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Results from Bottom Trawl Survey on Flemish Cap of July 2001

by

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Abstract

A stratified random bottom trawl survey on Flemish Cap was carried out on July 2001 up to a depth of 730 metres. Survey results are presented and compared with results of previous surveys in the series since 1988. Abundance-at-age indices were presented for cod, American plaice, redfish and Greenland halibut.

KEYWORDS: Survey, Flemish Cap, Cod, American plaice, Redfish, Greenland halibut.

Introduction

The survey on Flemish Cap was carried out in 2001 on board R/V Cornide de Saavedra. A total of 120 valid bottom trawls were made up to a depth of 730 metres (400 fathoms) (Fig. 1). The survey adequately covered all strata of the bank. A synoptic sheet of the survey with vessel and gear characteristics is shown in Table 1. This was the 14th 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
1988	Cornide de Saavedra	115	8/7 – 22/7
1989	Cryos	116	12/7 – 1/8
1990	Ignat Pavlyuchenkov	113	18/7 – 6/8
1991	Cornide de Saavedra	117	24/6 – 11/7
1992	Cornide de Saavedra	117	29/6 – 18/7
1993	Cornide de Saavedra	101	23/6 – 8/7
1994	Cornide de Saavedra	116	6/7 – 23/7
1995	Cornide de Saavedra	121	2/7 – 19/7
1996	Cornide de Saavedra	117	28/6 – 14/7
1997	Cornide de Saavedra	117	16/7 – 1/8
1998	Cornide de Saavedra	119	17/7 – 2/8
1999	Cornide de Saavedra	117	2/7 – 20/7
2000	Cornide de Saavedra	120	10/7 – 28/7
2001	Cornide de Saavedra	120	3/7 – 20/7

Results

Survey estimates of total biomass of main species on the bank (by the swept area method) were:

survey	Cod	American plaice	Redfish	Greenland halibut	Roughhead grenadier	Shrimp	
1988	37,133	11,887	158,419	6,818	2,390	2,164	
1989	103,644	10,533	136,658	4,391	1,024	1,923	
1990	55,360	9,101	104,193	5,649	996	2,139	
1991	36,597	7,565	63,845	8,038	1,587	8,211	
1992	24,295	6,492	104,477	8,588	1,817	16,531	
1993	55,642	5,949	62,589	7,210	3,757	9,256	
1994	24,062	6,173	126,011	7,904	2,350	3,338	
1995	8,815	5,087	73,641	10,705	1,855	5,413	
1996	8,196	3,073	100,544	11,409	1,619	6,502	
1997	9,063	2,268	139,241	15,846	1,425	5,096	
1998	4,532	2,577	59,316	23,849	2,014	16,620	
1999	2,596	1,940	82,894	20,877	1,488	12,430	
2000	2,782	1,204	149,213	16,690	1,249	9,720	
2001	2,451	1,803	63,913	13,654	2,473	14,106	tons

These survey estimates for total biomass, also presented in Table 2, are assumed to underestimate real values to various degrees, as a consequence of each species having a particular catchability and accessibility to bottom gears. Taking aside these considerations, the total biomass estimated for 2001 is at its lowest absolute level, primarily due to the low in redfish. 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. Only cod reached their biomass minimum in 2001. Greenland halibut maintained a continuous biomass increase to reach a maximum in 1998, but decreases since then. Shrimp catches were very sensitive to small changes in cod-end mesh size, as it happened in some years, so the interpretation of survey results needs to take into account all those circumstances. If all these highly variable species are excluded to calculate the total biomass of remaining species, the resulting amount is much more uniform (Fig. 2), with a maximum in 1998. But this uniform shape is not a consequence of being the secondary species more stable than dominant ones. The abundance of most of those secondary species undergoes so deep changes as main species do.

Cod

Mean catch by strata, biomass estimates for the whole bank by the swept area method and their standard error are presented in Table 3. Total biomass estimates by strata and its comparison with the results of previous surveys are presented in Table 4. Global data compared with Russian survey results are:

Year	EU (1)	Russia: (2)	(3)	
1983		23,070		
1984		31,210		
1985		28,070		
1986		26,060		
1987		10,150	21,600	
1988	37,133	7,720	34,200	
1989	103,644	36,520	78,300	
1990	55,360	3,920	15,200	
1991	36,597	6,740	8,200	
1992	24,295	2,490	2,400	
1993	55,642	8,990	9,700	
1994	24,062	-	-	
1995	8,815	8,260	-	
1996	8,196	730	-	
1997	9,063	-	-	
1998	4,532	-	-	
1999	2,596	-	-	
2000	2,782	-	-	
2001	2,451	-	-	tons

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

The calculated abundance at age is shown in the table bellow. 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 9 or less in 2001) were weak, weaker than the ones observed in the previous period. The 1995 to 1998 year-classes (ages 6 to 3 in 2001) failed almost completely and, according to the results of the present survey, the same failure appears to have occurred to the 1999 year-class (age 2 in 2001).

Age	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1	458	2418	237	13780	7118	438	315	155	4	4	3	1	18	46
2	7262	6062	1179	2560	3706	13274	385	1137	297	14	8	8	1	164
3	4057	6964	467	1538	475	2852	2459	123	613	315	9	10	28	1
4	1067	2819	1588	193	203	102	456	361	82	436	114	10	17	11
5	122	227	1453	628	33	127	12	90	225	36	145	66	8	7
6	19	33	394	168	127	17	6	1	19	90	7	41	41	1
7	22	12	32	31	21	50		2	1	2	14	2	16	14
8	7	7	13	7	1	10	12		1			1	1	10
9		1	8	4				1			1		2	1
10			3	1			1	1						1
11				2	1									1
12										1			1	
13														
14													1	
Total	13014	18543	5374	18906	11685	16870	3646	1873	1240	898	300	139	133	255
biomass	37133	103644	55360	36597	24295	55642	24062	8815	8196	9063	4532	2596	2782	2451
SOP *	32595	100217	51388	37231	22734	54945	22867	8841	8138	8873	4502	2582	2767	2375

iomass in tons and abundances x 10000

*) SOP = Sum of products: back calculation of biomass as sum of products of frequencies and mean weight at age.

Tables 5, 6 and 7 show length frequency, age-length key and estimated abundance at age of the stock in 2001 respectively. Catch per tow distribution is presented in Fig. 3.

American plaice

Mean catch by strata and estimates of the whole bank biomass by swept area method are presented in Table 8. Biomass estimated by strata and comparative results from previous surveys are presented in Table 9. Total biomass in comparison with Russian survey results is shown in the following table:

Year	EU	Russia (1)	
1983		8,900	
1984		7,500	
1985		7,800	
1986		20,200	
1987		9,300	
1988	11,887	6,500	
1989	10,533	5,000	
1990	9,101	1,200	
1991	7,565	14,400	
1992	6,492	1,200	
1993	5,949	2,700	
1994	6,173		
1995	5,087		
1996	3,073		
1997	2,268		
1998	2,577		
1999	1,940		
2000	1,204		
2001	1,803		tons

1) Rikhter *et al.* 1991; Borovkov *et al.* 1992, 1993, 1994

The abundance by age groups is presented in the following table. The 1984, 1986 and 1990 year-classes, ages 17, 15 and 11 in 2001, 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 (N 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. The improvement observed in 2001 is due to an increase in abundance of all age 8+ cohorts, consequence of an occasional increase in survey catchability.

Age	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1										7		6	13	
2	2284	454	359	309	736	9	34	19	28	14	22		22	33
3	625	6847	775	911	679	1365	40	99	103	96	29	20	6	44
4	3034	1500	7083	1877	910	969	1789	627	222	22	42	56	74	48
5	1975	3238	897	4461	1471	643	782	1620	465	99	62	60	88	82
6	3020	3006	2475	1836	3423	320	651	990	1236	311	202	57	118	45
7	4154	2868	1717	2009	913	3110	703	988	656	901	457	177	88	80
8	4258	1691	1657	1566	1090	339	2487	665	411	200	654	339	111	192
9	1492	587	1030	675	624	592	243	1132	308	312	388	371	289	311
10	207	261	485	232	289	296	480	128	470	223	267	189	314	417
11	109	34	90	8	138	198	166	143	113	372	235	260	167	347
12	61	14	15	48	74	229	164	119	63	103	228	163	141	311
13			31		16	280	195	119	67	19	73	98	59	146
14			17			865	398	241	90	77	94	100	44	127
15						28	397	183	62	38	47	49	38	93
16+						35	9	27	20	92	89	82	51	83
Total	21219	20500	16631	13932	10363	9268	8538	7100	4321	2886	2889	2027	1623	2359
biomass	11887	10533	9101	7565	6492	5949	6173	5087	3073	2268	2577	1940	1204	1803
SOP		9726	8827	7682	6111	5856	5966	5041	3031	2229	2533	1930	1181	1760
N 6+	13301	8461	7517	6374	6567	6282	5893	4735	3496	2648	2734	1885	1420	2152

Biomass in tons and abundances $\times 1000$

There is no change in the perception on the condition of the stock relative to the last year views. The stock has recorded a steady decline since 1988. Global indices in the table above, such as total abundance, biomass, SOP and N6+, have decreased over the period: their levels in 2001 are around 10 times lower than in 1988. However, some improvement is observed in those indices in 2001, but it was produced by an unexplainable increase in abundance of all cohorts of 1993 and older, ages 8+ in 2001. Consequently, the apparent improvement must be attributed to an occasional increase in gear catchability in the 2001 survey. 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, and all youngest year-classes, those with less than 10 years old in 2000, were among the weakest observed in this survey.

Tables 10, 11 and 12 show length frequency, age-length key and estimated abundance at age of the stock respectively. Catch per tow distribution is presented in Fig. 4.

Redfish

All redfish catches were classified by species. The group name *juvenile* contains those individuals of small size for which 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 by strata and whole bank data are presented in Tables 13, 15, 20 and 22 for *Sebastes marinus*, *S. mentella*, *S. fasciatus* and the *juvenile* group respectively. Total biomass estimates by the swept area method are summarised in the following table.

Year	*Sebastes*: *marinus*	spp. *mentella*	spp. *fasciatus*	spp. juvenile	EU total	Russia bottom (1)	Russia total (2)
1983						154,900	
1984						132,300	
1985						51,900	
1986						309,500	
1987						110,700	
1988	15,397		143,022		158,419	61,400	379,000
1989	22,962		113,696		136,658	90,100	365,900
1990	14,699	72,893		16,601	104,193	20,700	246,400
1991	4,093	50,071	5,680	4,001	63,845	45,500	107,700
1992	4,130	71,810	5,308	23,229	104,477	18,500	99,500
1993	4,173	25,056	4,425	28,935	62,589	72,600	147,100
1994	33,240	35,710	7,829	49,233	126,011		
1995	9,042	59,332	5,032	235	73,641	21,600	
1996	11,293	77,897	11,025	329	100,544	15,900	
1997	64,847	56,093	17,471	830	139,241		
1998	6,422	45,358	6,436	1,100	59,316		
1999	9,431	65,254	7,954	255	82,894		
2000	44,888	89,365	12,915	2,045	149,213		
2001	8,610	38,617	11,530	5,156	63,914		

tons

1) Trawlable biomass.
2) Trawlable plus pelagic biomass (Vaskov 1994, Vaskov and Karsakov 1996, Vaskov 1997)

Tables 14, 16, 21 and 23 show length frequency for the four groups. Age-length key for *S. mentella* is presented in Table 17, as well as abundance-at-age in 2001 (Table 18) and all previous surveys (Table 19). Catches per tow distributions of the three species are presented in Fig.5, 6 and 7; their abundance at age is given together in the table below.

Greenland halibut

Mean catch by strata and whole bank estimates are presented in Table 24. Total biomass estimates by the swept area method by strata and its comparison with results of previous surveys are presented in Table 25 and summarised as follow:

1988	6,818	
1989	4,391	
1990	5,649	
1991	8,038	
1992	8,588	
1993	7,210	
1994	7,904	
1995	10,705	
1996	11,409	
1997	15,846	
1998	23,849	
1999	20,877	
2000	16,690	
2001	13,654	tons

Length frequency, age-length keys and abundance at age of the population were calculated (Tables 26, 27 and 28). Catch per tow distribution is presented in Fig.8. Abundance at age of the stock was calculated in surveys as follows:

age	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1	349	922	937	832	6,165	2,874	1,597	1,434	525	1,602	4,157
2		800	933	706	1,394	4,613	2,113	1,268	426	147	839
3	235	286	599	1,082	1,369	1,527	4,396	5,149	1,904	312	1,154
4	993	861	566	1,224	1,249	2,066	5,157	7,835	7,178	1,405	687
5	1,956	1,600	960	1,365	1,709	3,070	5,216	9,168	9,818	5,557	2,044
6	1,253	1,996	1,574	2,233	3,793	4,394	6,045	8,821	9,599	11,591	5,927
7	2,283	1,793	1,732	2,096	3,026	2,020	3,885	6,334	4,382	4,093	5,569
8	545	991	1,388	1,213	1,729	1,378	1,709	2,339	1,544	1,701	2,978
9	464	473	905	689	1,134	392	593	703	322	351	168
10	388	266	257	264	254	75	200	201	101	98	49
11	122	139	141	95	68	31	33	27	8	49	7
12		67	51	54	26	35	22	6	4		
13		18	19	19			23	22	4		
14		13	10		7				8		
15						8	8				
16+							14				
total	8,588	10,225	10,072	11,860	21,925	22,483	31,091	43,217	35,823	26,906	23,579
biomass	8,038	8,588	7,210	7,904	10,705	11,409	15,846	23,849	20,877	16,690	13,654
SOP	8,329	8,084	7,136	7,406	9,782	11,005	15,367	23,627	20,094	16,264	13,984
N 10+	510	503	478	432	355	149	300	256	125	147	56

Biomass in tons and abundances $\times 1000$

Shrimp

Díaz (2001) presented detailed results.

Roughhead grenadier (*Macrourus berglax*)

Total biomass estimated by swept area method in this survey was:

1989	1,024	
1990	996	
1991	1,587	
1992	1,817	
1993	3,757	
1994	2,350	
1995	1,855	
1996	1,619	
1997	1,425	
1998	2,014	
1999	1,488	
2000	1,249	
2001	2,473	tons

Detailed results were presented by Murua (2002).

Oceanographic conditions

A CTD station was made after each haul. Cabanas (2002) analysed the results.

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Table 1 – Technical data of the 2001 survey.

Procedure	Specification
Vessel	R/V Cornide de Saavedra
GT	1.200 t
Power	1.500 + 750 HP
Mean trawling speed	3.50 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	2.5 times depth + 100 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 ecosonder 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 (*Sebastes marinus*, *S. mentella* and *S. fasciatus*), Greenland halibut and roughhead grenadier (*Macrourus berglax*).

Table 2 – Total biomass swept area method estimates for several species or groups of species in 1988-2001 surveys (tons).

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Rajidae	4,495	1,908	2,824	4,064	3,765	6,279	3,462	2,267	2,052	1,839	1,981	1,610	1,149	2,237
Synaphobranchus sp.	219	88	42	77	70	70	8	16	3	11	37	1		25
Urophycis sp.	654	167	169	261	69	161	214	83	81	32	229	246	165	394
Antimora sp.	392	302	284	560	720	594	799	195	186	235	488	292	263	665
Macrouridae	3,088	1,438	1,223	2,249	2,592	6,183	3,230	2,604	2,342	2,289	2,833	2,332	1,805	3,076
Notacanthus sp.	501	408	65	478	449	705	455	346	180	287	169	62	100	107
Illex sp.	5	8	1,647	1,159	66	1	210	1	87	64	71	18	3	7
Anarhichadidae	7,973	7,478	8,120	10,097	9,095	14,304	15,516	19,217	20,559	14,036	10,987	5,583	4,475	5,861
Witch flounder	909	335	420	769	823	1,048	776	705	509	319	240	379	412	462
Greenland halibut	6,818	4,391	5,649	8,038	8,588	7,210	7,904	10,705	11,409	15,846	23,849	20,877	16,690	13,654
Zoarcidae	559	923	1,202	1,978	1,356	3,277	1,869	2,182	1,702	1,730	2,055	896	777	1,248
Cod	37,127	103,644	55,360	36,597	24,295	55,642	24,062	8,815	8,196	9,063	4,532	2,596	2,782	2,451
American plaice	11,887	10,533	9,101	7,565	6,492	5,949	6,173	5,087	3,073	2,268	2,577	1,940	1,204	1,803
Redfish	158,419	136,658	104,193	63,845	104,477	62,589	126,011	73,641	100,544	139,241	59,316	82,894	149,213	63,914
Shrimp*	2,164	1,923	2,139	8,211	16,531	9,256	3,338	5,413	6,502	5,096	16,620	12,430	9,720	14,106
Others	624	206	1,138	664	439	779	503	395	692	584	1,109	618	1,588	1,448
Total	235,834	270,410	193,576	146,612	179,827	174,047	194,530	131,672	158,117	192,940	127,093	132,774	190,346	111,458

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

Table 3 – Cod catches (Kg) by strata in the 2001 survey.

	area	tow	catch per tow		catch per mile towed	
stratum	sq. miles	number	mean	s. deviat.	mean	s. deviat.
1	342	4	3.03	3.17	1.72	1.80
2	838	10	6.96	5.01	3.99	2.88
3	628	7	4.39	5.67	2.50	3.24
4	348	4	16.77	5.33	9.58	2.97
5	703	8	4.42	5.12	2.52	2.93
6	496	6	18.03	17.45	10.30	9.97
7	822	9	0.18	0.27	0.10	0.15
8	646	7	2.27	2.27	1.30	1.31
9	314	3				
10	951	11	1.01	2.29	0.58	1.31
11	806	9	2.60	3.07	1.48	1.74
12	670	8				
13	249	3				
14	602	7				
15	666	8				
16	634	7				
17	216	2				
18	210	2				
19	414	5				
total	10555	120	3.05	0.43	1.74	0.24

	ind.	?	?	total
Stock biomass estimated by swep t area method (t)				2,451

Table 4 – Cod biomass estimated by the swept area method (tons) 1988-2001.

	depth in	year													
stratum	fathoms	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1	70- 80	1,223	590	751	5,078	69	469	1,969	1,421	915	221	114	90	227	78
2	81-100	9,229	9,386	1,876	4,988	4,683	8,223	7,443	2,764	3,629	1,863	1,727	1,366	673	446
3	101-140	4,065	9,344	1,994	2,236	7,704	7,670	5,539	1,042	958	1,029	639	132	327	209
4	"	2,846	4,404	2,355	2,637	3,131	12,885	1,714	678	971	779	127	23	403	444
5	"	1,937	9,731	7,738	9,685	4,155	6,205	840	1,158	851	1,045	887	233	386	236
6	"	2,937	6,173	3,007	1,392	866	3,837	1,284	1,191	564	977	557	341	465	681
7	141-200	2,022	14,571	3,582	2,308	859	5,595	779	111	50	970	71	47	5	11
8	"	8,121	14,943	15,313	4,644	2,136	7,241	3,287	317	85	1,464	70	21	67	112
9	"	167	4,784	5,895	171	130	907	217	8	94	158		18	37	
10	"	1,217	4,454	4,255	1,417	297	851	460	53	42	274	181	93	97	74
11	"	2,278	12,020	3,706	1,625	204	1,526	529	71	37	282	160	232	96	159
12	201-300	305	2,245	1,478	115		22								
13	"	8	2,304	689	85										
14	"	97	868	584	119	61	211								
15		680	7,671	2,137	98										
16	301-400		60												
17			5												
18		2													
19			91												
total		37,133	103,644	55,360	36,597	24,295	55,642	24,062	8,815	8,196	9,063	4,532	2,596	2,782	2,451

Table 5 – Cod length frequency by strata (× 1,000) in the 2001 survey.

length	stratum										
cm	1	2	3	4	5	6	7	8	10	11	total
15-17	52			7							58
18-20	110	64		7							181
21-23	32	128		33							193
24-26				7		6					13
27-29	6										6
30-32	6	6		46							59
33-35	13	58	14	219		13		28			344
36-38	13	128	27	365	53	31	14	49			681
39-41	13	83	61	186	33	44		28		7	456
42-44		32	14	20		25	7	7		7	111
45-47											
48-50	6										6
51-53			7								7
54-56		6		13		13					32
57-59		26			7	13		7			52
60-62		13		7		6					26
63-65	6		7	7	7	6					33
66-68		13		7		6					26
69-71			7			25		7			39
72-74	6		7			13		7		7	40
75-77			7		13	25					45
78-80		13				19			7		38
81-83		6			7	13				14	39
84-86		6				19					25
87-89									7	7	13
90-92		6	7			6					20
93-95											
96-98											
99-101											
102-104											
105-107					7						7

Table 6 – Cod age-length key in 2001.

length	age															no	
cm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15 16+	id	total
15-17	11																11
18-20	44																44
21-23	46																46
24-26	4																4
27-29	1																1
30-32	1	9															10
33-35		54															54
36-38		118															118
39-41		77															77
42-44		16														1	17
45-47																	
48-50			1														1
51-53				2													2
54-56			1	5													6
57-59				8													8
60-62				2	2												4
63-65				1	4		1	1									7
66-68					4		1										5
69-71					2		4										6
72-74					1	3	3	2									9
75-77							5	2									7
78-80							3	4									7
81-83							4	2									6
84-86							2	3									5
87-89								3									3
90-92								1	1	1							3
93-95																	
96-98																	
99-101																	
102-104																	
105-107											1						1
total	107	274	2	18	13	3	23	18	1	1	1					1	462

no id. – no identified

Table 7 – Cod abundance at age by strata (× 1,000) in the 2001 survey.

	stratum											mean weight	mean length
age	1	2	3	4	5	6	7	8	10	11	total	g	cm
1	201	193		59		6					459	82	20
2	44	306	116	831	86	113	21	112		14	1,643	481	37
3	6	1		2		2					11	1,253	52
4	1	38	8	15	8	28		7			105	1,696	57
5	4	17	7	13	4	21		3		1	70	2,560	66
6	2		2			4		2		2	12	3,419	73
7	3	15	13	2	15	65		7	3	12	135	3,905	76
8	2	15	7	1	7	39		2	11	13	97	4,683	81
9		2	2			2					6	6,563	91
10		2	2			2					6	6,563	91
11					7						7	10,309	106
12													
13													
14													

Table 8 – American plaice catch (Kg) by strata in the 2001 survey.

	area	tow	catch per tow		catch per mile towed	
stratum	sq. miles	number	mean	s. deviat.	mean	s. deviat.
1	342	4	30.24	22.51	17.15	12.77
2	838	10	9.77	6.17	5.60	3.55
3	628	7	1.46	2.05	0.83	1.16
4	348	4	2.42	1.13	1.39	0.65
5	703	8	1.57	1.59	0.89	0.91
6	496	6	0.73	1.14	0.42	0.65
7	822	9	0.34	0.82	0.20	0.47
8	646	7	0.69	0.87	0.40	0.50
9	314	3				
10	951	11	0.99	1.30	0.56	0.74
11	806	9	0.34	0.66	0.19	0.38
12	670	8	0.06	0.18	0.04	0.10
13	249	3				
14	602	7				
15	666	8				
16	634	7				
17	216	2				
18	210	2				
19	414	5				
total	10555	120	2.25	0.40	1.28	0.23

	ind.	?	?	total
Stock biomass estimated by swept area method (t)		857	946	1,803

Table 9 – American plaice biomass estimated by swept area method (tons) 1988-2001.

	depth in	year													
stratum	fathoms	1988	1989	1990	1991	1992	1993	1984	1995	1996	1997	1998	1999	2000	2001
1	70- 80	979	750	448	808	532	809	496	1,672	1,096	286	117	279	259	782
2	81-100	1,990	2,701	1,040	1,997	1,285	950	899	1,001	707	555	1,190	1,357	732	626
3	101-140	1,025	838	1,207	935	473	333	244	189	126	371	213	73	16	70
4	"	1,649	346	661	240	418	429	640	367	201	152	257	40	75	64
5	"	1,949	2,319	1,406	1,055	628	968	922	412	375	464	558	55	42	84
6	"	359	847	720	376	451	229	606	92	24	10	26	30	19	28
7	141-200	880	398	562	292	479	239	237	187	54	62	35	14	11	21
8	"	313	123	209	188	545	365	128	99	42	92	124	2		34
9	"	77	122	262		280	154	15	375	41	27				
10	"	1,742	1,118	1,555	981	1,054	1,094	1,677	531	311	215	27	54	34	71
11	"	889	876	973	301	279	219	227	82	51	24	22	28	17	20
12	201-300	7	14	35	13	8	11	25	9	24	5				3
13	"	2		15					2						
14	"	6	6	6	292	22	53	18	11	3		3	7		
15	"	17	74	2	73	28	82	30	51	17	5	5			
16	301-400	4			3	7	9	4							
17	"														
18	"														
19	"				11	3	4	2	8						
total		11,887	10,533	9,101	7,565	6,492	5,949	6,169	5,087	3,073	2,268	2,577	1,940	1,204	1,803

Table 10 – American plaice length frequency by strata (× 1,000) in the 2001 survey.

length	estratum											
cm	1	2	3	4	5	6	7	8	10	11	12	total
18-19				7								7
20-21		6	21									27
22-23												
24-25									7			7
26-27			7		7	6	7					27
28-29	6	6	7					7	20			46
30-31					7				7	7		20
32-33	26	12			7				13			58
34-35	110	19	14		27							170
36-37	200	32							13	7		252
38-39	349	70			27		7		20			472
40-41	226	64	7			6					6	309
42-43	155	19	7						7			188
44-45	58	32	7	14	7		7					124
46-47	25	38			7	13			13	7		103
48-49	19	77	14	13	7				7			136
50-51	13	102	14	7	20				7	7		169
52-53	39	70	7	13	7	6		14				156
54-55	6	51		7			7	7	7			85
56-57												
58-59		6										6

Table 11 – American plaice age-length key in the 2001 survey.

MALE

length	age																no	
cm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	id.	total
18-19		1																1
20-21		4																4
22-23																		
24-25			1															1
26-27			1	1														2
28-29			2	3	2												2	9
30-31			1	1	2												1	5
32-33				1	3	2	2	1	1	1							1	12
34-35					3	4	2	4	4	4	4	4					3	32
36-37					3	1	3	7	8	13	9	4					4	52
38-39							4	11	22	21	15	12	3	1	1		11	101
40-41						1	6	6	19	19	18	7	4	1			2	83
42-43								7	4	5	12	7	3	2	1		2	43
44-45								2	4	4	4	2	1					17
46-47											1	2						3
total		5	5	6	13	8	17	38	62	67	63	38	11	4	2		26	365

FEMALE

length	age																no	
cm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	id.	total
12-13	1																	1
...																		
20-21		3																3
...																		
26-27			1	1														2
...																		
32-33			1															1
34-35				1														1
36-37					2													2
38-39						2	1											3
40-41										1								1
42-43									1	1								2
44-45								2	1	3	3	4						13
46-47								1	1	8	5	7	4	1			1	28
48-49									2	9	4	9	5	3			2	34
50-51									1	2	4	10	9	7	7	9	1	50
52-53										1	1	6	7	13	6	8		42
54-55										1			1	5	7	4		18
56-57																1	1	2
58-59															1	1		2
total	1	3	2	2	2	2	1	3	6	26	17	36	26	29	21	23	5	205

Table 12 – American plaice abundance at age by strata (× 1,000) in the 2001 survey.

	stratum												mean weight	mean length
age	1	2	3	4	5	6	7	8	10	11	12	total	g	cm
1														
2		6	20	7								33	67	20
3	2	8	5		5	3	3	2	14	2		44	201	28
4	5	3	6		12	3	3	3	11	2		48	231	29
5	39	8	3		7			2	13	10		82	349	33
6	31	5	2		4				3			45	408	35
7	59	12	1		4				4			80	499	37
8	139	30	3	2	8	1	2		7			192	575	39
9	216	57	9	4	11	2	2		10			311	597	40
10	249	97	13	8	16	5	4	1	16	2	6	417	683	41
11	228	72	8	6	13	4	3		11	2		347	684	41
12	155	94	12	9	17	5	3	2	11	3		311	836	43
13	52	58	6	7	8	3	1	3	6	2		146	1064	47
14	32	61	5	8	6	2	2	6	4	1		127	1301	50
15	18	49	3	5	4	1	3	5	4	1		93	1409	52
16+	11	47	4	5	5	1	2	4	3	1		83	1452	52

Table 13 – Redfish (*Sebastes marinus*) catch (Kg) by strata in the 2001 survey.

	area	tow	catch per tow		catch per mile towed	
stratum	sq. miles	number	mean	s. deviat.	mean	s. deviat.
1	342	4	3.38	3.36	1.92	1.91
2	838	10	0.56	0.53	0.32	0.31
3	628	7	5.16	6.10	2.94	3.48
4	348	4	5.99	2.97	3.44	1.73
5	703	8	7.23	16.51	4.10	9.37
6	496	6	3.36	2.21	1.92	1.26
7	822	9	4.63	10.85	2.64	6.20
8	646	7	1.39	1.43	0.80	0.82
9	314	3	3.72	3.83	2.11	2.18
10	951	11	70.19	188.48	39.60	106.13
11	806	9	21.65	28.32	12.30	16.03
12	670	8	0.30	0.51	0.17	0.29
13	249	3	0.29	0.51	0.17	0.29
14	602	7	8.41	17.89	4.81	10.22
15	666	8	6.60	12.06	3.74	6.85
16	634	7				
17	216	2				
18	210	2				
19	414	5	1.35	3.03	0.76	1.70
total	10555	120	10.81	5.22	6.12	2.94

	ind.	?	?	total
Stock biomass estimated by swept area method (t)		3,508	5,102	8,610

Table 14 – Redfish (*Sebastes marinus*) length frequency by strata (× 1,000) in 2001.

length	stratum																
cm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	19	total
14						12											12
15		6	7														13
16		19	7		7	57					34						123
17	6	6	27			12				7	14						73
18	6		21	7	7	25				22	14						100
19			7	7		38				20	17						87
20	13		14	7	10	13	7			7	21			14			102
21				7		6	7			26	23						68
22	26		21	7	17	13	28	7		65	14						195
23	25	12	14		29	19	7			54	14			7			181
24	6		14		26	25	7	21		83	71						253
25	13	13	14		40	13	14			102	84	6		7	19		323
26	13	6	34	13	85	13	82	14	8	148	94			33	37		582
27	6	6	61	27	94	19	103	21	8	234	132			52	38		803
28	26		81	13	56	38	90	14	8	468	218		6	46	76		1140
29	19	12	41	33	72	37	97	7	13	774	191			20	62		1380
30	25	12	34	53	75	25	56		8	946	240	13		39	81		1609
31	25	6	21	40	72	25	42	14	8	1387	190			65	113		2008
32	19	13	61	40	89	13	14	7	13	900	157			130	63		1519
33	13		41	20	45	6	42	7	43	950	184		6	52	56		1467
34	6		21	27	48	6	14	21	8	1063	103	6		104	38		1465
35			14		62	6	21	14	13	781	153			66	44		1172
36			34	7	35	13	14		40	580	137			52	31		944
37		6	14	7	10	13		7		156	80			46	25		361
38				13	19		14	7		124	55			14	12		258
39								7		157	14	6		7			190
40			7							78	10						95
41			7							91	36						134
42				13			7			39	55						115
43										7	7						13
44							7				10						17
45															6		6
46							7				19			7			33
47											10						10
48											10						10
49																	
50										7							7
51											10						10
52											10						10
...																	
...																	
68																6	6

Table 15 – Redfish (*Sebastes mentella*) catch (Kg) by strata in the 2001 survey.

	area	tow	catch per tow		catch per mile towed	
stratum	sq. miles	number	mean	s. deviat.	mean	s. deviat.
1	342	4				
2	838	10	0.02	0.06	0.01	0.03
3	628	7	0.37	0.46	0.21	0.26
4	348	4	2.10	1.69	1.20	0.97
5	703	8	0.80	1.72	0.46	0.98
6	496	6	0.15	0.19	0.09	0.11
7	822	9	6.48	6.99	3.68	3.97
8	646	7	10.63	10.26	6.05	5.80
9	314	3	624.11	500.13	376.09	303.89
10	951	11	133.31	182.58	75.37	103.16
11	806	9	17.80	16.91	10.13	9.64
12	670	8	40.54	29.52	22.88	16.63
13	249	3	67.85	46.21	38.83	26.42
14	602	7	128.64	70.74	73.27	40.41
15	666	8	29.74	18.15	16.90	10.44
16	634	7	4.48	3.26	2.52	1.82
17	216	2	0.19	0.27	0.11	0.16
18	210	2	6.47	7.67	3.72	4.42
19	414	5	4.61	3.03	2.62	1.69
total	10555	120	47.22	10.10	27.44	6.02

	ind.	?	?	total
Stock biomass estimated by swept area method (t)		19,206	19,412	38,617

Table 16 – Redfish (*Sebastes mentella*) length frequency by strata (× 1,000) in 2001.

length	stratum																		
cm	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	total
12								4	6										8
13				2			3	17	108	7									139
14		7	3	6	3	17	10	35	359	49		1	1	1					491
15		4	1	17	3	55	41	46	615	104		1	8	2					898
16	2	3	3	17		119	162	141	2170	255	2	2	36	7					2917
17		1	3	6	1	67	114	139	1893	254	2	2	37	13					2530
18		2	3	1		29	37	56	654	121	1	1	30	8					941
19		1	1	2		19	27	9	258	60	3	2	39	14					432
20			2	1		28	42	44	517	55	16	5	32	18				1	759
21		2	2	1		35	49	100	726	86	21	7	131	32	1		1		1193
22		1	1		1	21	43	252	645	73	41	21	182	66			1	1	1348
23		1	1	1		13	16	230	384	39	62	24	126	70	1				970
24			3			13	15	376	299	16	57	38	140	73	2			2	1035
25		1	2	2		8	5	711	116	14	75	46	153	68	3		1	2	1204
26		1	3		1	6	5	973	166	7	93	46	270	109	4		3	1	1688
27			1	1		2	1	1184	82	8	104	62	223	74	4		1	4	1751
28			1	1		4	2	774	105	5	101	53	277	55	5		4	2	1390
29			1			1		449	33	1	56	37	185	33	3		2	5	805
30			2			2	2	310	42	3	38	40	113	19	7	1	2	4	584
31			1			3	1	37	4	2	22	11	71	5	7		3	4	171
32								23		1	17	9	40	1	5		2	2	100
33									1		9	6	15	3	3		2	3	40
34								11		2	7	5	24	2	6		1	1	59
35											2	10	10	1	3		3		29
36											2	5	13		1		3	2	26
37											2	1	8	2					11
38											2	3	6					2	13
39												1	2	1	1			1	6
40												1	2						3
41											1	1	3					1	5
42																		1	1
43											1		3					1	4

Table 17 – Redfish (*Sebastes mentella*) age-length key in the 2001 survey.

MALE

length	age																							no	
cm	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	id.	total
12																										
13																									5	5
14		1																							22	23
15		1																							23	24
16		5	2																						34	41
17		1	4																						24	29
18			3	1																					19	23
19			1	1																					14	16
20				2																					19	21
21				2	1																				18	21
22					2																				21	23
23					3																				19	22
24					1	2				1															19	23
25						2				1															22	25
26						1	3			1															21	26
27							3	2		2															21	28
28							1	1	1	3															16	22
29								2	1	1															18	22
30									1	5															19	25
31										2	1														18	21
32										2	4				1										14	21
33										1	2														13	16
34											1	1	1												18	21
35													3	2											10	15
36														2											11	13
37												1													6	7
38																1									8	9
39																									2	2
40																									1	1
41																									1	1
total		8	10	6	7	5	7	5	3	19	8	2	4	4	1	1									456	546

Table 17 – (continued)

FEMALE

length	age																							no	
cm	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	id.	total
12																										
13	1																								6	7
14		3																							17	20
15		5																							18	23
16		4																							19	23
17		1	2																						27	30
18			2																						14	16
19			3																						14	17
20			1	3																					19	23
21				2																					23	25
22				2	1																				19	22
23				1	1																				19	21
24					2	4																			20	26
25					1	4																			16	21
26						1	3	1																	20	25
27						1	2			3															19	25
28							1	1		2															27	31
29									2	2															22	26
30									1	5															24	30
31									2	5	1														31	39
32										2	1	1													10	14
33										1															17	18
34												2		1											12	15
35												1		1	2										10	14
36													1		1	1									5	8
37																									7	7
38																1		1							2	4
39																									5	5
40																									1	1
41																						1			2	3
42																									1	1
43																									4	4
total	1	13	8	8	5	10	6	2	5	20	2	4	1	2	3	2		1				1			450	544

Table 18 – Redfish (*Sebastes mentella*) abundance at age (× 10,000) in the 2001 survey.

	stratum																			mean weight	mean length
age	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	total	g	cm
1																					
2				1				3	47	4									55	30	13
3	2	14	7	40	6	193	218	231	3276	434	2	3	43	11					4480	54	16
4		3	5	8		108	166	185	2601	380	6	5	92	29					3588	73	17
5		2	4	3		74	105	227	1478	184	60	25	233	93	1		1		2490	127	21
6		2	3	1	1	34	56	560	958	103	102	51	301	125	2		1	1	2301	162	23
7		1	4	1		15	13	1004	291	21	114	75	263	118	4		1	3	1928	221	25
8			2	1		6	4	1218	154	9	117	62	307	105	4		2	3	1994	267	27
9			1			2	1	473	45	3	57	29	143	35	2		1	3	795	295	28
10			1			1		290	33	2	42	28	122	23	4		2	3	551	351	29
11			5	1		12	7	1681	235	17	204	124	555	127	20	1	9	12	3010	308	28
12						1		19	1		15	11	44	3	6		1	2	103	469	32
13								6		2	6	5	20	3	4		1	1	48	560	34
14								4			3	4	10		1		2	1	25	593	35
15										1	3	7	17		3		2	1	34	626	35
16								2			2	4	5		2		1		16	552	34
17											2	3	6				1	2	14	760	38
18																					
19												1	1						2	785	38
20																					
21																					
22																					
23											1	1	3						5	990	41
24																					
25+																					

Table 19 – Frequencies at age of *Sebastes mentella*.

age	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1			10	6			6	11		
2			49	259	280	59	151	237		55
3	132		1074	3040	1620	480	2140	2291	349	4480
4	2673	173	5249	19700	11726	3190	1371	3971	1250	3588
5	9884	550	2273	11900	30498	17631	1534	2224	2565	2490
6	3829	1420	1285	490	4765	10163	3950	2435	2041	2301
7	3048	1013	1915	870	850	794	2713	4089	3291	1928
8	2181	637	1178	980	826	331	11249	3836	5801	1994
9	1361	228	778	570	641	217	447	14301	3077	795
10	862	317	605	550	374	251	69	596	16404	551
11	631	335	519	610	281	133	46	24	292	3010
12	465	410	330	280	284	134	275	42	28	103
13	446	259	253	220	168	72	30	99	23	48
14	321	260	161	250	188	121	40	13	199	25
15	174	297	172	260	147	34	18	28	11	34
16	172	69	85	160	106	48	28	30	8	16
17	107	95	59	102	69	44	53	20	15	14
18	69	44	84	87	67	11	2	52	7	
19	72	34	38	46	32	14	6	8	51	2
20	19	26	22	38	41	16		10		
21	13	31	13	25	18	6		9	4	
22			13	11	5	2	3	3	7	
23	5	10	7	5	13			5	9	5
24					5		2	4	10	
25+	16	3	2	31	17		2	12	12	

(frequencies × 10,000)

Table 20 – Redfish (*Sebastes fasciatus*) catch (Kg) by strata in the 2001 survey.

	area	tow	catch per tow		catch per mile towed	
stratum	sq. miles	number	mean	s. deviat.	mean	s. deviat.
1	342	4	0.52	0.75	0.29	0.43
2	838	10	0.17	0.25	0.10	0.14
3	628	7	4.42	4.19	2.52	2.39
4	348	4	6.58	4.26	3.77	2.45
5	703	8	6.99	11.80	3.97	6.70
6	496	6	4.46	2.32	2.55	1.32
7	822	9	14.84	13.98	8.44	7.99
8	646	7	17.52	8.10	9.99	4.60
9	314	3	36.85	22.68	21.39	12.37
10	951	11	52.63	37.87	29.84	21.53
11	806	9	43.15	32.83	24.53	18.65
12	670	8	3.69	3.64	2.09	2.08
13	249	3	8.58	7.91	4.90	4.51
14	602	7	8.58	9.53	4.89	5.45
15	666	8	14.15	8.09	8.01	4.56
16	634	7	0.09	0.13	0.05	0.07
17	216	2				
18	210	2	0.36	0.51	0.21	0.29
19	414	5	0.47	0.35	0.27	0.20
total	10555	120	14.40	1.50	8.19	0.85

	ind.	?	?	total
Stock biomass estimated by swept area method (t)		5,752	5,778	11,530

Table 21 – Redfish (*Sebastes fasciatus*) length frequency by strata (× 1,000) in the 2001 survey.

length	stratum																		
cm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	total
11					7			7											14
12			14		67				209	11			6						306
13		6	75	20	227	31		14	427	183	15								999
14		12	116	126	224	94	35	70	714	1276	227		6	7					2909
15	6	26	396	80	548	415	194	336	1699	2781	966	13	6	40	63			6	7575
16		19	512	133	482	491	343	492	2049	4855	1581	31	38	190	119			6	11340
17	6	19	362	106	424	346	458	519	1463	3346	1544	32	44	248	157	7	8	25	9115
18	6	6	143	73	292	196	290	266	899	1769	1308	88	13	215	188	7		6	5767
19	6		95	93	220	145	568	224	497	1652	993	108	38	163	170		8	19	4999
20	6	12	61	66	192	57	555	527	527	2309	1693	114	50	170	257			38	6637
21	13		95	126	296	57	741	618	518	3067	2285	120	38	248	402	14	8	6	8652
22			102	133	231	57	812	575	375	3280	2313	177	95	320	585	7	8		9068
23	12	6	82	113	150	25	931	603	162	1868	1285	215	120	254	497		8		6333
24	19		55	40	108	25	600	450	133	1137	1115	76	108	222	465			13	4564
25	6		34	13	49	12	225	246	79	632	728	57	69	78	283			6	2520
26		6	27	13	18		156	154	67	705	357	19	44	98	233				1899
27			14	20	18		92	140	35	395	259	25	26	72	125				1221
28			7	27		13	53	91	30	249	199	13	19	59	145				905
29				13	7			56		140	147	25	25	13	70				496
30				13				21	13	99	140		13	26	19				344
31				7				7		33	83		13	13	6				161
32										7	28		13		6				54
33								7	17	33	15		6	7	13				97
34															6				6
35				7							15								22

Table 22 – Juvenile redfish (*Sebastes sp*.) catch (Kg) by strata in the 2001 survey.

	area	tow	catch per tow		catch per mile towed	
stratum	sq. miles	number	mean	s. deviat.	mean	s. deviat.
1	342	4	0.25	0.35	0.14	0.20
2	838	10	1.48	1.89	0.85	1.08
3	628	7	7.27	11.17	4.14	6.37
4	348	4	2.19	1.77	1.25	1.01
5	703	8	3.49	6.35	1.98	3.61
6	496	6	12.19	5.86	6.96	3.35
7	822	9	5.08	3.52	2.89	2.02
8	646	7	2.22	1.85	1.26	1.05
9	314	3	5.08	8.42	2.89	4.79
10	951	11	36.33	57.96	20.73	33.21
11	806	9	13.30	8.13	7.55	4.60
12	670	8	0.02	0.06	0.01	0.03
13	249	3				
14	602	7	0.29	0.70	0.17	0.40
15	666	8	0.06	0.10	0.03	0.06
16	634	7				
17	216	2				
18	210	2				
19	414	5				
total	10555	120	6.43	1.63	3.66	0.93

	ind.	?	?	total
Stock biomass estimated by swept area method (t)	5,156			5,156

Table 23 – Juvenile redfish (*Sebastes sp*.) length frequency by strata (× 1,000) in the 2001 survey.

length	stratum														
cm	1	2	3	4	5	6	7	8	9	10	11	12	14	15	total
6										1					1
7			1							2					4
8		3	14		3	11	16	1		18	18				83
9	1	15	66	9	21	50	98	7	1	464	182	1		1	916
10	2	30	126	16	57	167	85	10	17	1128	326			1	1966
11	1	9	16	7	11	53	5	5	5	166	28				305
12		2	15	2	12	10	7	2	10	50	6				115
13		1	7	1	5	15	14	8	14	82	44				192
14		1	1		5	2	8	5	4	29	17				72
15						2	4	3		5	1				16
16								3		4	1				8
17								1		1					2

Table 24 – Greenland halibut (*Reinhardtius hippoglossoides*) catch (Kg) by strata in the 2001 survey.

	area	tow	catch per tow		catch per mile towed	
stratum	sq. miles	number	mean	s. deviat.	mean	s. deviat.
1	342	4				
2	838	10	0.24	0.58	0.14	0.33
3	628	7	7.90	5.74	4.51	3.28
4	348	4	5.81	4.17	3.33	2.39
5	703	8	4.96	4.01	2.82	2.27
6	496	6	6.92	5.85	3.95	3.33
7	822	9	15.54	7.86	8.82	4.46
8	646	7	22.52	7.66	12.84	4.39
9	314	3	14.58	10.23	8.35	5.69
10	951	11	23.87	9.89	13.53	5.68
11	806	9	16.43	6.37	9.35	3.64
12	670	8	30.82	7.52	17.43	4.23
13	249	3	15.03	2.65	8.60	1.53
14	602	7	18.91	10.24	10.75	5.82
15	666	8	31.71	13.27	17.92	7.44
16	634	7	27.27	11.93	15.46	6.86
17	216	2	10.07	6.40	5.79	3.71
18	210	2	35.15	35.57	20.20	20.50
19	414	5	34.73	22.38	19.95	12.73
total	10555	120	17.06	0.95	9.70	0.54

	ind.	?	?	total
Stock biomass estimated by swept area method (t)	9	4,890	8,754	13,654

Table 25 – Greenland halibut (*Reinhardtius hippoglossoides*) biomass estimated by swept area method (tons) 1988-2001.

	depth in	year													
stratum	fathoms	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1	70- 80							0							0
2	81-100		3	6				0	119		2	6	3		15
3	101-140	26	31	8	8	18	3	0	21	106	89	361	342	240	378
4	"	142	20		15	27	10	0	5	0	23	40	194	204	155
5	"	73	96		28	41	1	2	21	35	96	170	403	302	264
6	"	31	18	15	12	8	15	0	31	104	224	355	296	175	261
7	141-200	84	62	63	186	242	93	211	890	1,130	1,401	2,566	2,319	1,545	967
8	"	149	219	63	177	373	138	45	328	353	1,048	973	1,962	1,296	1,106
9	"	177	162	53	75	318	30	42	175	157	250	464	348	241	349
10	"	106	81	48	169	356	31	231	518	705	848	1,348	1,504	1,577	1,716
11	"	44	60	20	104	225	230	232	484	660	617	1,208	1,299	1,071	1,005
12	201-300	399	637	290	749	609	918	1,200	1,129	2,091	2,213	3,029	3,604	2,140	1,557
13	"	63	122	214	43	24	141	150	125	293	476	545	963	376	286
14	"	362	289	315	775	834	469	610	404	888	1,564	1,438	1,063	483	863
15	"	428	166	505	958	633	1,356	1,469	1,740	1,425	2,647	3,991	2,940	2,645	1,591
16	301-400	1,352	1,342	2,492	2,487	1,798	2,141	1,500	1,832	2,065	1,742	3,303	1,125	1,984	1,307
17	"	262	118	130	408	39	105	730	730	254	517	725	594	490	167
18	"	104	49	449	348	57	208	380	943	188	548	763	917	176	565
19	"	3,016	919	977	1,498	2,988	1,321	1,108	1,211	956	1,539	2,562	999	1,746	1,102
total		6,818	4,391	5,649	8,038	8,588	7,210	7,910	10,705	11,409	15,846	23,849	20,877	16,690	13,654

Table 26 – Greenland halibut (*Reinhardtius hippoglossoides*) length frequency by strata (× 1000) in the 2001 survey.

Length	stratum																		
cm	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	total
12-13				7		7													14
14-15		27	20	34	12	131	21		261	177									683
16-17	26	34	79	127	38	352	42		763	550									2011
18-19		143	33	93	94	249	133		293	374				6					1420
20-21		41	7	13	38	14	14		7	27									160
22-23		7			6				7									6	26
24-25		21			19	21	14	8	7	34									123
26-27		103		7	25	110	35	8	46	68				6					408
28-29		157	13	27	95	152	56		14	136									649
30-31		143	7	27	13	89	14		7	61				6					367
32-33		34			6	28	28		20	7					7				129
34-35		62			12	21	21		33	28	13	6		13	21		16	6	250
36-37		47	7		31	97	98	16	33	34	25	12	13	51	27		48	12	554
38-39		21	7	33	38	103	189	25	91	150	126	12	20	113	89	8	48	70	1144
40-41	26	68	40	34	32	242	133	33	241	265	176	32	111	195	123	34	96	147	2027
42-43		68	27	40	56	249	315	66	339	163	323	44	203	278	267	50	152	198	2837
44-45		109	33	34	63	221	287	74	385	183	411	63	143	422	328	8	128	280	3174
46-47		61	40	100	32	256	168	33	391	163	266	88	176	328	363	50	136	293	2943
48-49		14	20	13	31	42	140	16	326	150	227	38	254	293	253	25	88	216	2146
50-51			7	20	12	42	56	74	104	41	152	31	105	165	164	25	40	83	1120
52-53			7	20	6	21	49	16	66	27	158	19	85	76	95		24	50	720
54-55							7	41	46	20	19		40	38	55		24	6	295
56-57								8	13	7	25	6	79	25	34			19	216
58-59									7		13	6	20	26	14	8		13	106
60-61													13					6	19
62-63															7			6	13
64-65											6								6
66-67											6								6
68-69															7				7

Table 27 - Greenland halibut (*Reinhardtius hippoglossoides*) age-length key in the 2001 survey.

MALE

length	age																no	
cm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	id.	total
14-15	25																	25
16-17	24																3	27
18-19	20	2																22
20-21	9	3																12
22-23		2	1															3
24-25		4	4															8
26-27		15	6														1	22
28-29		9	12															21
30-31		7	14															21
32-33		2	4	2														8
34-35			7	10	2													19
36-37			3	13	9												1	26
38-39			1	3	13	4												21
40-41					15	8	2										1	26
42-43					2	18	1											21
44-45						16	4	1									1	22
46-47						10	19											29
48-49						2	12	6										20
50-51							7	13									1	21
52-53							8	7	1									16
54-55							1	4	2									7
56-57								4	1									5
58-59									1	2								3
total:	78	44	52	28	41	58	54	35	5	2							8	405

Table 27 – (continued)

FEMALE

rango	age																no	
tallas	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	id.	total
12-13	1																	1
14-15	21																	21
16-17	22																	22
18-19	22	1																23
20-21	7	4																11
22-23	1																	1
24-25		6	1															7
26-27		9	9															18
28-29		11	15														1	27
30-31		1	18	1														20
32-33			8	1														9
34-35			4	5	1													10
36-37			1	9	11	1												22
38-39			1	8	11	4												24
40-41					6	13	2										3	24
42-43					2	11	7	2									3	25
44-45						11	8	2									1	22
46-47						5	11	6									2	24
48-49						1	13	5									1	20
50-51							10	11										21
52-53							3	18									1	22
54-55							8	13	1									22
56-57							2	12	6								2	22
58-59								5	7	1								13
60-61									2	2								4
62-63									1	1								2
64-65										1								1
66-67										1								1
68-69											1							1
total:	74	32	57	24	31	46	64	74	17	6	1						14	440

Table 28 – Greenland halibut (*Reinhardtius hippoglossoides*) abundance at age (× 1000) in the 2001 survey.

	stratum																			mean weight	mean length
age	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	total	g	cm
1	26	229	134	264	170	731	197		1,303	1,097				6					4,157	38	16
2		193	13	28	87	185	73	13	69	167				5	2			4	839	147	26
3		308	13	43	94	247	107	5	70	186	13	4	2	22	19		13	8	1,154	225	30
4		66	6	10	31	89	103	15	59	68	46	12	10	57	45	3	42	25	687	394	36
5	16	80	28	33	57	223	233	38	190	235	190	31	83	194	153	23	105	132	2,044	496	39
6	8	163	67	99	109	501	545	118	723	417	679	108	333	645	588	77	267	480	5,927	653	43
7	2	94	62	102	80	340	386	117	717	339	616	122	452	695	629	67	250	499	5,569	821	46
8		27	24	49	31	131	178	105	357	151	372	75	328	388	375	30	122	235	2,978	979	49
9								8	12	3	18	4	44	25	28	3	2	21	168	1,477	57
10									1		13		12	2	9	5		7	49	1,824	61
11															7				7	2,547	68
12																					
13																					
14																					
15																					
16+																					

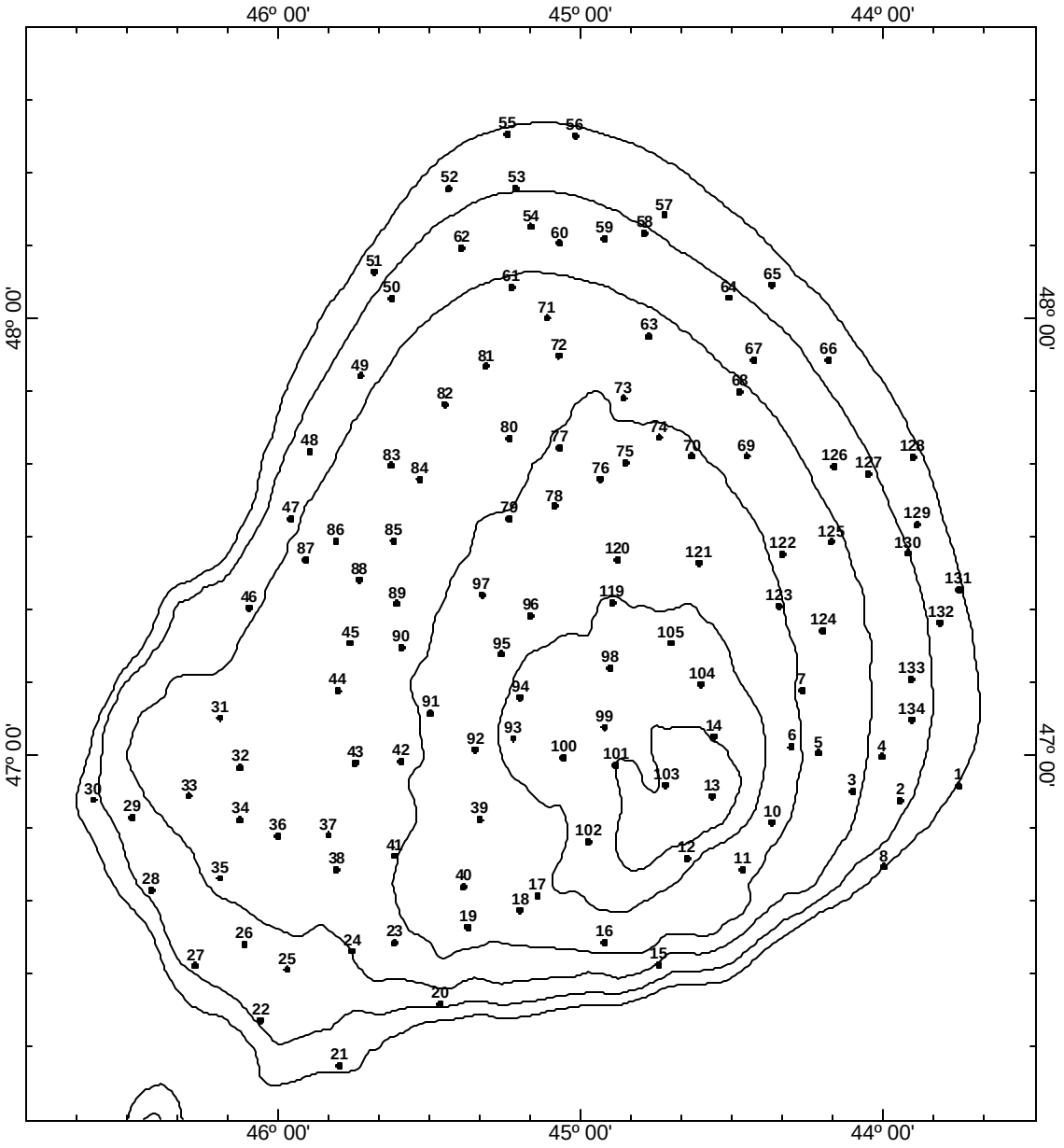
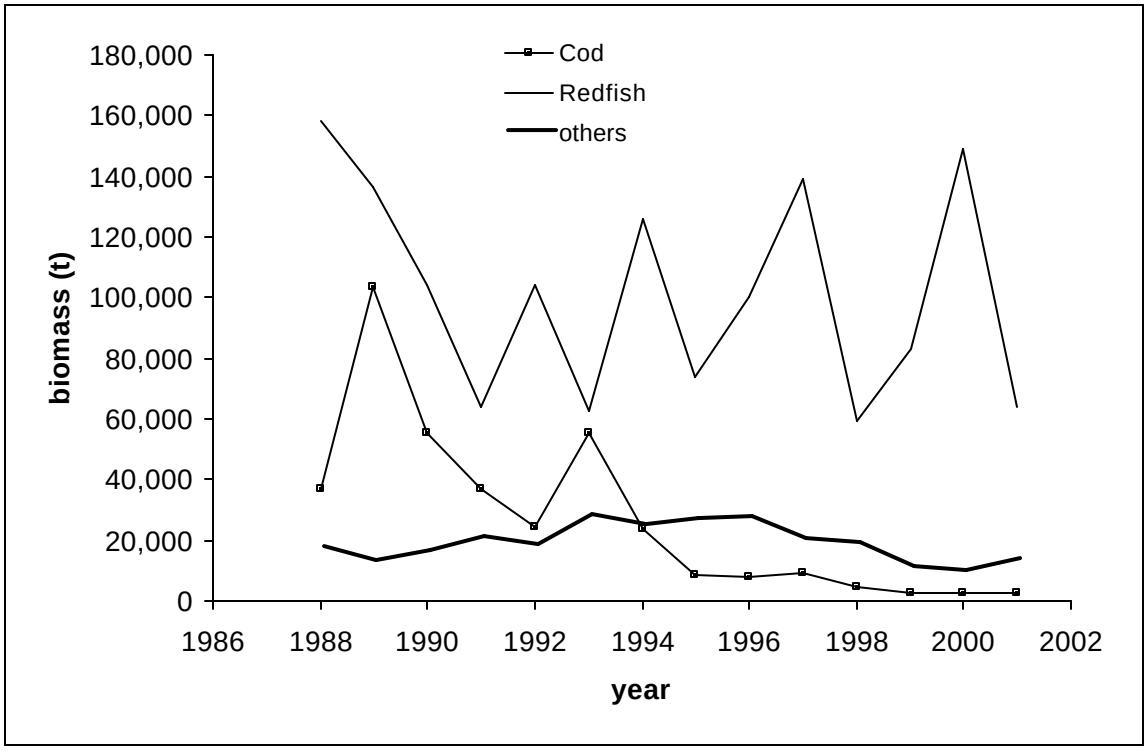


Figure 1 - Haul positions for the Flemish Cap-01 survey.



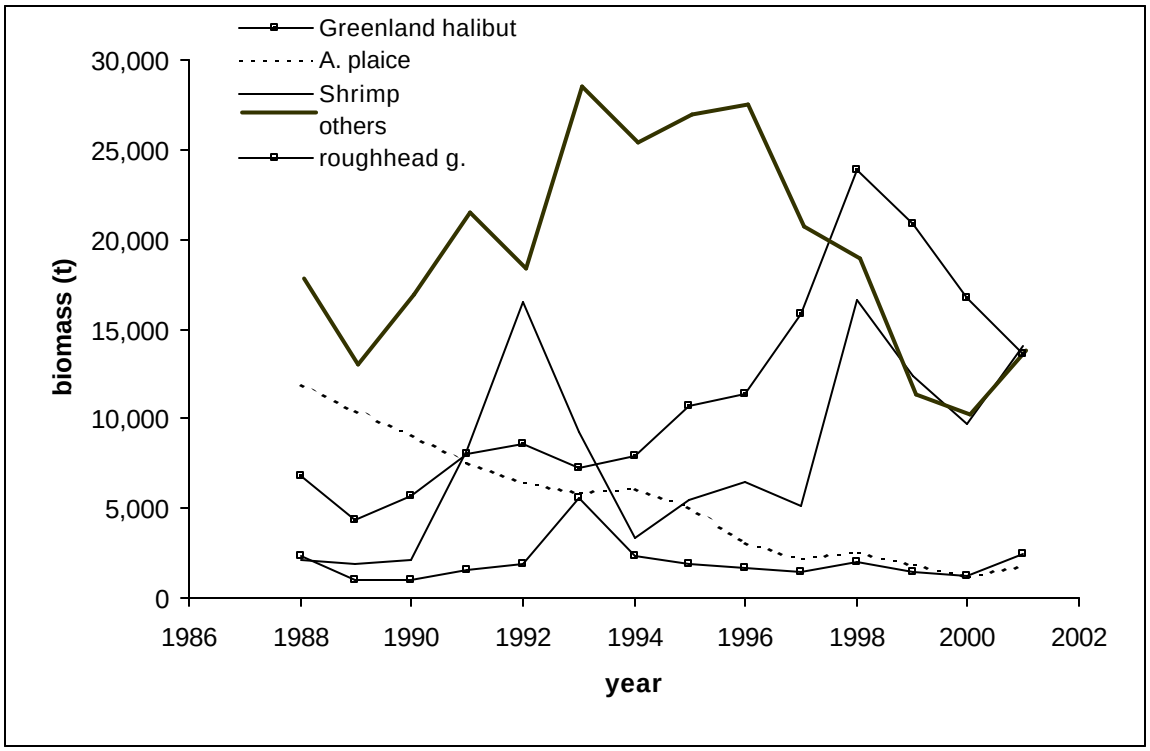


Figure 2 – Total biomass estimated. The label *others* corresponds to all species no cited in either graphic.

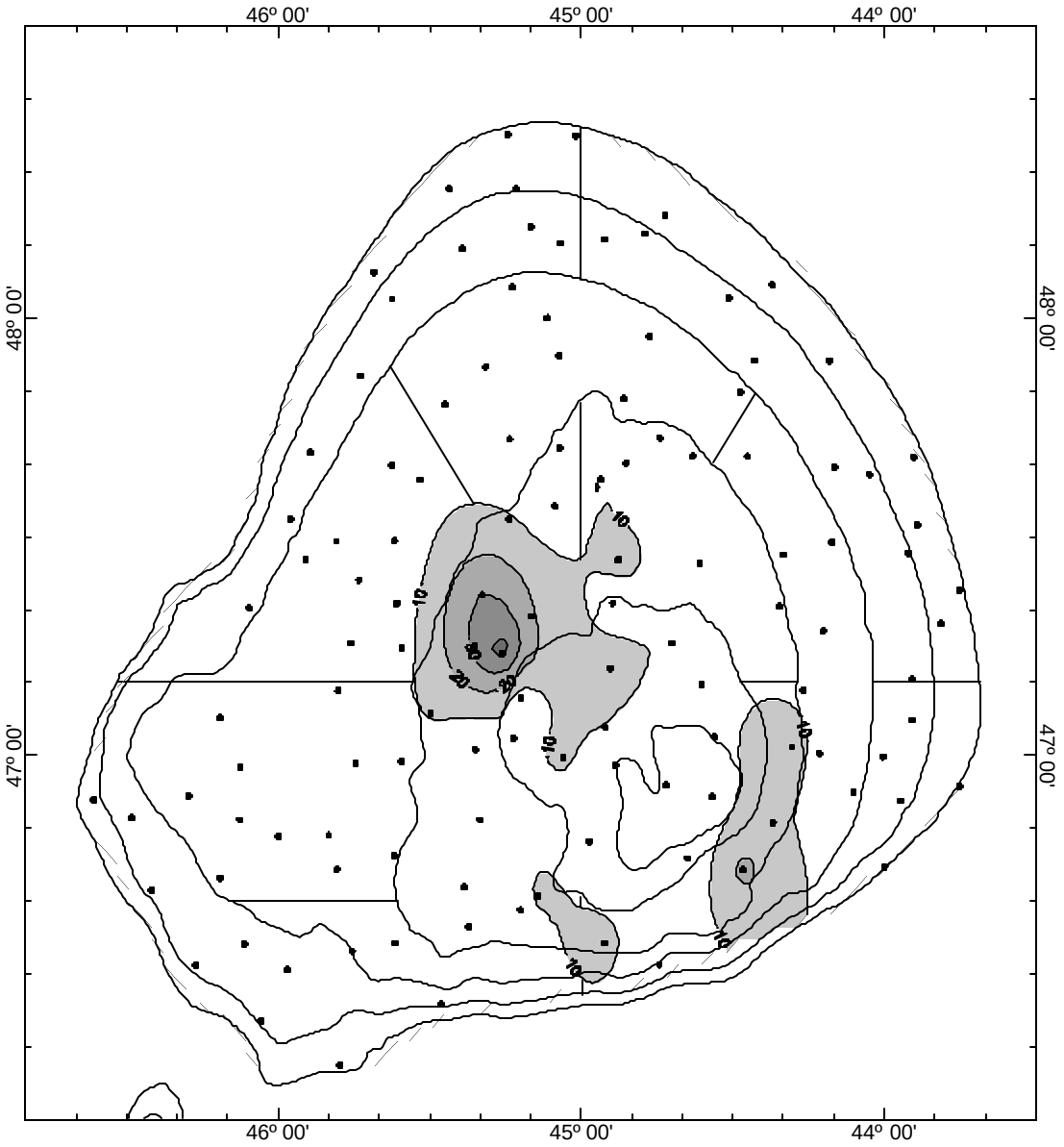


Figure 3 - Cod (*Gadus morhua*) catch distribution in the 2001 survey in Kg/tow.

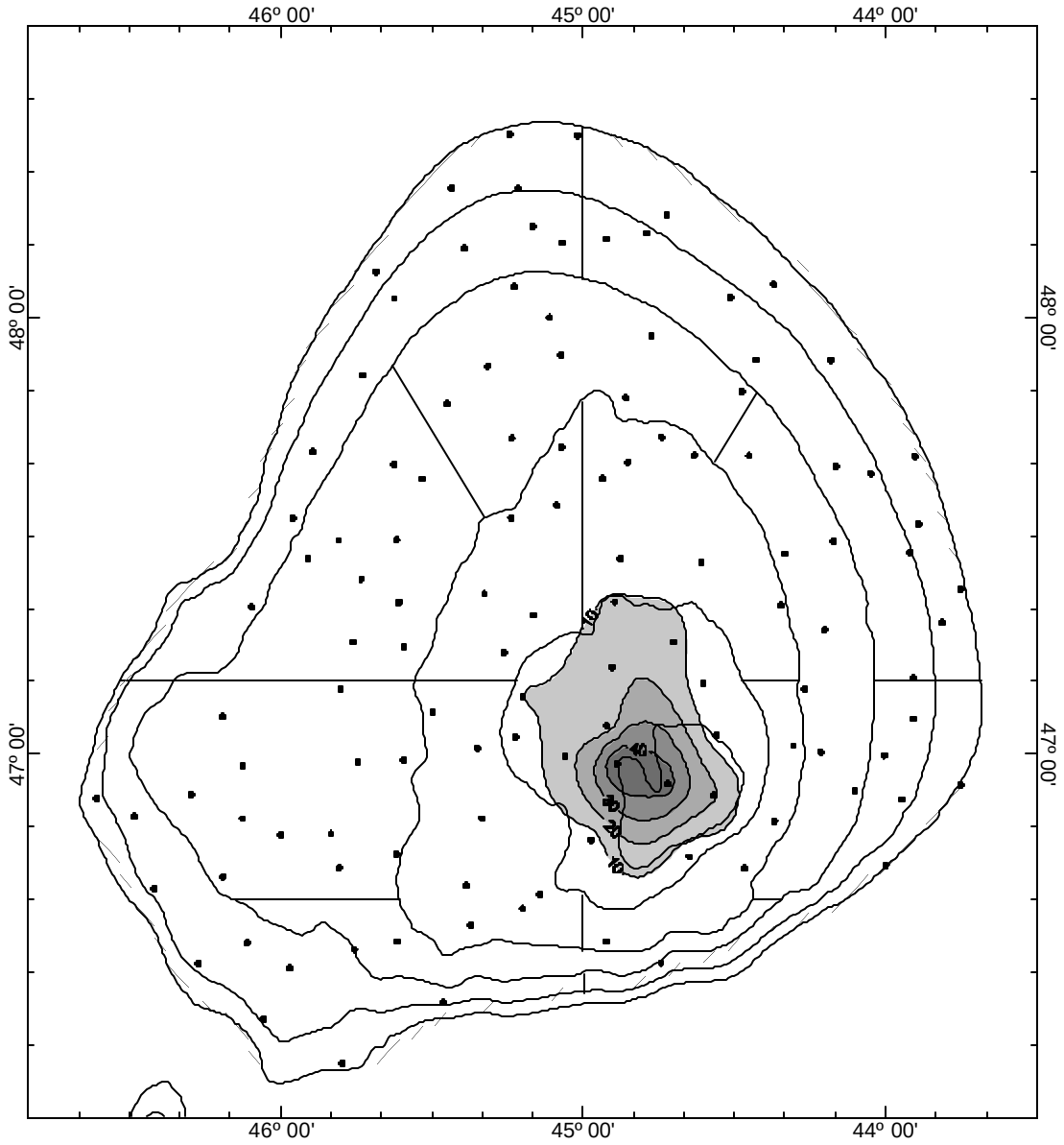


Figure 4 - American plaice (*Hippoglossoide platessoides*) catch distribution in the 2001 survey in Kg/tow

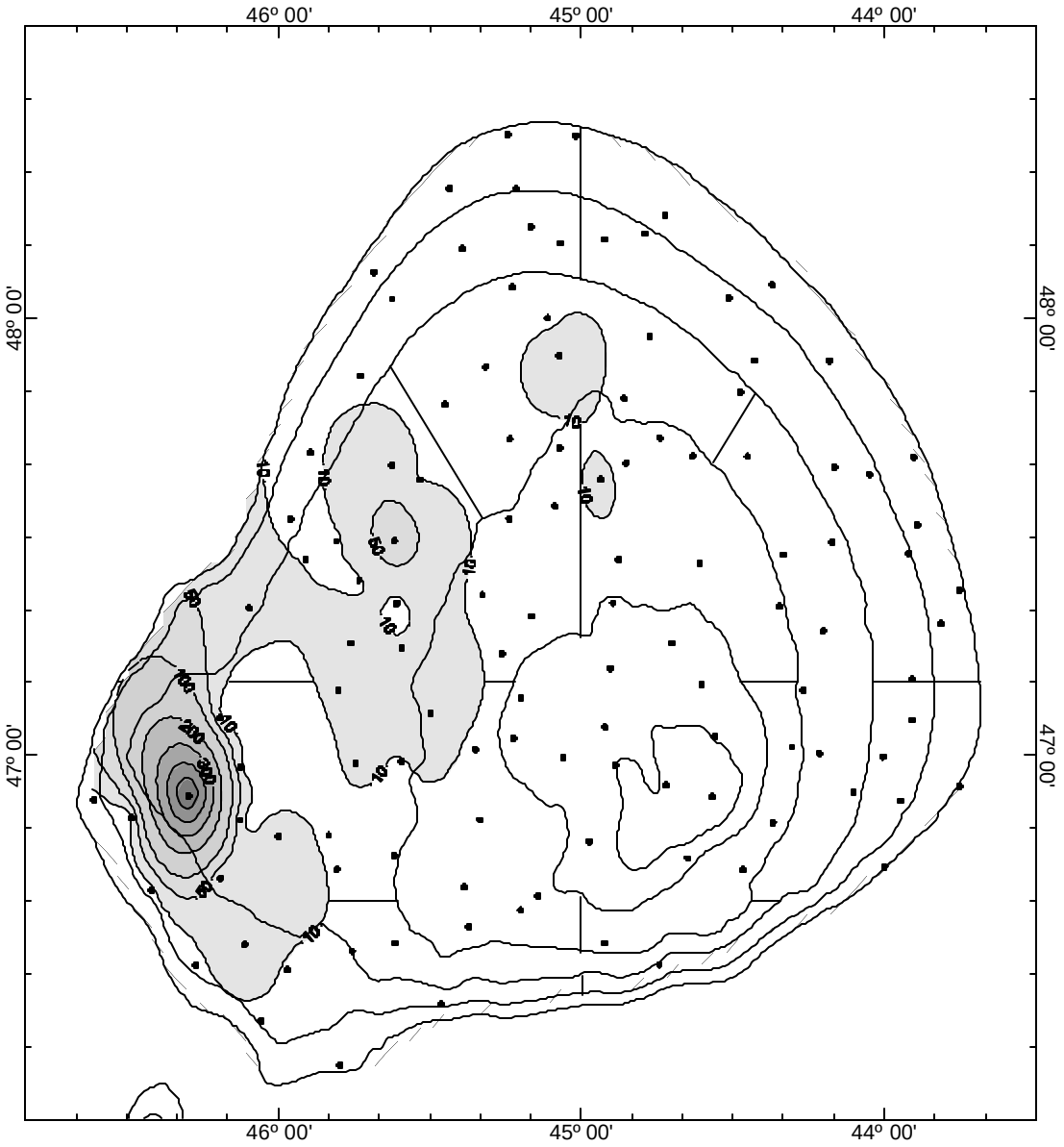


Figure 5 - Redfish (*Sebastes marinus*) catch distribution in the 2001 survey in Kg/tow

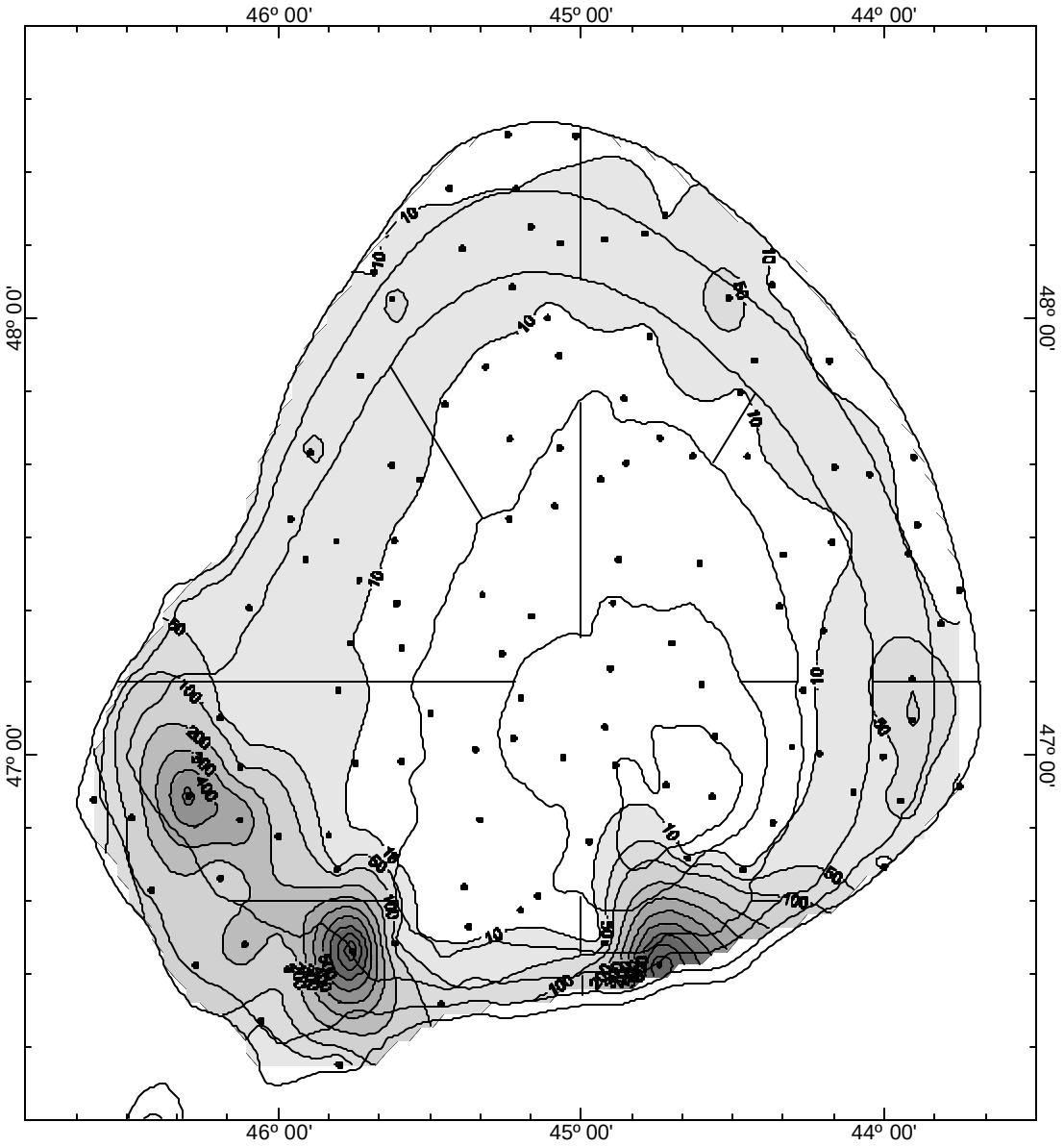


Figure 6 - Redfish (*Sebastes mentella*) catch distribution in the 2001 survey in Kg/tow

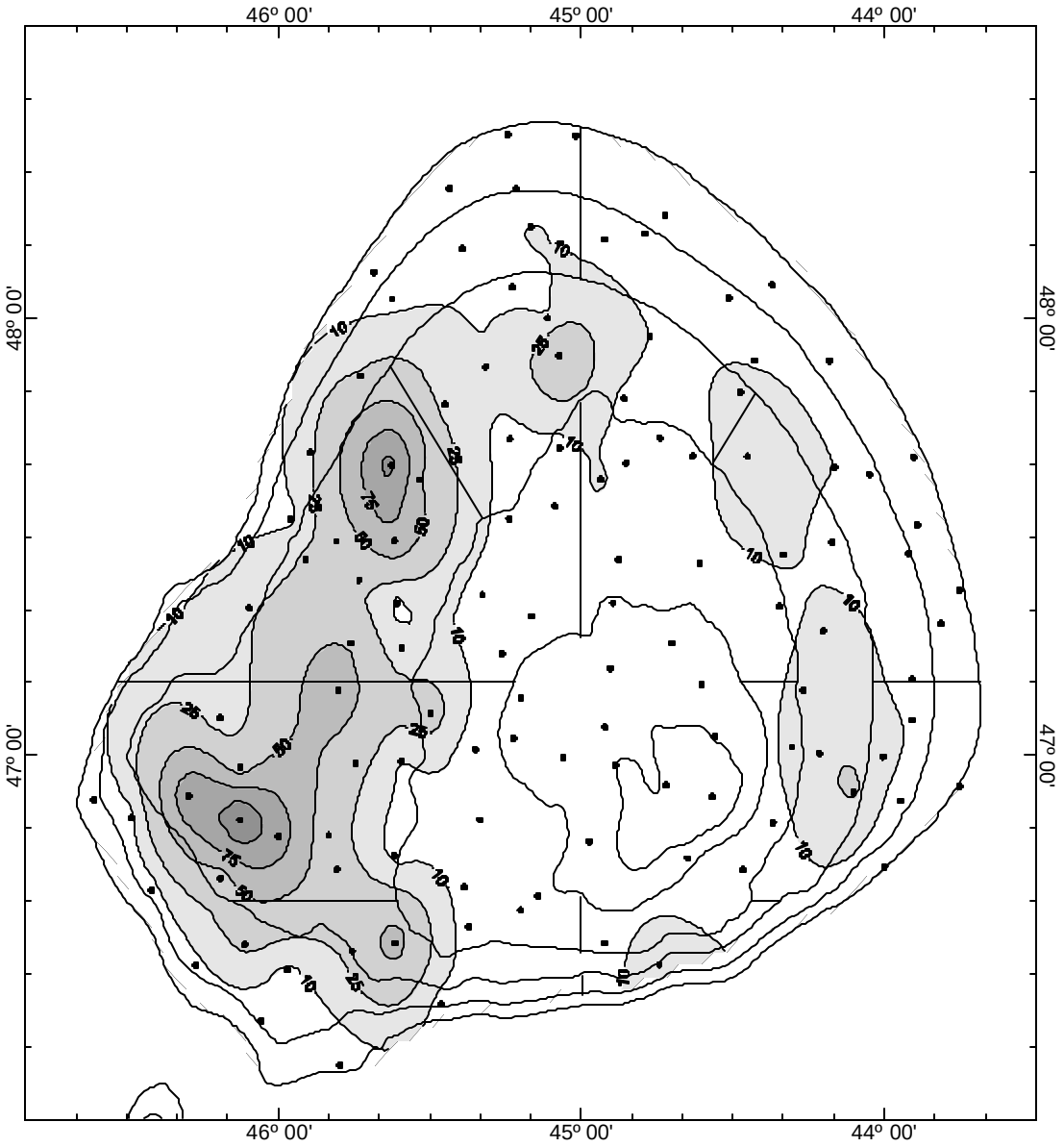


Figure 7 - Redfish (*Sebastes fasciatus*) catch distribution in the 2001 survey in Kg/tow

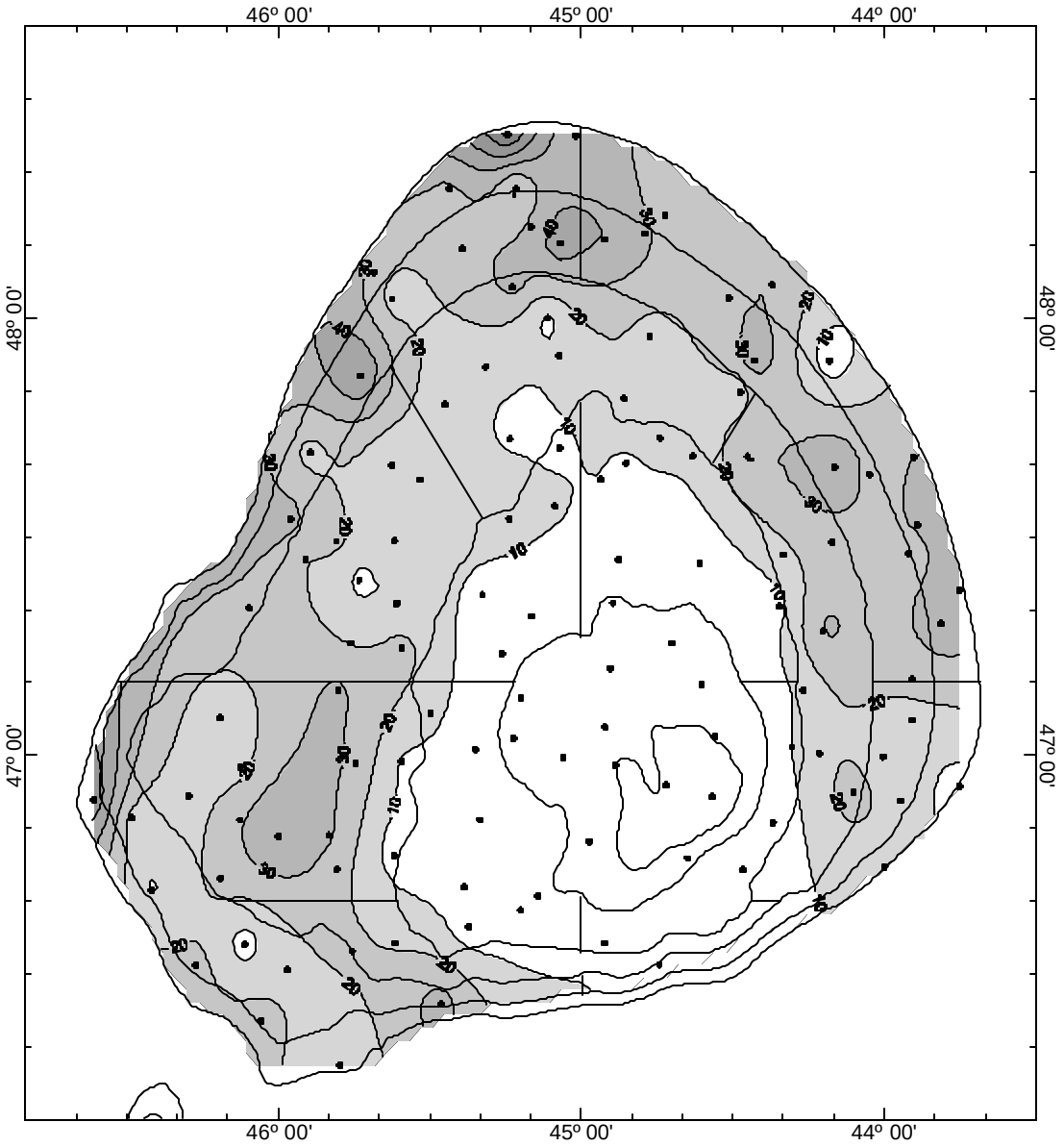


Figure 8 - Greenland halibut (*Reinhardtius hippoglossoides*) catch distribution in the 2001 survey in Kg/tow.