				1	4	1	6	1	3								16
34-35				1	3	3	3	6	8	3	2	3	2	1	1		36
36-37					1	3	3	4	7	11	8	17	12	6	3	1	76
38-39							1	3	11	11	14	19	12	10	7	2	90
40-41						1	1		5	10	13	26	9	4	6	4	79
42-43							1	1	5	9	5	16	6	9		1	53
44-45								2	1	2	1	3	4	3	1	1	18
46-47									1	1	1	1	1	1	1	1	8
48-49																	
50-51														1			1
52-53																	
54-55																1	1
56-57																	
58-59													1				1
total	0	9	24	8	11	11	16	17	41	47	44	85	47	35	19	11	425

**FEMALE**

Length cm	age																total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	
16-17		2															2
24-25		1															1
26-27		2															2
28-29		5	2														7
30-31		2	4														6
32-33		1	11														12
34-35			10	1													11
36-37			1	1													2
38-39																	
40-41				2	1												3
42-43				1	1												2
44-45					5	4											9
46-47					1	6	1	2									10
48-49						1	6	5									12
50-51							1	2	7	7	2	2		2	1		24
52-53									1	4	4	3	3	2	2	3	22
54-55								1	2	1	5	8	8	6	10	9	50
56-57										1	1	11	14	13	15	19	74
58-59										1	1	3	8	12	17	14	92
total	0	13	28	5	8	11	8	10	11	14	15	33	41	47	55	109	408



**Table 13** – Redfish (*Sebastes marinus*) mean catch per tow by strata and its standard error in the 2004 survey.

strata	Area sq. miles	tow number	mean catch per tow
			(Kg)
1	342	5	22.66
2	838	13	106.34
3	628	7	61.52
4	348	5	52.07
5	703	8	438.26
6	496	6	415.08
7	822	9	93.05
8	646	7	18.03
9	314	3	11.44
10	951	12	159.44
11	806	10	93.64
12	670	8	1.73
13	249	2	1.27
14	602	7	6.90
15	666	8	2.22
16	634	7	
17	216	2	
18	210	2	
19	414	3	
total	10555	124	106.17
s.error			22.00

**Table 14** – Redfish (*Sebastes marinus*) mean length frequency per tow ('000) in the 2004 survey.

length	male	female	length	male	female
13			29	0.97	0.15
14		0.07	30	1.24	0.14
15	0.76	1.30	31	1.51	0.10
16	9.24	10.73	32	1.87	0.66
17	24.00	24.16	33	2.96	0.35
18	49.80	47.57	34	1.87	0.36
19	66.44	61.40	35		
20	79.13	92.51	36	0.71	0.35
21	56.30	67.33	37	0.16	0.70
22	30.94	40.13	38	0.15	0.74
23	9.84	15.08	39	0.05	0.09
24	3.55	6.83	40	0.06	0.34
25	2.27	3.38	41		0.36
26	1.72	1.52	42		0.36
27	1.12	0.31	43		0.11
28	1.14	0.79	44		0.12

**Table 15** – Redfish (*Sebastes mentella*) mean catch per tow and its standard error by in the 2004 survey.

strata	Area sq. miles	tow number	mean catch per tow)
			(Kg
1	342	5	
2	838	13	0.23
3	628	7	3.88
4	348	5	4.04
5	703	8	7.06
6	496	6	23.43
7	822	9	99.01
8	646	7	69.18
9	314	3	235.89
10	951	12	96.48
11	806	10	100.89
12	670	8	53.55
13	249	2	119.75
14	602	7	114.4
15	666	8	14.91
16	634	7	1.6
17	216	2	1.73
18	210	2	
19	414	3	1.67
total	10555	124	57.2
s.error			7.63

**Table 16** – Redfish (*Sebastes mentella*) mean length frequency per tow ('000) in the 2004 survey.

length	male	female	length	male	female	length	male	female
13			24	4.44	3.20	35	0.04	0.36
14	0.19		25	3.06	2.67	36	0.02	0.17
15	2.21	1.84	26	3.46	2.77	37	0.06	0.07
16	14.03	12.05	27	4.71	2.62	38	0.05	0.07
17	15.12	16.43	28	4.43	2.90	39		
18	26.88	27.08	29	3.07	1.96	40		
19	52.82	51.57	30	1.55	1.94	41	0.01	
20	51.51	45.29	31	0.51	2.06	42		
21	17.65	16.02	32	0.12	1.98	43		
22	4.79	5.89	33	0.19	1.09	44		
23	4.43	3.74	34	0.06	0.85	45		

**Table 17** – Redfish (*Sebastes mentella*) mean frequency ('000)at age per tow in the 2004 survey.

Age	Strata																		Total (1-19)	Mean length cm.	Mean weight g.
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	19	20			
2	0.08	0.16	0.28	1.43	13.46	8.24	1.84	5.29	11.72	3.73	0.10	0.10		0.03					3.02	16.1	60
3	1.73	6.37	5.12	23.37	125.99	171.83	58.37	163.77	177.50	101.82	3.10	1.14	1.44	4.22	0.09				54.33	17.3	75
4	0.71	5.94	5.03	12.45	54.68	175.30	85.82	217.56	166.13	152.48	7.67	1.11	2.92	8.99	0.10				57.22	18.8	97
5	0.52	20.14	20.79	24.71	88.06	563.44	385.49	1089.41	549.75	636.21	48.32	19.91	29.34	42.13	0.45			0.08	213.60	20.0	116
6	0.03	3.10	3.88	6.27	9.94	64.84	74.12	318.21	78.02	91.84	42.66	62.76	35.59	11.64	0.21			0.14	41.26	21.7	150
7		0.33	0.65	0.64	0.47	4.11	10.13	80.98	10.19	6.87	47.67	116.71	43.46	5.63	0.22		0.07	0.03	13.54	24.9	223
8		0.17	0.55	0.37		2.13	2.23	23.54	2.53	1.58	41.87	137.22	49.25	4.28	0.37		0.20	0.01	10.41	26.6	273
9		0.12	0.35	0.96		1.94	0.35	7.00	0.49	0.11	25.58	96.56	49.62	3.06	0.51		0.11	0.06	7.47	28.3	329
10		0.04	0.09	1.02		0.59	0.36	4.22	0.21	0.04	14.03	44.32	33.13	1.67	0.39		0.16	0.10	4.25	29.2	362
11		0.01	0.02	0.35		0.15	0.16	1.70	0.05	0.01	6.86	18.52	22.80	0.81	0.26	0.14	0.12	0.07	2.35	30.7	420
12				0.19			0.12	0.74	0.01		3.59	6.62	15.57	0.47	0.18	0.20	0.09	0.03	1.36	31.9	473
13				0.02			0.14	0.21			3.21	4.44	16.15	0.40	0.36	0.54	0.11	0.07	1.30	33.0	523
14		0.05	0.18	1.18		0.93	0.47	6.34	0.26	0.04	25.81	75.02	80.73	3.26	0.94	0.51	0.53	0.27	8.70	30.3	405
15											0.13		1.30	0.02	0.02				0.09	34.5	592
16							0.02				0.44	0.62	3.83	0.14	0.14	0.37	0.08		0.27	35.3	639
17				0.01				0.21			0.55	1.44	3.11	0.09	0.11		0.11	0.01	0.27	32.8	513
18												0.39	0.59		0.10		0.08		0.05	36.5	701
19											0.19		1.60	0.10	0.20	0.60	0.16		0.14	38.3	811
20												0.39	0.59		0.10		0.08		0.05	36.5	701
21											0.13		1.30	0.02	0.02				0.09	34.5	592
22							0.02				0.22	0.23	0.87	0.02	0.02	0.07			0.07	33.5	542
25																					
26																					
29											0.21		1.08	0.04	0.13	0.13	0.07	0.05	0.09	35.5	645
32											0.21		1.08	0.04	0.13	0.13	0.07	0.05	0.09	35.5	645
36											0.10		0.53			0.30	0.47		0.07	39.8	927
Total	3.07	36.44	36.94	72.96	292.60	993.50	619.65	1919.19	996.88	994.72	272.63	587.49	395.89	87.05	5.07	2.98	2.48	0.98	420.07	20.6	136



**Table 19** – Redfish (*Sebastes fasciatus*) mean catch per tow by strata in the 2004 survey.

strata	Area sq. miles	tow number	mean catch per tow (Kg)
1	342	5	22.01
2	838	13	80.65
3	628	7	17.26
4	348	5	36.99
5	703	8	272.85
6	496	6	217.08
7	822	9	116.72
8	646	7	110.06
9	314	3	184.12
10	951	12	212.52
11	806	10	76.83
12	670	8	20.55
13	249	2	15.7
14	602	7	8.64
15	666	8	16.93
16	634	7	0.27
17	216	2	
18	210	2	
19	414	3	0.35
total	10555	124	94.71
s. error			21.86

**Table 20** – Redfish (*Sebastes fasciatus*) mean length frequency per tow ('000) in the 2004 survey.

length	male	female	length	male	female	length	male	female	length	male	female
13			20	52.88	45.13	27	1.02	1.93	34	0.01	0.03
14	0.03	0.06	21	35.98	38.02	28	0.21	1.52	35		
15	4.93	4.31	22	23.15	25.87	29	0.08	1.36	36		
16	40.16	35.37	23	11.37	16.87	30	0.15	1.02	37		
17	68.11	57.68	24	7.44	7.77	31		0.72	38		
18	75.52	63.57	25	3.89	4.93	32	0.06	0.13	39		
19	61.09	57.56	26	3.26	4.51	33		0.13	40		

**Table 21** – Juvenile redfish (*Sebastes sp.*) mean catch per tow by strata and its standard error in the 2004 survey.

stratum	Area sq. miles	tow number	mean catch per tow
			(Kg)
1	342	5	1.36
2	838	13	344.49
3	628	7	77.57
4	348	5	82.12
5	703	8	92.86
6	496	6	71.63
7	822	9	23.7
8	646	7	3.38
9	314	3	3.47
10	951	12	32.92
11	806	10	15.29
12	670	8	0.06
13	249	2	
14	602	7	0.25
15	666	8	
16	634	7	
17	216	2	
18	210	2	
19	414	3	
total	10555	124	53.54
s. error			12.68

**Table 22**– Juvenile redfish (*Sebastes sp.*) mean length frequency per tow ('000) in the 2004 survey.

length	length
7	0.51
8	22.45
9	124.46
10	324.75
11	319.49
12	548.91
13	389.68
14	195.80
15	87.76
16	20.27
17	6.54

**Table 23** – Greenland halibut (*Reinhardtius hippoglossoides*) mean catch per tow by strata and its standard error in the 2004 survey.

strata	Area sq. miles	tow number	mean catch per tow
			(Kg)
1	342	5	0.08
2	838	13	0.16
3	628	7	17.58
4	348	5	11.91
5	703	8	4.19
6	496	6	11.58
7	822	9	15.46
8	646	7	15.69
9	314	3	18.07
10	951	12	9.1
11	806	10	9.33
12	670	8	14.73
13	249	2	18.2
14	602	7	29.46
15	666	8	19.57
16	634	7	19.09
17	216	2	11.8
18	210	2	34.4
19	414	3	16.27
total	10555	124	15.28
s. error			0.99

**Table 24** – Greenland halibut (*Reinhardtius hippoglossoides*) mean length frequency ('000) per tow in the 2004 survey.

length	male	female	length	male	female	length	male	female	length	male	female
10-11			30-31	0.30	0.45	50-51	0.28	0.47	70-71		
12-13			32-33	0.36	0.27	52-53	0.17	0.33	72-73		
14-15	0.05	0.10	34-35	0.76	0.68	54-55	0.10	0.33	74-75		
16-17	0.76	0.57	36-37	1.07	1.20	56-57	0.08	0.17	76-77		
18-19	1.41	1.67	38-39	1.20	1.40	58-59	0.05	0.25	78-79		
20-21	0.45	0.42	40-41	0.97	1.68	60-61	0.01	0.12	80-81		
22-23	0.08	0.06	42-43	1.11	1.57	62-63	0.04	0.06	82-83		0.01
24-25	0.37	0.22	44-45	0.92	1.54	64-65	0.00	0.04	84-85		
26-27	1.06	0.94	46-47	0.43	1.06	66-67	0.00	0.01			
28-29	0.87	0.95	48-49	0.33	0.84	68-69	0.00	0.02			

**Table 25** – Greenland halibut (*Reinhardtius hippoglossoides*) mean frequency ('000) at age per tow and strata in the 2004 survey.

age	strata																			total	mean weight g	mean length cm	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19				
1			0.324	0.018	0.141	0.094	0.129	0.106	0.058	0.864	0.409	0.018	0.004	0.004	0.003						2.20	44	17.4
2			0.651	0.029	0.210	0.147	0.191	0.202	0.088	1.067	0.725	0.021		0.006	0.005						3.34	57	18.9
3			1.106	0.107	0.097	0.799	0.620	0.304	0.041	0.429	0.930	0.009			0.009		0.005				4.42	168	27.2
4	0.001	0.001	0.434	0.077	0.058	0.299	0.294	0.146	0.058	0.191	0.165	0.039	0.005	0.053	0.050	0.024	0.008	0.034	0.033	1.98	322	33.3	
5	0.006	0.011	0.974	0.258	0.207	0.541	0.908	0.597	0.388	0.645	0.468	0.378	0.129	0.387	0.471	0.316	0.088	0.217	0.352	7.33	489	38.3	
6		0.014	0.373	0.250	0.234	0.196	0.698	0.577	0.387	0.449	0.360	0.656	0.189	0.646	0.718	0.798	0.211	0.278	0.577	7.62	691	43.0	
7			0.013	0.057	0.023	0.021	0.143	0.116	0.082	0.073	0.048	0.275	0.107	0.488	0.253	0.419	0.107	0.187	0.175	2.56	1071	49.7	
8				0.006	0.004	0.001	0.021	0.025	0.011	0.008	0.009	0.063	0.031	0.163	0.047	0.128	0.010	0.059	0.019	0.62	1439	54.7	
9				0.004	0.004		0.005	0.015	0.003	0.004	0.005	0.024	0.038	0.101	0.020	0.038	0.008	0.031	0.011	0.30	1693	57.8	
10					0.005			0.008		0.004	0.005	0.005	0.021	0.043	0.013	0.004	0.001	0.018	0.001	0.13	2014	61.2	
11					0.003			0.005		0.001	0.003	0.010	0.016	0.028	0.005	0.004		0.008		0.08	2176	62.7	
12								0.005				0.004	0.014	0.023		0.005		0.001		0.05	2356	64.3	
13													0.004	0.004						0.01	3967	75.6	
14														0.004						0.00	5058	82.5	
15																							
16+														0.004						0.00	5058	82.5	



**Table 26** - Greenland halibut (*Reinhardtius hippoglossoides*) age-length key in the 2004 survey.**MALE**

Length cm	age																total	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+		
12-13																		6
14-15	6																	6
16-17	14	8																22
18-19	8	13																21
20-21		20																20
22-23		3	5															8
24-25		2	15															17
26-27			20															20
28-29			17	2	1													20
30-31			7	10	3													20
32-33				9	12													21
34-35				8	14													22
36-37					17	4												21
38-39				2	12	6												20
40-41				1	5	16												22
42-43					4	17												21
44-45					2	17	3											22
46-47						15	5											20
48-49						8	10	1										19
50-51						2	18	1										21
52-53							18	3										21
54-55							8	13	1									22
56-57							3	13	5									21
58-59								7	10	1								18
60-61									2	3	1							6
62-63										1	2	3						6
total	28	46	64	32	70	85	65	38	18	5	3	3						457

Table 26 – (continued)

## FEMALE

length cm	age																total		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+			
12-13																			
14-15	11	1																	12
16-17	17	6																	23
18-19	7	12																	19
20-21		21																	21
22-23		4	3																7
24-25			13																13
26-27			19	1															20
28-29			17	3															20
30-31			8	11	2														21
32-33			1	15	6														22
34-35				7	15														22
36-37				3	17														20
38-39				2	11	7													20
40-41					13	7													20
42-43					7	14													21
44-45					5	14	1												20
46-47					2	15	7												24
48-49						10	12												22
50-51							20	3											23
52-53						1	17	4											22
54-55							10	8	3										21
56-57							5	12	3										20
58-59							1	7	11	1									20
60-61									5	11	5								21
62-63									2	9	6	3							20
64-65										4	4	5							13
66-67											7	2							9
68-69											1	3	1						5
70-71													1	3					4
72-73												1	5	1					7
74-75													4	3	1				8
76-77													1	1	2	1			5
78-79													1		2				3
80-81													1	2	2				5
82-83													1	1		1			3
total	35	44	61	42	78	68	73	34	24	25	23	14	15	11	7	2			556

**Table 27** – Greenland halibut (*Reinhardtius hippoglossoides*) mean catch per tow (Kg) by strata in 1988-2004 surveys.

strata	depth in fathoms	year																
		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	70- 80																0.00	0.08
2	81-100		0.04	0.10					1.89		0.04	0.09	0.05		0.24	0.16	0.00	0.16
3	101-140	0.55	0.66	0.16	0.17	0.38	0.06		0.46	2.25	1.90	7.67	7.27	5.09	8.03	2.93	1.15	17.58
4	"	5.45	0.76		0.57	1.04	0.39		0.20	0.02	0.87	1.55	7.46	7.81	5.92	2.19	3.96	11.91
5	"	1.39	1.81		0.53	0.77	0.01	0.03	0.40	0.67	1.82	3.22	7.65	5.72	5.01	1.24	1.72	4.19
6	"	0.84	0.48	0.40	0.34	0.22	0.42		0.84	2.80	6.02	9.54	7.94	4.69	7.02	2.74	0.56	11.58
7	141-200	1.36	1.01	0.92	3.01	3.92	1.50	3.42	14.44	18.33	22.74	41.63	37.61	25.06	15.68	6.85	6.61	15.46
8	"	3.07	4.51	1.25	3.65	7.70	2.84	0.92	6.77	7.28	21.64	20.09	40.51	26.74	22.84	17.83	10.30	15.69
9	"	7.53	6.86	2.21	3.17	13.48	1.29	1.80	7.45	6.66	10.63	19.72	14.79	10.22	14.84	5.80	5.85	18.07
10	"	1.48	1.14	0.80	2.37	4.99	0.44	3.23	7.25	9.89	11.89	18.90	21.08	22.11	24.06	10.26	3.95	9.1
11	"	0.73	0.99	0.37	1.72	3.72	3.81	3.84	8.01	10.91	10.21	19.99	21.50	17.73	16.63	5.52	4.51	9.33
12	201-300	7.94	12.68	5.64	14.90	12.12	18.27	23.88	22.46	41.60	44.04	60.30	71.74	42.59	31.00	21.27	13.18	14.73
13	"	3.38	6.51	11.49	2.29	1.26	7.53	8.06	6.70	15.69	25.47	29.21	51.59	20.15	15.29	27.47	3.22	18.2
14	"	8.01	6.58	6.20	17.16	18.48	7.12	13.51	8.95	19.67	34.64	31.86	23.54	10.70	19.11	23.57	19.30	29.46
15	"	8.57	3.32	10.35	19.18	12.67	27.15	29.41	34.84	28.52	53.00	79.91	58.86	52.95	31.86	24.31	11.96	19.57
16	301-400	28.43	28.22	52.65	52.31	37.80	45.03	31.55	38.53	43.43	36.65	69.46	23.65	41.72	27.48	45.17	13.10	19.09
17	"	16.18	7.26	7.71	25.16	2.44	12.01	45.10	45.07	15.66	31.93	44.75	36.70	30.28	10.29	12.42	8.99	11.8
18	"	6.58	3.08	31.63	22.08	3.65	8.15	24.13	59.86	11.95	34.78	48.43	58.21	11.21	35.90	43.36	66.38	34.4
19	"	97.13	29.60	32.52	48.26	96.24	42.54	35.69	38.99	30.78	49.58	82.51	32.19	56.24	35.48	69.55	7.86	16.27
total		8.62	5.56	7.21	10.16	10.85	8.93	10.00	13.52	14.42	20.01	30.13	26.37	21.08	17.25	15.05	7.73	15.28
s.e.		0.95	0.49	1.01	1.02	1.73	1.19	0.84	1.52	1.10	1.41	1.68	1.89	1.15	0.97	0.82	0.76	0.99

**Table 28** – Greenland halibut (*Reinhardtius hippoglossoides*) abundance ('000) by age in 1988-2004 surveys.

AGE	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	1309	1669	1444	1386	10036	4728	2653	2203	856	3002	6498	3300	1764	1769
2	208	1259	1273	1029	2017	6404	3066	1705	583	246	1134	2371	811	2688
3	249	448	752	1379	1826	1980	5150	6182	2412	482	1463	2248	494	3554
4	1137	1040	673	1452	1531	2430	5367	8890	8355	1698	781	1344	1220	1590
5	2127	1844	1029	1533	1987	3403	5418	9906	10909	5539	2225	3111	1982	5898
6	1269	2230	1564	2389	4157	4634	6621	9052	10166	11536	6068	4454	2369	6128
7	2212	1945	1632	2139	3152	2012	4075	6240	4373	4388	5396	4668	1536	2062
8	515	1042	1244	1168	1686	1298	1681	2145	1455	1830	2759	934	382	497
9	460	481	775	628	1034	346	537	612	279	363	138	115	105	239
10	363	264	211	230	214	65	172	169	80	92	37	48	81	102
11	143	137	108	85	54	22	24	24	6	44	5	16	15	67
12	11	66	39	48	20	28	17	6	2			5	4	43
13		17	20	16			18	15	2					5
14		12	10		4	4			5					3
15	14					5	6							
16+	8						8							3
<b>TOTAL ('000)</b>	10025	12453	10774	13484	27717	27357	34812	47150	39485	29221	26504	22613	10762	24648
<b>N5+('000)</b>	7122	8038	6632	8236	12308	11817	18577	28169	27277	23792	16628	13351	6474	15047

**Table 29** – Greenland halibut (*Reinhardtius hippoglossoides*) biomass (ton.) by age in 1988-2004 surveys.

AGE	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	35	58	42	47	370	155	85	89	28	104	265	103	48	78
2	18	159	130	108	232	948	375	233	77	26	164	310	79	152
3	198	111	147	361	375	459	1233	1745	572	91	327	394	112	599
4	652	612	188	588	518	985	1824	3437	3234	612	316	503	452	511
5	1481	1354	488	812	900	1854	2474	4875	5334	2592	1133	1668	1094	2886
6	1168	1845	1064	1587	2493	3159	3878	5623	6216	7212	4039	3138	1864	4232
7	2450	1820	1393	1735	2356	1739	3087	4609	3449	3544	4477	4438	1711	2208
8	610	1118	1297	1182	1642	1397	1651	2111	1435	1923	2704	1100	518	715
9	462	580	961	792	1301	474	719	726	370	435	207	177	178	405
10	451	339	306	344	352	104	269	224	142	150	68	92	160	205
11	214	195	189	145	105	58	64	31	10	89	13	33	37	146
12	30	101	71	59	46	52	31	10	6			12	11	101
13		28	44	32			38	32	6					20
14		17	40		12	20			14					15
15	48					18	14							
16+	34						27							15
<b>TOTAL (ton.)</b>	7852	8339	6361	7793	10703	11422	15768	23744	20893	16776	13713	11968	6263	12288
<b>Biomass 5+</b>	6949	7397	5855	6689	9207	8876	12251	18241	16982	15944	12641	10657	5573	10948

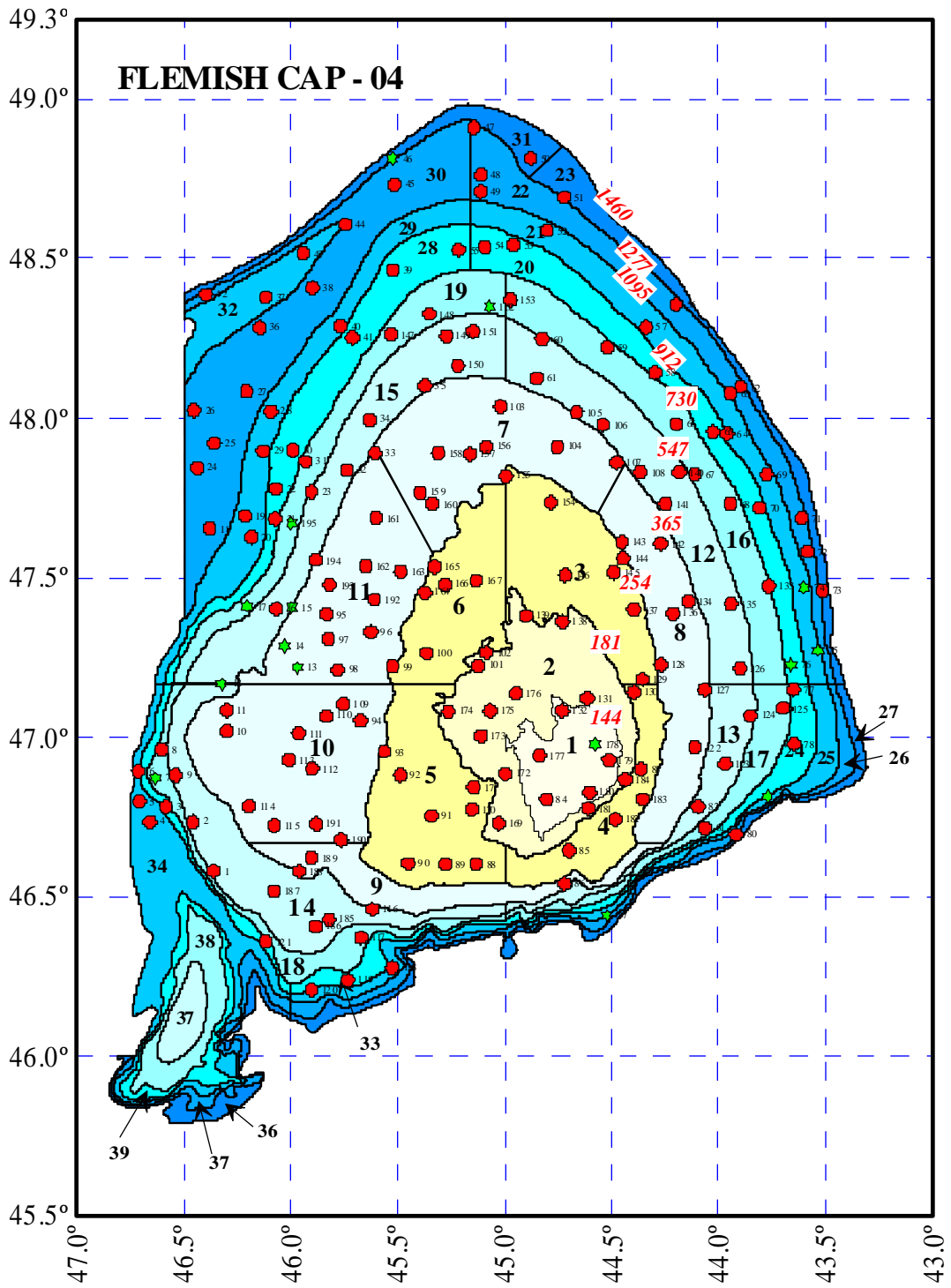
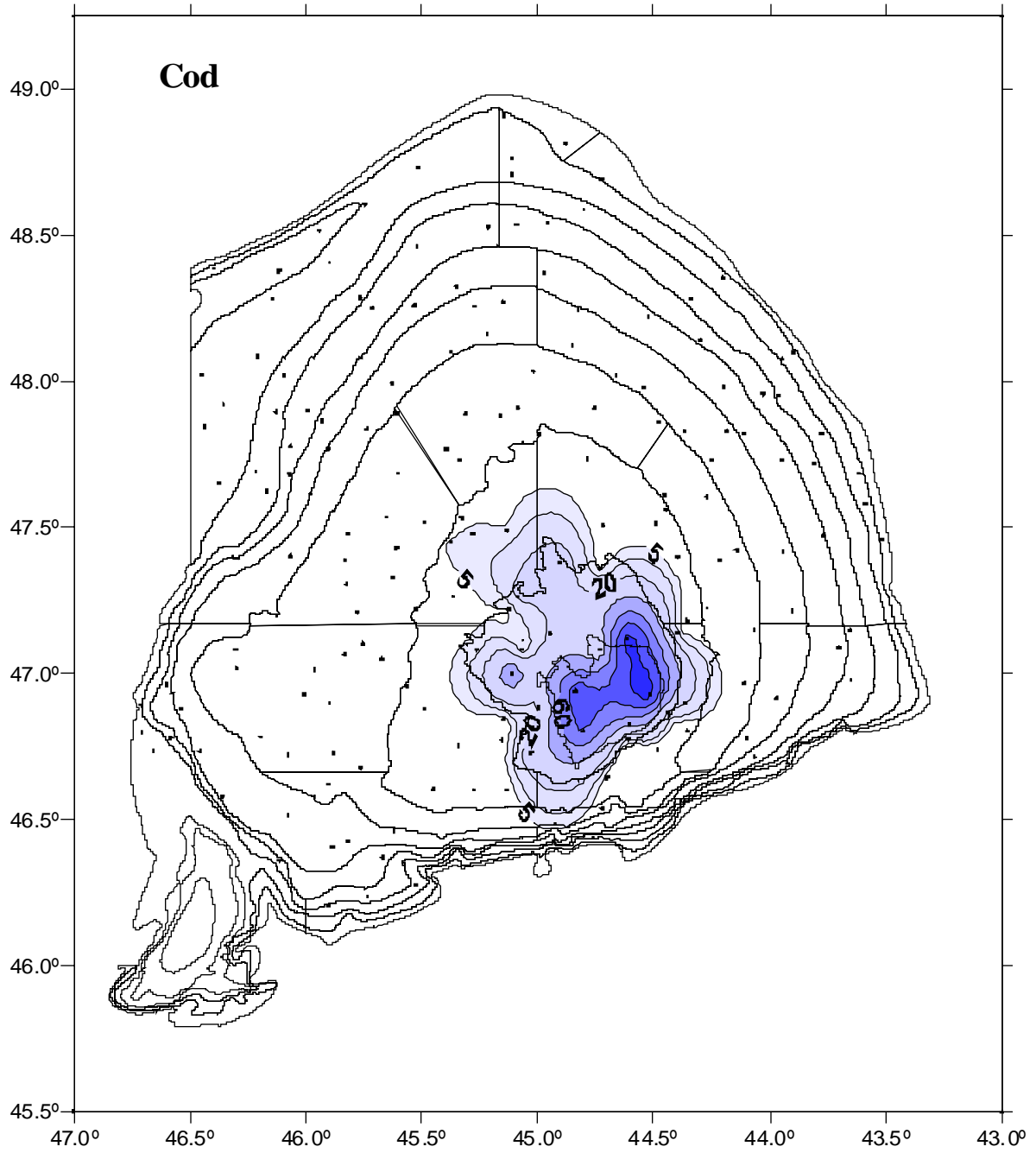
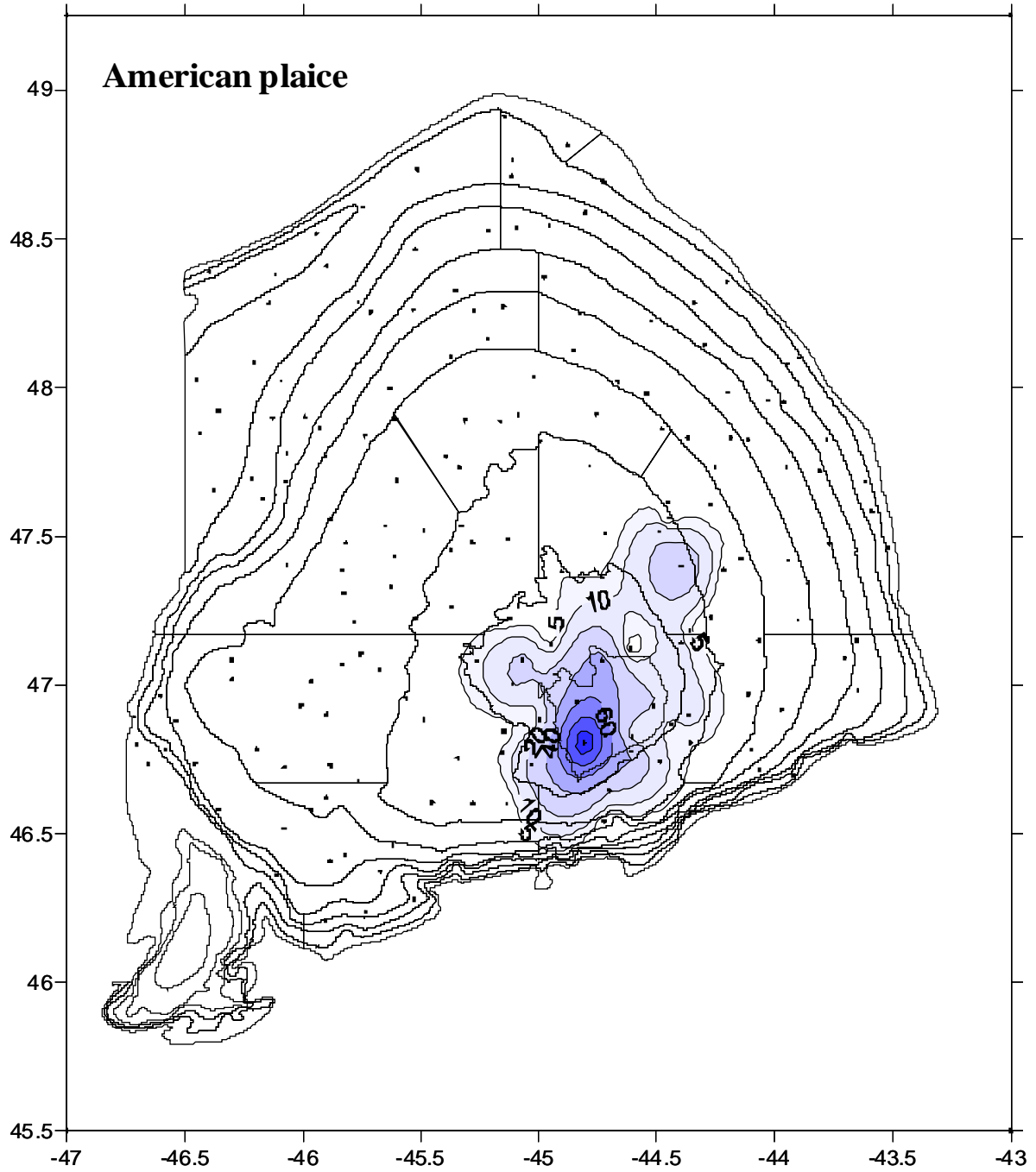


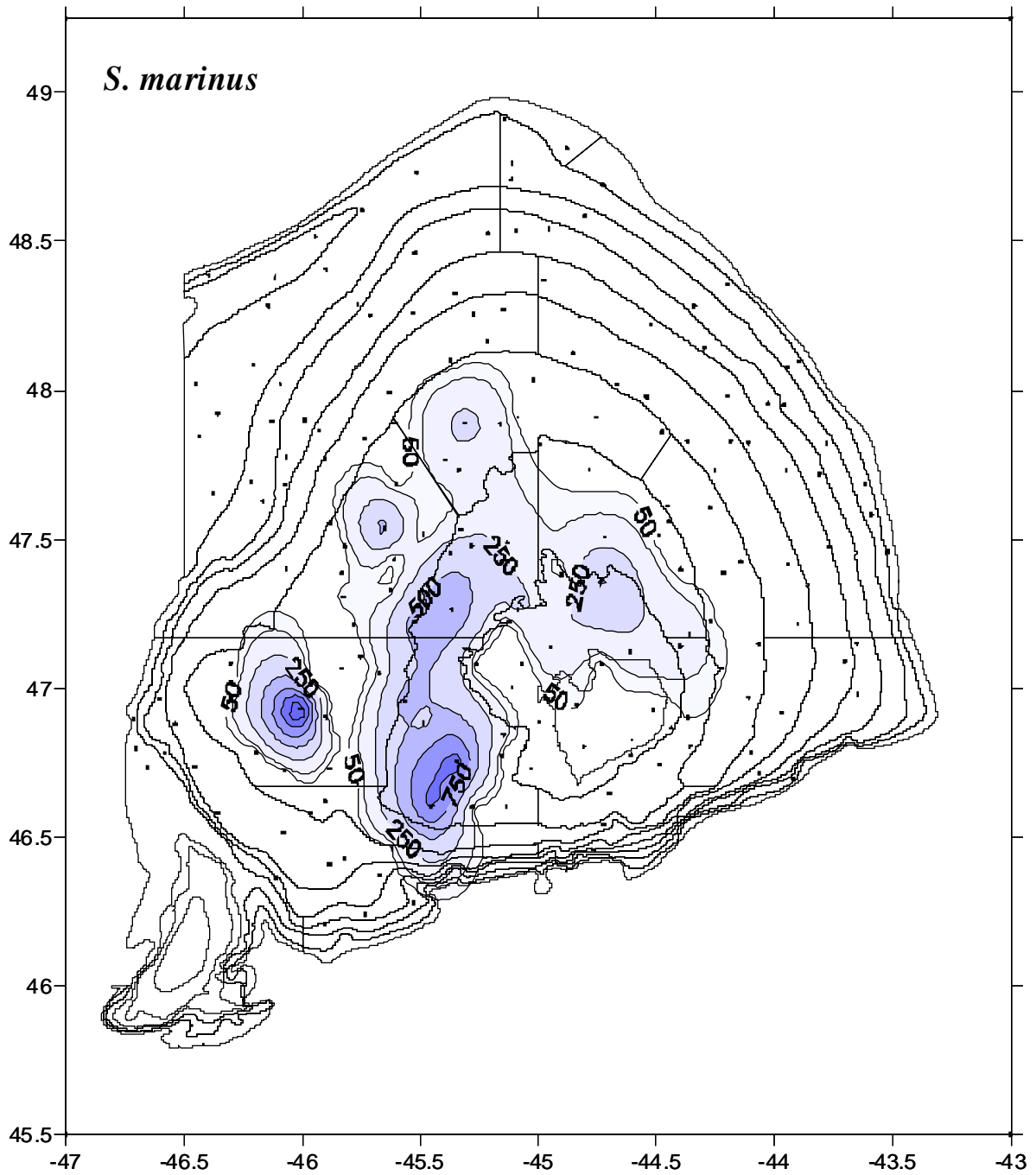
Figure 1 - Haul positions for the Flemish Cap 2004 survey.



**Figure 2** - Cod (*Gadus morhua*) catch distribution in the 2004 survey in Kg/tow.

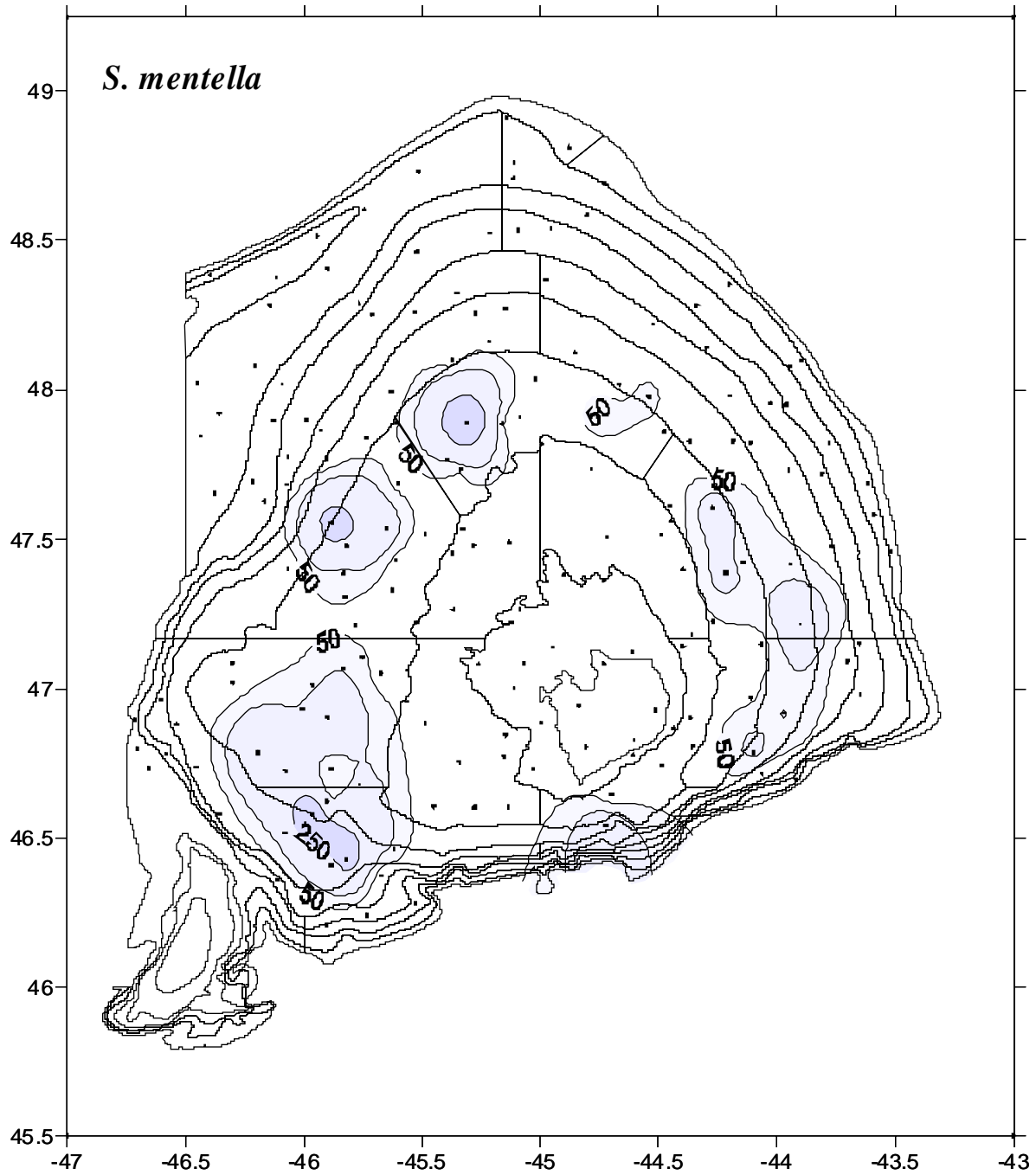


**Figure 3** - American plaice (*Hippoglossoides platessoides*) catch distribution in the 2004 survey in Kg/tow

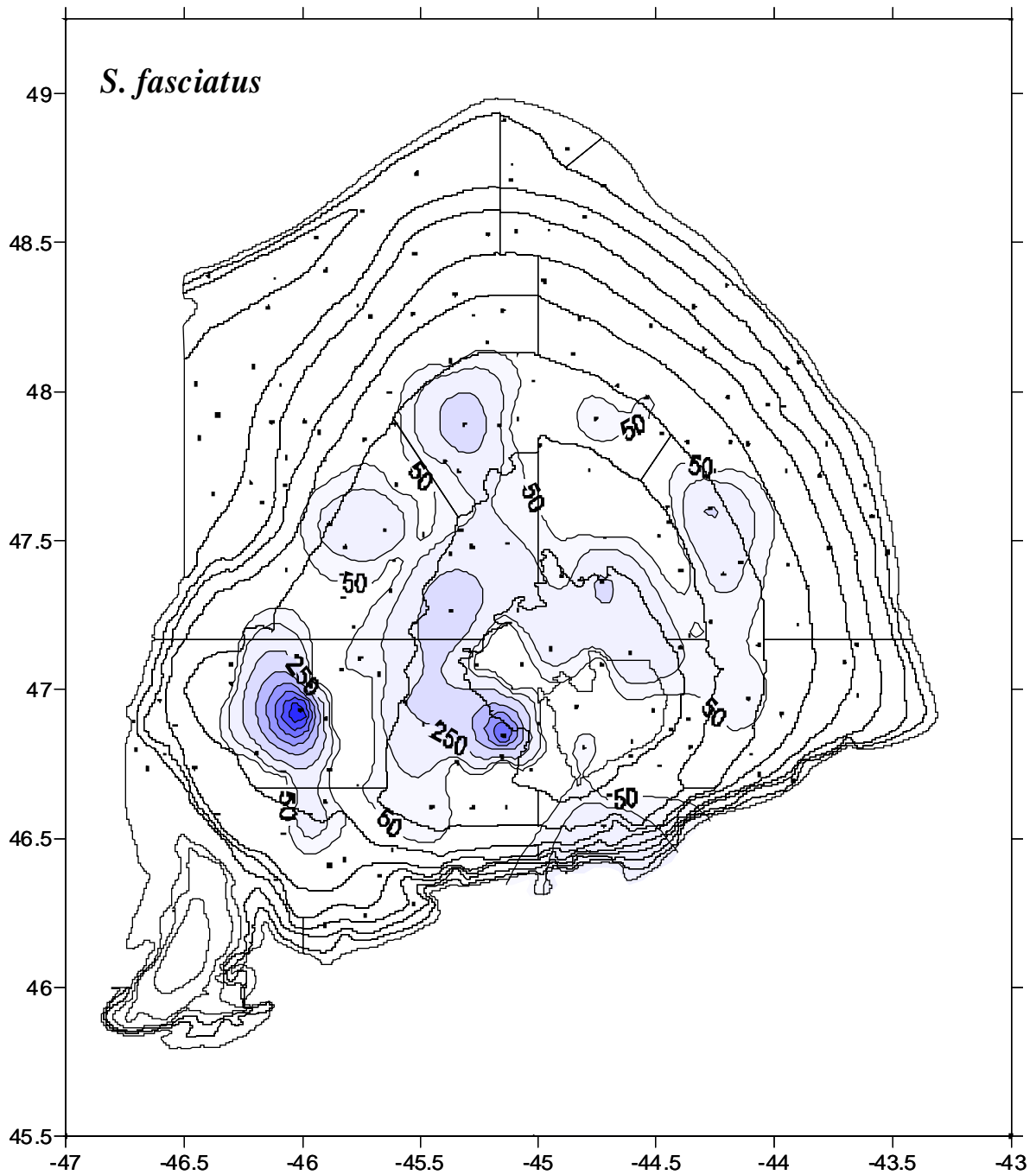


**Figure 4** - Redfish (*Sebastes marinus*) catch distribution in the 2004 survey in Kg/tow

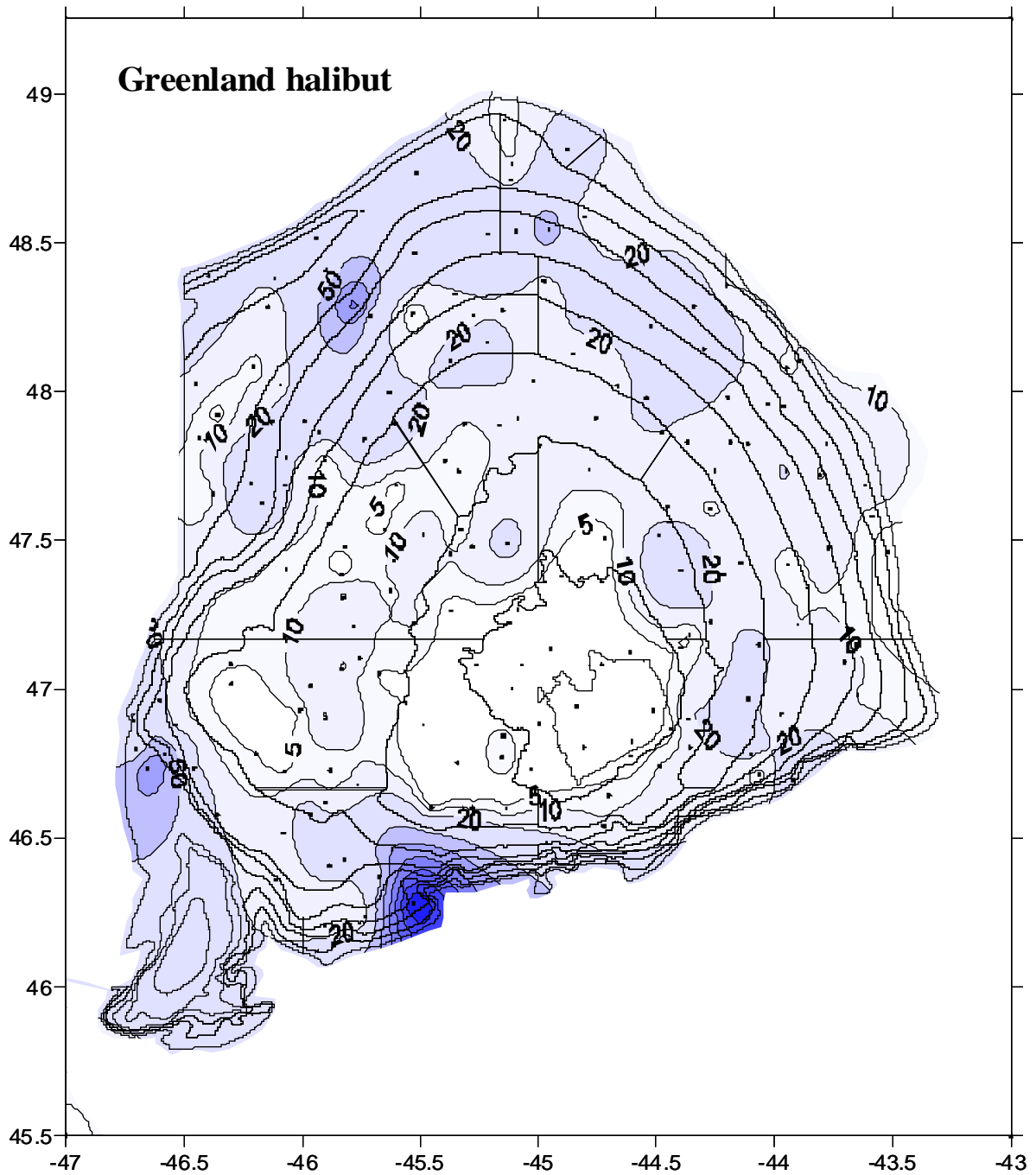




**Figure 5** - Redfish (*Sebastes mentella*) catch distribution in the 2004 survey in Kg/tow



**Figure 6** - Redfish (*Sebastes fasciatus*) catch distribution in the 2004 survey in Kg/tow



**Figure 7** - Greenland halibut (*Reinhardtius hippoglossoides*) catch distribution in the 2004 survey in Kg/tow.