Northwest Atlantic Fisheries Organization

Serial No. N2730 NAFO SCR Doc. 96/54

SCIENTIFIC COUNCIL MEETING - JUNE 1996

Results from Bottom Trawl Survey of Flemish Cap in July 1995

by

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The survey of Flemish Cap was carried out in 1995 on board R/V Cornide de Saavedra. A synoptic sheet of the survey with ship and gear characteristics is shown in Table 1. This was the eighth survey of the series initiated by the EU in 1988. Dates of the previous survey 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

All survey had a stratified random design following NAFO specifications (Doubleday, 1981).

A total of 121 valid bottom trawl were made up to a depth of 720 metres (400 fathoms) (Figure 1). The survey covered adequately all strata of the bank.

Total biomass of all species was calculated by the swept area method. The results are presented in Table 2, where some species are grouped to balance possible identification error in former surveys. Those amounts are assumed to underestimate real values in different degrees, according with the species. In this framework, the total biomass estimated for 1995 has the minimum value of all the series. Cod and redfish are the species more contributing to this decline. Redfish have a wide pelagic distribution and their estimated biomass in this surveys had big changes year to year; their actual reduction seems not be indicative of a real change. The cod biomass decrease goes with equivalent reduction in other demersal species: Antimora spp., grenadiers and Notacanthus spp., but biomass of other demersal species, like dogfish, increased. Among flatfish, American plaice biomass decreased with the same rate as previous years, and Greenland halibut increased. In conclusion, the cod biomass reductions seems not be a consequence of a change in gear efficiency to all species in general, or demersal species in particular. In fact, we were not conscious of some change in the gear.

RESULTS

Weighted (by stratum area) mean catches in half-hour tows of main species on the bank were:

	1988	1989	1990	1991	1992	1993	1994	1995
cod	46,7	146,0	70,8	47,1	30,3	67,1	54,4	11,6
American plaice	15,0	14,3	11,6	9,7	8.0	7,1	7,6	6,6
redfish	207,5	194,4	133,3	81,5	126,9	70,9	95,6	94,7
Greenland halibut	7,9	5,9	7,2	7,9	10,3	7,3	9,2	13,4
shrimp	2,5	2,7	2,7	10,2	20,3	9,5	3,8	6,9

Kg

Cod

Mean catch by strata and for the whole bank data with associated standard errors are presented in Table 3. Biomass estimated by the swept area method by strata and its comparison with 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	37.127	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		2.500
1993	55.642	13.020	13.820
1994	42.767		
1995	8.815		

tons

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

The abundance (x 10000) by age-groups was calculated as follow:

age	1988	1989	1990	1991	1992	1993	1994	1995	
1 -	458	2085	237	13780	7118	438	314	155	
2 -	7196	1100	1179	2560	3706	13274	385	1137	
3 -	4037	8422	467	1548	475	2852	4710	123	
4 -	1085	4922	1588	192	203	102	844	361	
5 -	128	1858	1453	622	33	127	18	90	
6 -	22	127	394	173	127	17	9	1	
7 -	28	15	32	25	21	50		2	
8 -	11	12	13	1	1	10	18		
9 -			8	4				1	
10 -		1	3				1	1	
11 -				1	1				
12 -									
total	12965	18542	5374	18906	11685	16870	6270	1873	
Biomass	37127	103644	55360	36597	24295	55642	42767	8815	tons
SOP*	33474	100217	51388	37231	22734	54945	42153	8841	tons

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

Recruitment is believed to be completed before age 2 with the 35 mm mesh size used in the cod-end. The 1990 year-class was the more abundant one observed at age 1, but its importance did not maintained in the following years, after recruitment; it seems indicate that its abundance was overestimated in 1991 survey. The 1991 year-class, the more abundant one at age 2, was the more important of last years, but its abundance decreased quickly to be only residual in 1995. This so deep changes in abundance seems to be a consequence of an intense fishery on ages 2 and 3 during year 1993 and 1994. Most recent year-classes, those of 1993 and 1994, were among weaker ones observed in the period.

According to the above table, there was a sharp decrease in stock abundance from 1994 to 1995, primarily attributed to fishing activity during the second half of 1994 and beginning 1995. An alternative explanation to be checked is that a heavy fishery took place prior to 1994 survey. If this is the case, the 1994 survey results must be interpreted in other way: approximately the half part of the cod catch of the 1994 survey was taken in one tow; if this tow is not considered, the total biomass swept area estimate is only 24,062 tons, well in agreement with the occurrence of cod concentrations where fishing could be focused.

Tables 5, 6 and 7 show length frequency, age-length key and estimated age composition of the stock respectively. Catch per tow distribution is presented in Figure 2.

American plaice

Mean catch by strata and for the whole bank data, with associated standard errors, are presented in Table 8. Biomass estimated by swept area method by strata and its comparison with results of previous surveys are presented in Table 9. Total biomass in comparison with Russian survey results is:

year	EU	Russia (1)
1983 -		8.900
1984 -		7.500
1985 -		7.800
1986 -		20.200
1987 -		9.300
1988 -	11.868	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	

tons

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

The abundance (x 1000) by age-groups were calculated as follow:

age	year: 1988	1989	1990	1991	1992	1993	1994	1995
2 -	2284	454	359	309	736	9	34	25
3 -	625	6847	775	911	679	1365	40	79
4 -	3034	1500	7083	1877	910	969	1789	611
5 -	1975	3238	897	4461	1471	643	782	1639
6 -	3020	3006	2475	1836	3423	320	651	1356
7 -	4154	2868	1717	2009	913	3110	703	1131
8 -	4258	1691	1657	1566	1090	339	2487	798
9 -	1492	587	1030	675	624	592	243	674
10 -	207	261	485	232	289	296	480	82
11 -	109	34	90	8	138	198	166	131
12 -	61	14	15	48	74	229	164	191
13 -	-	-	31	-	16	280	195	151
14 -	-	-	17	-	-	865	398	89
15 -	-	-	-	-	-	28	397	117
16 -	-	-	-	-	-	35	9	15
total	21219	20500	16631	13932	10363	9268	8538	7089
Biomass	11868	10533	9101	7565	6492	5949	6173	5087
SOP		9726	8827	7682	6111	5856	5966	5038
N 6+	13301	8461	7517	6374	6567	6282	5893	4735

The 1986 year-class (age 9 in 1995) was the most abundant cohort since 1989, when it was 3 years old. Its actual abundance is not different from contiguous cohorts. The 1990 year-class (age 5 in 1995), the most abundant cohort of recent years, is less abundant than the 1986 year-class at the same age. Global indices in the above table, such us total abundance, biomass, SOP and N+, had a decreasing tendency since 1988: their level in 1995 are 2 or 3 times lower than the ones recorded at the beginning of the survey series. These results neither show some signal that could indicate a change in the tendency for the next years: the last three year-classes (ages 2, 3 and 4 in 1995) were the weaker observed in this survey series.

Tables 10, 11 and 12 show length frequency, age-length key and estimated age composition of the stock 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 which identification was not possible. The great amount of juveniles in 1994 survey had a modal length of 17-18 centimetres. Their decrease from 1994 to 1995 is a consequence of better identification as fish grows and coincides with an increase of S. mentella at age 5. These changes seems indicate that juveniles mainly were from that species, as it had been supposed (Saborido-Rey 1995). The small amount of juveniles observed in 1995 survey indicates that no new abundant year-class is recruiting to the area.

Mean catch by strata and whole bank data are presented in Tables 13, 17, 21 and 25 for Sebastes marinus, S. mentella, S. fasciatus and "juvenile" respectively. Total biomass estimates by the swept area method are summarised in the next table:

		Sebastes: spp.				Russia	
year	marinus	mente-lla	fascia-tus	juve-nile	UE total	bottom(1)	total(2)
1983						154,900	
1984						132,300	
1985						51,900	
1986						309,500	
1987						106,400	
1988	15,289		142,933		158,222	47,000	379,000
1989	22,958		113,675		136,633	83,300	365,900
1990	14,699	72,893		16,601	104,193	17,700	246,400
1991	4,093	50,071	5,680	4,001	63,846	45,400	107,700
1992	4,130	71,810	5,308	23,229	104,477	18,200	99,500
1993	4,173	25,056	4,425	28,935	62,589	69,800	147,100
1994	33,240	35,710	7,829	49,233	126,011		
1995	9,042	59,332	5,032	235	73,641		

1) Trawlable biomass.
2) Trawlable plus pelagic biomass (Vaskov 1994).

Tables 14, 18, 22 and 26 show length frequency for the four groups/species. Age-length keys were made for three species (Tables 15, 19 and 23). Age composition for each of the three species are presented in tables 16, 20 and 24. Catch per tow distribution of the three species are presented in Figures 4, 5 and 6; their age composition are given together in the following table.

age	S. marinus freq.	S. marinus m.w.	S. mentella freq.	S. mentella m.w.	S. fasciatus freq.	S. fasciatus m.w.
2 :		-	6	7	2	12
3 :	122	35	259	25	81	34
4 :	765	57	3040	63	400	57
5 :	1342	96	19700	91	875	98
6 :	1529	145	11900	118	1108	141
7 :	406	205	490	203	422	214
8 :	281	295	870	276	238	282
9 :	146	380	980	343	105	361
10 :	76	425	570	389	31	428
11 :	61	447	550	440	11	463
12 :	57	552	610	500	17	504
13 :	32	618	280	533	8	567
14 :	48	679	220	616	7	605
15 :	26	749	250	695	2	744
16 :	23	817	260	702	1	429
17 :	14	955	160	770		876
18 :	17	1059	100	784		876
19 :	6	1223	87	818		-
20 :	3	1496	46	920		-
21 :	7	1168	38	966		-
22 :		-	25	1071		-
23 :	1	2349	11	960		-
24 :	1	1009	5	1047		-
25+:		1495	31	1128		-

frequency x 10000 and mean-weight in grams

Greenland halibut

Mean catch by strata and whole bank estimates are presented in table 27. Biomass estimates by the swept area method by strata and its comparison with results of previous surveys are presented in Table 28. Total biomass was:

1988 - 6,818
1989 - 4,391
1990 - 5,649
1991 - 8,038
1992 - 8,588
1993 - 7,210
1994 - 7,904
1995 - 10,705 tons

Length frequency, age-length keys and age composition of the population were calculated (Tables 29, 30 and 31). Catch per tow distribution is presented in Figure 7. Age composition of the stock was calculated as follows:

age	1991	1992	1993	1994	1995
1 -	349	922	937	832	6165
2 -		800	933	706	1394
3 -	235	286	599	1082	1369
4 -	993	861	566	1224	1249
5 -	1956	1600	960	1365	1709
6 -	1253	1996	1574	2233	3793
7 -	2283	1793	1732	2096	3026
8 -	545	991	1388	1213	1729
9 -	464	473	905	689	1134
10 -	388	266	257	264	254
11 -	122	139	141	95	68
12 -		67	51	54	26
13 -		18	19	19	
14 -		13	10		7
15 -					
16 -					
					(x 1000)
total	8588	10225	10072	11860	21925
Biomass	8038	8588	7210	7904	10705
SOP	8329	8084	7136	7406	9782

Abundance of each cohort increases up to ages 6 or 7, according to these results, when total length is around 40 centimetres. This seems indicate an immigration of young fish to the area, which coincides with Flemish Cap being not an area for spawning. All Greenland halibut caught in the survey was immature: length of first maturation in the area occurs at 65 centimetres (Junquera and Saborido-Rey, 1995) and few fish overpass that length. Finally, fish abundance at ages 1, 2 and 3 are the biggest observed in the period, which could be a signal of good recruitments for the next coming years.

Shrimp

Detailed results were presented by Sainza (1995).

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Table 1 - Technical data of the survey.

Procedure	specification
Vessel	R/V CORNIDE DE SAAVEDRA
GT	1,200 t
power	1,500 + 750 HP
Trawling speed	3.62 knots
Trawling time	30 minutes effective time
Trawl gear	type "Lofoten"
footrope / handrope	31.20 / 17.70 m
footgear	27 steel bobbins of 35 cm
vertical opening	2.5 - 2.8 m
warps	100 meters, 45 mm, 200 Kg/100 m
trawl doors	polyvalent, 850 Kg
wire length	2.75 times the depth
mesh size in codend	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 from previous surveys.
Criterion to reject data from tow	- tears in codend - 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 fishes, squid and shrimp
Species for age determination	cod, American plaice, redfish (Sebastes marinus, S. mentella and S. fasciatus) and Greenland halibut.

Table 2 - Total biomass swept area method estimates for several species or groups of species in 1988-1995 surveys (tons).

specie	survey 1988	1989	1990	1991	1992	1993	1994	1995
Rajidae	4495	1908	2824	4064	3765	6279	3462	2267
Synaphobranchus sp.	219	88	42	77	70	70	8	16
Urophycis sp.	654	167	169	261	69	161	214	83
Antimora sp.	392	302	284	560	720	594	799	195
Macrouridae	3088	1438	1223	2249	2592	6183	3230	2604
Notacanthus sp.	501	408	65	478	449	705	455	346
Illex sp.	5	8	1647	1159	66	1	210	1
Anarhichadidae	7973	7478	8120	10097	9095	14304	15516	19217
witch flounder	909	335	420	769	823	1048	776	705
Greenland flounder	6818	4391	5649	8038	8588	7210	7904	10705
Zoarcidae	559	923	1202	1978	1356	3277	1869	2182
cod	37127	103644	55360	36597	24295	55642	42767	8815
American plaice	11886	10533	9101	7565	6492	5949	6173	5087
redfish	158417	136658	104194	63845	104477	62589	126010	73640
shrimp	2164	1923	2139	8211	16531	9163	3337	5389
others	624	206	1138	664	439	779	503	395
Total	235833	270410	193575	146611	179828	173954	213234	131647

Table 3 - Cod catches (Kg) by strata.

stratum	area squa. miles	tow number	catch per tow mean	catch per tow s.deviat.	catch per mile towed mean	catch per mile towed s.deviat.
1 -	342	4	59,04	79,42	31,16	41,55
2 -	838	11	45,01	71,98	24,74	39,65
3 -	628	7	23,23	21,83	12,45	11,45
4 -	348	4	26,09	34,16	14,61	19,27
5 -	703	8	23,06	26,04	12,35	13,87
6 -	496	6	32,97	35,46	18,00	19,60
7 -	822	9	1,86	3,79	1,01	2,06
8 -	646	7	6,96	10,11	3,68	5,32
9 -	314	3	0,35	0,61	0,20	0,34
10 -	951	11	0,77	2,17	0,42	1,19
11 -	806	9	1,24	2,47	0,67	1,32
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	121				

	catch per tow	catch per mile towed
mean	11,56	6,26
standard error	2,47	1,34

(Kg)

Stock biomass estimated by swept area method = 8,815 tons

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

Stratum	depth in fathoms	survey 1988	1989	1990	1991	1992	1993	1994	1995
1 -	70- 80	1223	590	697	5078	69	469	1969	1421
2 -	81-100	9229	9386	1878	4988	4683	8223	7443	2764
3 -	101-140	4065	9344	2174	2236	7704	7670	5539	1042
4 -	"	2846	4404	2242	2637	3131	12885	1714	678
5 -	"	1937	9731	7681	9685	4155	6205	840	1158
6 -	"	2932	6173	2988	1392	866	3837	1284	1191
7 -	141-200	2022	14571	3987	2308	859	5595	779	111
8 -	"	8121	14943	14524	4644	2136	7241	21992	317
9 -	"	167	4784	5765	171	130	907	217	8
10 -	"	1217	4454	3813	1417	297	851	460	53
11 -	"	2278	12020	3509	1625	204	1526	529	71
12 -	201-300	305	2245	1443	115	-	22	-	-
13 -	"	8	2304	667	85	-	-	-	-
14 -	"	97	686	496	119	61	211	-	-
15 -	"	680	7671	2131	98	-	-	-	-
16 -	301-400	-	60	-	-	-	-	-	-
17 -	"	-	5	-	-	-	-	-	-
18 -	"	2	-	-	-	-	-	-	-
19 -	"	-	91	-	-	-	-	-	-
total		37127	103644	53977	36597	24295	55642	42767	8815

Table 5 - Cod length frequency by strata (x 1000).

length (cm)	Stratum 1	2	3	4	5	6	7	8	9	10	11	total
12-14	6	11		19	6							43
15-17	117	346	52	237	128	41						921
18-20	74	133	98	147	64	24						539
21-23		6		13								18
24-26	142	507	13	301	38	6				6		1013
27-29	635	3106	104	666	102	59	39					4712
30-32	623	3010	182	609	102	47	111					4685
33-35	179	718	65	147	45	41	13					1208
36-38	129	350	98	64	26	18	13					697
39-41	160	214	78	13	102	24	13					604
42-44	234	224	111	58	102	24	7	20				778
45-47	203	258	137	32	179	130		33	8			979
48-50	228	142	202	45	159	124	7	20		6		933
51-53	166	73	85	26	121	148	7	27				652
54-56	62	17	46		45	107		27				302
57-59	25	11	33	13	51	112	7	7		6		264
60-62	18		13		45	77						153
63-65			13		26	30	7			6	6	87
66-68	12					18						30
69-71			7		6			13			6	33
72-74			7									7
75-77												
78-80			7									7
81-83												
84-86			7		6					6	6	26
87-89								7				7
90-92					6							6
93-95					6							6
96-98												
99- 1												
102- 4								7				7

Table 6 - Cod age-length key

length (cm)	age 1	2	3	4	5	6	7	8	9	10	11	12	no id	tot n.
9-11														
12-14	6													6
15-17	119												1	120
18-20	63												1	64
21-23	1													1
24-26	1	40											3	44
27-29		176											1	177
30-32		234	2										6	242
33-35		73	21	1									5	100
36-38		10	73	1									3	87
39-41		1	39	40									2	82
42-44			4	98									1	103
45-47				137		1							1	139
48-50				129	3									132
51-53				73	20								1	94
54-56				17	27									44
57-59				2	39	1								42
60-62					22								1	23
63-65					14									14
66-68					3									3
69-71					3	2								5
72-74					1		1							2
75-77														
78-80							1							1
81-83														
84-86							1		2					3
87-89						1								1
90-92							1							1
93-95									1					1
96-98														
99- 1														
102- 4										1				1
total:	190	534	139	498	132	5	4		3	1			261	532

Table 7 - Cod age composition by strata (x 10000).

age	stratum 1	2	3	4	5	6	7	8	9	10	11	total	mean weight (g)
1 :	20	51	15	42	20	7						155	46
2 :	155	718	36	168	28	15	16			1		1137	235
3 :	24	60	14	10	9	4	2					123	466
4 :	89	79	57	16	60	45	3	10	1	1		361	961
5 :	13	4	12	2	18	33	2	4		1	1	90	1850
6 :								1				1	3159
7 :			1		1							2	5555
8 :													-
9 :					1							1	6406
10 :								1				1	10557
11 :													-
12 :													-
13 :													-
14 :													-
15 :													-
16+:													-

Table 8 - American plaice catch (Kg) by strata.

stratum	area squa. miles	tow number	catch per tow mean	catch per tow s.deviat.	catch per mile towed mean	catch per mile towed s.deviat.
1 -	342	4	67,59	33,66	36,67	18,23
2 -	838	11	16,23	30,71	8,96	16,92
3 -	628	7	4,18	2,47	2,26	1,31
4 -	348	4	14,15	9,45	7,91	5,29
5 -	703	8	8,25	6,49	4,40	3,36
6 -	496	6	2,57	1,32	1,39	0,73
7 -	822	9	3,15	2,38	1,70	1,31
8 -	646	7	2,06	2,89	1,15	1,66
9 -	314	3	16,19	24,50	8,96	13,60
10 -	951	11	7,82	5,62	4,19	2,92
11 -	806	9	1,41	0,83	0,76	0,46
12 -	670	8	0,18	0,37	0,10	0,20
13 -	249	3	0,10	0,18	0,06	0,10
14 -	602	7	0,21	0,31	0,13	0,20
15 -	666	8	1,04	1,15	0,58	0,64
16 -	634	7	-	-	-	-
17 -	216	2	-	-	-	-
18 -	210	2	-	-	-	-
19 -	414	5	0,24	0,27	0,14	0,15
total	10555	121				

	catch per tow	catch per mile towed
mean	6.63	3.61
standard error	1.05	0.57

(Kg)

Stock biomass estimated by swept area method = 5,087 tons

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

stratum	depth in fathoms	1988	1989	1990	1991	1992	1993	1994	1995
1 -	70- 80	979	750	448	808	532	809	496	1672
2 -	81-100	1990	2701	1040	1997	1285	950	899	1001
3 -	101-140	1025	838	1207	935	473	333	244	189
4 -	"	1649	346	661	240	418	429	640	367
5 -	"	1949	2319	1406	1055	628	968	922	412
6 -	"	358	847	720	376	451	229	606	92
7 -	141-200	880	398	562	292	479	239	237	187
8 -	"	313	123	209	188	545	365	132	99
9 -	"	77	122	262	-	280	154	15	375
10 -	"	1742	1118	1555	981	1054	1094	1677	531
11 -	"	889	876	973	301	279	219	227	82
12 -	201-300	7	14	35	13	8	11	25	9
13 -	"	2	-	15	-	-	-	-	2
14 -	"	6	6	6	292	22	53	18	11
15 -	"	17	74	2	73	28	82	30	51
16 -	301-400	4	-	-	3	7	9	4	-
17 -	"	-	-	-	-	-	-	-	-
18 -	"	-	-	-	-	-	-	-	-
19 -	"	-	-	-	11	3	4	2	8
total		11886	10533	9101	7565	6492	5949	6173	5087

Table 10 - American plaice length frequency by strata (x 1000).

length (cm)	stratum 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	19	total
16-17						12											12
18-19			7	6													13
20-21																	
22-23																	
24-25					6				8	12	12						39
26-27			7	12			7			6	6						39
28-29	12		7	13	6				16	31	6			7			98
30-31	68	6	7			12	27		8	37	6	6				6	183
32-33	222	56	20		32		33	14	39	100	19	6	6		6		552
34-35	228	50	20	6	25	18	26		55	93	32				13	6	573
36-37	394	56	20	6	57	24	26	20	148	131	19	6					908
38-39	585	56	26	45	77	6	39		171	150		6		7	19		1187
40-41	444	101	33	38	39	12	14	7	171	106	12				25	6	1007
42-43	333	51	13	51	77	6	20	7	39	68					6		670
44-45	99	39	7	38	38	12	20	7	31	37				7	12		347
46-47	56	56	33	26	32	6	26	7		75	19				6		341
48-49	43	117	7	45	26		7	7	16	37	13						316
50-51	74	145	33	19	51	12	13	20		12							379
52-53	49	84	13	32	26	6	13	13									236
54-55	18	67		26	19	6				12	13						162
56-57		22		6													29
58-59		6															6
60-61		6															6

Table 11 - American plaice age-length key.

MALE

length (cm)	age 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	no id	tot n.
16-17																		
18-19																		
20-21																		
22-23																		
24-25			3	2														5
26-27			2															2
28-29			2	6													2	10
30-31			1	12	3												1	17
32-33				21	20	4	1										3	49
34-35				5	26	5	3										4	43
36-37					28	16	11	1									7	63
38-39					12	18	11	8	2								7	58
40-41					2	18	18	14	2								9	63
42-43						14	9	7	6								7	43
44-45						1	2		2	1							4	10
46-47								3										3
48-49										2								2
total:			8	46	91	76	55	33	12	3							44	368

FEMALE

length (cm)	age 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	no id	tot n.
16-17		1																1
18-19		2																2
20-21																		
22-23																		
24-25			1															1
26-27			2	2														4
28-29				2													1	3
30-31				3														3
32-33				5	1												1	7
34-35				4	9	1												14
36-37				1	17	2											1	21
38-39					23	5	5										4	37
40-41					11	9	9	1									2	32
42-43					1	12	14	2	2								4	35
44-45						3	9	13	9								1	35
46-47						1	5	18	17	1	2						2	46
48-49							2	7	20	2	2	4		1	1		4	43
50-51								2	11	2	6	10	5	1	3		13	53
52-53									3	1	4	5	6	2	5	1	9	36
54-55									1		1	2	5	4	3		7	23
56-57														2	1	1	1	5
58-59																	1	1
60-61																	1	1
total:		3	3	17	62	33	44	43	63	6	15	21	16	10	13	2	52	403

Table 12 - American plaice age composition by strata (x 1000).

mean

age	stratum 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	19	total	weight (g)
1 :																		
2 :			7	6		12												
3 :	7		4	12	5	1	5		9	20	14			2			25	37
4 :	192	43	34	14	28	14	47	8	47	132	28	7	3	5	4	5	79	159
5 :	638	125	59	54	132	37	75	23	176	233	45	8	3	5	19	7	611	275
6 :	653	98	28	44	75	14	34	9	190	166	14	4	1	2	21	3	1639	435
7 :	494	100	29	58	75	13	31	9	150	133	12	3		3	19	2	1356	577
8 :	325	92	24	38	50	11	27	10	83	108	12	1		3	14		1131	632
9 :	178	155	30	58	62	11	27	16	37	75	15			2	8		798	775
10 :	24	19	3	6	6	1	2	2	6	11	1				1		674	1023
11 :	23	47	9	13	15	3	5	6	1	7	2						82	1150
12 :	34	72	11	19	23	5	6	8	2	8	3						131	1354
13 :	26	58	7	18	18	5	5	5		5	4						191	1386
14 :	11	41	2	13	9	2	1	2		4	4						151	1526
15 :	19	47	5	15	13	3	4	4		4	3						89	1626
16+:	2	9		3	1												117	1526
																	15	1709

Table 13 - Redfish (Sebastes marinus) catch (Kg) by strata.

stratum	area squa. miles	tow number	catch per tow mean	catch per tow s.deviat.	catch per mile towed mean	catch per mile towed s.deviat.
1 -	342	4	21,00	24,14	11,07	12,64
2 -	838	11	3,33	7,65	1,84	4,23
3 -	628	7	13,66	26,51	7,64	15,00
4 -	348	4	3,95	7,17	2,12	3,83
5 -	703	8	17,19	20,78	9,57	11,77
6 -	496	6	33,86	38,25	18,55	21,54
7 -	822	9	18,37	30,91	9,98	16,83
8 -	646	7	3,12	3,52	1,69	1,91
9 -	314	3	2,70	2,44	1,51	1,35
10 -	951	11	42,00	43,19	22,44	22,54
11 -	806	9	22,09	24,71	11,99	13,52
12 -	670	8	0,12	0,23	0,06	0,12
13 -	249	3	0,50	0,87	0,27	0,48
14 -	602	7	0,10	0,17	0,05	0,10
15 -	666	8	0,19	0,28	0,10	0,16
16 -	634	7	0,05	0,14	0,03	0,08
17 -	216	2	-	-	-	-
18 -	210	2	0,14	0,20	0,08	0,12
19 -	414	5	-	-	-	-
total	10555	121				

	catch per tow	catch per mile towed
mean	11.84	6.42
standard error	1.94	1.05

(Kg)

Stock biomass estimated by swept area method = 9,042 tons

Table 14 - Redfish (Sebastes marinus) length frequency by strata (x 1000).

length (cm)	stratum 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	total
10-			7															7
11-	51																	51
12-	201	39	7		6	12												265
13-	414	79	20	13	45	182	13	7										771
14-	881	173	46	6	171	450	7			25								1760
15-	815	213	150	13	203	954	39		8	61	40							2495
16-	917	280	260	12	322	1398	111	14	23	229	155							3721
17-	804	190	261	12	413	1205	223	20	16	390	238				6			3778
18-	648	179	260	6	455	1078	275	26	31	765	603							4327
19-	485	207	260	51	515	1065	464	67		871	1015							4999
20-	280	129	325	64	713	995	622	53	62	1674	1113	6		7				6043
21-	395	84	293	90	630	634	641	100	16	1145	1083	6	18	7	6			5146
22-	183	28	274	45	385	605	406	46	31	942	723	12			6			3687
23-	117	39	267	64	244	172	354	54	8	687	419		12		6			2443
24-	35	45	150	6	124	101	260	40	23	406	228				6			1423
25-	46	22	163	6	147	124	163	7	23	375	145		12					1234
26-	21	17	124	13	174	171	242	20	8	317	170		6				9	1291
27-		11	39	13	86	95	223	13	46	266	96							888
28-		12	79	13	85	59	216	13		287	115							878
29-	21	12	65	13	30	83	98	7	23	422	106	6		7	6	7		904
30-		6	78	6	67	30	72	20		203	86							567
31-			46	19	32	60	72			225	52							505
32-			27		25	59	91			116	73							389
33-			13	12	24	36	85			289	39				6			505
34-			20		25	12	13	7		262	12							350
35-			20		19	24	27			176	39							303
36-			14	6	12	18	27			112	13							200
37-					13	6	7	7	8	178	6							224
38-					6	12	27			89	19							153
39-							7			79	6							92
40-		6			13	6	7			75	29	6						141
41-										75	6							81
42-						6				73	6							86
43-					12	6	7			30								55
44-		6									29							34
45-										34								34
46-							7			43								50
47-										6								6
48-										6								6
49-																		
50-																		
51-					6					6	6							19
52-					6		7				22							35
53-											6							6

Table 15 - Redfish (Sebastes marinus) age-length key.

MALES length (cm)	ages 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	no id	n. tot
12-	2																								2
13-	7	1																						2	10
14-	3	10																						3	16
15-		15																							15
16-		17	2																						19
17-		1	25																						26
18-			26																						26
19-		1	19	6																					26
20-			2	21																					23
21-			2	37																				1	40
22-			1	17	1																			1	20
23-				7	14																				21
24-				2	15	1																		1	19
25-				1	12	4																			17
26-						15																			15
27-						14																			14
28-						4	10	1																1	16
29-						2	11	3																4	20
30-							2	7																	9
31-								4	12	5	1														22
32-									6	4	1														11
33-									2	8	3	5	2											1	21
34-									1	2	2	6													11
35-										1	4	5	2	1											13
36-											1	2	5	2										2	12
37-													1	6	3	2									12
38-														2	3									1	6
39-																1									1
40-														1	1	2	1					1			6
41-																									
42-																1									1
43-																									
44-																									
45-																							1		1
total	12	45	77	91	42	40	23	15	21	20	12	18	10	12	7	6	1					1	1	17	471

FEMALES length (cm)	ages 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	no id	n. tot
12-	3																								3
13-	7	2																						1	10
14-	1	7																						3	11
15-		10																							10
16-		16	3																						19
17-		2	18																						20
18-			15																						15
19-			21	5																					26
20-			2	27	2																			1	32
21-			4	21					1															1	27
22-			1	13	2																			1	17
23-			1	8	13																				22
24-				3	7																				10
25-					9	3																		3	15
26-						20																	1		21
27-						12	2																	1	15
28-						4	4																	1	9
29-						1	15	2																	18
30-							1	2																	3
31-								7	7	2															16
32-								2	5	3	2														12
33-									1	7	1													2	11
34-										2	1	1	1											1	6
35-						1				1	1	1	2												6
36-											2	1	1	1											5
37-												2		2										1	5
38-											1		1	2	2										6
39-							1					1	1												3
40-														1		3	1								5
41-												1				1									2
42-																			1						1
43-													1			2									3
44-																	1								1
45-																	1	2							3
46-															1			1							2
47-																									
48-																1									1
49-																									
50-																								1	1
51-																							1		1
52-																							4		4
53-																					1				1
total	11	37	65	77	33	41	23	13	14	15	8	7	7	6	3	7	3	3	1		1		6	17	398

Table 16 - Redfish (Sebastes marinus) age composition (x 10000).

mean weight age (g)	stratum 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	total
1 : -																		
2 : -																		
3 : 35	71	14	3	1	8	23	1	1										122
4 : 57	246	62	44	3	67	268	17	2	3	32	21							765
5 : 96	196	57	81	7	142	337	100	12	6	216	187				1			1342
6 : 145	91	28	96	21	174	227	175	21	10	383	297	2	2	1	1			1529
7 : 205	16	8	44	6	42	37	59	8	4	114	65		2		1			406
8 : 295	4	4	24	3	32	31	56	4	6	80	35		1				1	281
9 : 380	2	2	12	2	10	12	25	2	2	59	17				1			146
10 : 425		1	9	1	7	6	11	2		28	11							76
11 : 447	1		4	1	5	7	10			25	8							61
12 : 552			3	1	3	5	9			30	6							57
13 : 618			2		2	3	4			18	3							32
14 : 679			2		3	3	4			33	3							48
15 : 749			1		1	2	2			18	2							26
16 : 817					1	1	2			17	2							23
17 : 955					1	1	2			9	1							14
18 : 1059					1	1	1			12	2							17
19 : 1223		1								2	3							6
20 : 1496										3								3
21 : 1168										6	1							7
22 : 0																		
23 : 2349											1							1
24 : 1009										1								1
25+: 1495					2		1			3	3							9

Table 17 - Redfish (Sebastes mentella) catch (Kg) by strata.

stratum	area squa. miles	tow number	catch per tow mean	catch per tow s.deviat.	catch per mile towed mean	catch per mile towed s.deviat.
1 -	342	4	-	-	-	-
2 -	838	11	11,76	39,02	6,54	21,69
3 -	628	7	0,34	0,54	0,18	0,29
4 -	348	4	0,54	1,08	0,29	0,58
5 -	703	8	5,26	13,16	2,98	7,45
6 -	496	6	2,20	2,27	1,18	1,24
7 -	822	9	127,95	195,38	69,14	106,30
8 -	646	7	44,54	53,55	24,61	29,68
9 -	314	3	192,02	181,73	107,36	100,58
10 -	951	11	162,59	85,72	88,11	46,42
11 -	806	9	93,26	92,73	50,31	49,87
12 -	670	8	119,48	98,20	65,80	53,98
13 -	249	3	277,33	181,94	153,09	100,42
14 -	602	7	120,22	107,60	70,99	61,07
15 -	666	8	145,82	142,05	81,63	76,85
16 -	634	7	25,50	45,34	14,25	24,52
17 -	216	2	93,47	117,06	57,82	72,87
18 -	210	2	10,37	7,25	6,29	4,24
19 -	414	5	15,00	12,02	8,87	7,50
total	10555	121				

	catch per tow	catch per mile towed
mean	76.02	42.16
standard error	8.91	4.90

(Kg)

Stock biomass estimated by swept area method = 59,332 tons

Table 18 - Redfish (Sebastes mentella) length frequency by strata (x 1000).

length (cm)	stratum 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	total
8-						6													6
9-										1									1
10-						2				1									3
11-						26				1									27
12-						127	9	4	15	15									168
13-					1	43	8		11	22	1								83
14-		2	1	8	2	25	5	13	67	19	2								142
15-		1		11	8	31	13	6	187	135			1	3					397
16-		1		40	12	184	35	9	589	375	10		2	15					1273
17-	3	2	1	66	12	640	138	128	1826	1045	33	1	18	51				1	3983
18-	3	4		58	21	1261	290	659	3034	1680	133	8	84	158			2	1	7396
19-	29	1	2	53	15	1795	484	1665	3563	1636	341	33	252	424	1	1	6	3	10300
20-	45	2	1	15	9	1441	552	990	2099	985	538	73	285	482	1		8	2	7526
21-	23	1	1	5		893	290	397	433	271	198	96	117	187	2		8	1	2921
22-	7		1	1	2	152	108	93	79	53	57	38	33	48	2		2		675
23-	4					61	20	24	25	18	22	17	16	19	1			1	227
24-	7					13	3	12	10	2	20	17	14	54	2	1	1	2	156
25-	16	1		1		6	4	9	3	5	51	28	24	93	5	7	1	2	255
26-	31					14	2	8	10	8	63	36	43	166	4	11	3	14	415
27-	23				1	1	2		3	7	62	60	58	137	14	30	4	14	417
28-	20		1	2	1	8	2	15		2	72	89	82	136	34	41	5	17	525
29-	19		2	1		1		8	4	2	65	100	115	148	32	49	5	19	571
30-	13	1			1		2	3	5	1	81	103	116	154	30	63	4	12	588
31-	10			1		11		3	3	8	71	60	112	122	14	50	2	8	475
32-	9						1	6	10	7	77	67	79	103	12	29	2	5	405
33-	8					4	1			10	71	58	71	85	12	25	3	2	350
34-	2			1						6	85	39	65	72	13	18		2	302
35-	5									4	77	34	51	66	15	9	2	3	268
36-	2				1		2				77	59	38	51	15	6	2	1	252
37-	4			1			1				41	72	46	29	19	4		2	220
38-							1				23	35	30	30	11	3		3	135
39-						1					14	34	15	15	13	1	1	2	97
40-	1										10	11	15	7	3	2	2	1	52
41-											3	19	9	9	3			2	45
42-								2			5	10	6	7	1	1		1	33
43-											1	7	4	3	1				16
44-											1	1	1	2					4
45-													2		1		1	1	4
46-												2		1				1	4
47-													1						1

Table 19 - Redfish (Sebastes mentella) age-length key.

MALES

length (cm)	age 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	no id	tot n.
12-	2																								2
13-	3																							1	4
14-		1																						2	3
15-		6																						10	16
16-		6																							6
17-		5	15																					9	29
18-			16																					2	18
19-		1	14	7																					22
20-			6	20																				1	27
21-			5	8																				3	16
22-			1	12	1																			4	18
23-			1	3	5																			7	16
24-					7																			12	19
25-					4	4																		9	17
26-						15																		2	17
27-						10	1																	2	13
28-						3	15																		18
29-							8	15																	23
30-							3	5	4															3	15
31-								3	8	2														3	16
32-									4	12															16
33-									1	10	2	1												2	16
34-									1	1	5	5	2	2										2	18
35-										1		2	6	4	1									3	17
36-													5	7	4	3	3	1						4	27
37-												1	2	5	5	4	1							6	24
38-															6	3	5				1			4	19
39-													1											2	3
40-																								1	1
41-																							1	2	3
42-																		1			1			2	4
43-																								1	1
44-																								1	1
45-																								1	1
46-																							1		1
total	5	19	58	50	17	32	27	23	18	26	7	9	16	18	16	10	9	2			2		2	101	467

FEMALE

length (cm)	age 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	no id	tot n.
12-																									
13-	2	1																							3
14-																									
15-		5																						3	8
16-		9	2																					1	12
17-		6	12																					2	20
18-			10																					7	17
19-			13	4																					17
20-			3	18																				1	22
21-			1	15																				1	17
22-			2	14	1																			7	24
23-				4	1																			9	14
24-					3																			7	10
25-					11	1																		13	25
26-						15																		3	18
27-						8	7																	4	19
28-							14																	1	15
29-							5	2																5	12
30-							5	4	8	1															18
31-								2	4	6	3													2	17
32-								1	2	8	9														20
33-									1	7	6	3													17
34-											4	7	3	1										1	16
35-											2	7	4	3										1	17
36-						1						1	3	4	2	1								2	14
37-												1	3	8	5	2	1							3	23
38-												1		2	2	2	1	1	1					4	14
39-													1	1	2	1	5	3	2					5	20
40-															1		1	1	1	1	1			8	14
41-																1		1	2	1		1	2	16	24
42-																		1	1	3			1	4	10
43-																							1	3	4
44-																								1	1
45-																								2	2
46-																									
47-																								1	1
total	2	21	43	55	16	25	31	9	15	22	24	20	14	19	12	7	8	7	7	5	1	1	4	117	485

Table 20 - Redfish (Sebastes mentella) age composition (x 100000).

age	stratum 2	3	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	total	mean weight (g)
1 :																			0
2 :					1													1	7
3 :					19	2		2	3									26	25
4 :			8	2	44	10	10	138	84	3		1	4					304	63
5 :	4	1	16	4	348	90	220	739	386	55	8	35	63				1	1970	91
6 :	7		3	1	253	92	167	309	150	75	18	43	70				2	1190	118
7 :	2				6	2	3	3	2	7	5	4	13	1	1			49	203
8 :	6				2		1	1	1	14	10	11	31	2	4	1	3	87	276
9 :	3				1		2	1		12	16	18	26	6	9	1	3	98	343
10 :	2						1			9	10	11	15	3	5		1	57	389
11 :	1				1			1	1	9	9	11	14	2	5		1	55	440
12 :	1							1	1	12	10	13	15	2	5		1	61	500
13 :										6	4	7	8	1	2			28	533
14 :										6	3	5	6	1	1			22	616
15 :										7	5	5	5	2	1			25	695
16 :										7	6	5	5	2	1			26	702
17 :										4	5	3	3	1				16	770
18 :										2	3	2	2	1				10	784
19 :										2	3	1	1	1				8	818
20 :										1	2	1	1					5	920
21 :										1	1	1	1					4	966
22 :											1	1						2	1071
23 :																			960
24 :																			1047
25+:											1	1	1					3	1128

Table 21 - Redfish (Sebastes fasciatus) catch (Kg) by strata.

stratum	area squa. miles	tow number	catch per tow mean	catch per tow s.deviat.	catch per mile towed mean	catch per mile towed s.deviat.
1 -	342	4	0,31	0,45	0,17	0,23
2 -	838	11	0,26	0,67	0,14	0,37
3 -	628	7	8,78	20,98	4,94	11,85
4 -	348	4	2,25	4,17	1,21	2,23
5 -	703	8	3,69	4,93	2,05	2,79
6 -	496	6	8,42	9,63	4,55	5,23
7 -	822	9	6,65	5,59	3,59	3,04
8 -	646	7	5,44	5,87	2,94	3,19
9 -	314	3	24,82	18,59	14,03	10,57
10 -	951	11	30,67	34,81	16,41	18,51
11 -	806	9	5,47	4,13	2,95	2,22
12 -	670	8	1,61	1,43	0,90	0,79
13 -	249	3	1,57	2,44	0,86	1,33
14 -	602	7	1,79	1,37	1,14	1,05
15 -	666	8	4,03	3,63	2,26	2,00
16 -	634	7	0,17	0,22	0,10	0,12
17 -	216	2	-	-	-	-
18 -	210	2	-	-	-	-
19 -	414	5	0,15	0,21	0,08	0,11
total	10555	121				

	catch per tow	catch per mile towed
mean	6.55	3.58
standard error	1.15	0.63

(Kg)

Stock biomass estimated by swept area method = 5,032 tons

Table 22 - Redfish (Sebastes fasciatus) length frequency by strata (x 1000).

lenght (cm)	stratum 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	19	total
6-											28							28
7-							7											7
8-																		
9-							7											7
10-		11				6												17
11-		6					33	7										45
12-	12	11			13	12	79	13	23	17	33							214
13-	18	28	26		58	42	119	14		62	32							397
14-		12	14	6	122	178	73	34	62	271	45							812
15-		33	78	6	211	195	105	13	101	635	90			7	6			1481
16-	6	11	53	12	205	160	123	47	295	777	177	6		7	13			1889
17-	18		46	25	134	136	176	53	240	885	135	12	12	27	44			1945
18-	12	11	111	64	172	213	343	67	340	1011	312	31	6	46	145	14		2899
19-	6	17	117	89	198	190	473	220	820	1212	419	74	12	67	257	14	19	4204
20-	12	28	202	51	223	131	565	300	813	1326	420	143	18	141	319	7	6	4704
21-		11	182	38	115	112	390	299	852	970	249	130	42	81	182	14	6	3674
22-		6	202	39	19	83	313	206	310	638	134	62	18	46	132		6	2215
23-			215	19	44	65	85	120	162	682	58	50	24	7	63	7		1602
24-	6		137	6	32	101	170	127	93	892	86	24	12	46	94			1828
25-		6	176		45	83	46	67	63	768	107	18	12	20	50	7		1467
26-			85	13	25	83	65	40	39	598	58	6		20	38			1069
27-			72	13	19	89	59	7	47	524	48	6	6	13	13			915
28-			33		6	36			16	404	26				6			526
29-			66	6	6	30		13	8	251	32			7	6			424
30-			33		6	18		14	8	173	6							257
31-			33		6	12	7	20		149								226
32-			7			18	7			76	6		6					120
33-			20			6	7			62								94
34-							7			46	6							59
35-										8								8
36-										20								20
37-											6							6
38-							7			8								15
39-										8								8

Table 23 - Redfish (Sebastes fasciatus) age-length key.

MALES

length (cm)	ages 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	no id	tot n.
11-	1																								1
12-	1																								1
13-	6	1																							7
14-	1	7																							8
15-		11																						1	12
16-		22	3																					2	27
17-		1	26																					2	29
18-			12																						12
19-			24	11																				1	36
20-			6	37																				3	46
21-				38																				3	41
22-				16	3																			1	20
23-				2	17																				19
24-				1	13	1																			15
25-					21	7																		1	29
26-					1	13																		1	15
27-						8																		1	9
28-							6																		6
29-							10	5																	15
30-							1	5	1					1											8
31-								1		2															3
32-										3	1														4
33-												1													1
34-												1													1
35-																									
36-																									
37-																									
38-																								1	1
tal:	9	42	71	105	55	29	17	11	1	5	1	2		1										17	366

FEMALES

length (cm)	ages 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	no id	tot n.
11-																									
12-	2																							1	3
13-	7	1																							8
14-	2	5																							7
15-	1	15																							16
16-		18	1																					1	20
17-		2	17																					2	21
18-			19																						19
19-			25	8																				2	35
20-			8	38																					46
21-			2	39																					41
22-			1	26	4																				31
23-				4	10																			1	15
24-				2	10																				12
25-				1	7	10																		2	20
26-					1	16																		2	19
27-						12	8																	1	21
28-							7																		7
29-						2	16	5																1	24
30-							5	2	4	1															12
31-							1	5	3	1															10
32-									2	2	2														6
33-										3	2														5
34-											3	4													7
35-											1	2													3
36-													1												1
37-																									
38-															1	1									2
39-																									
40-																1									1
tal:	12	41	73	118	32	40	37	12	9	7	8	6	1		1	2								13	412

Table 24 - Redfish (Sebastes fasciatus) age composition (x 10000).

age	stratum 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	19	total	mean weight (g)
1 :																			-
2 :		1					1											2	12
3 :	3	5	3		9	9	24	4	4	13	7							81	34
4 :	1	6	14	2	51	49	29	9	43	162	30	1		1	2			400	57
5 :	4	3	28	16	50	51	97	34	133	300	83	12	3	15	43	2	1	875	98
6 :	1	4	61	14	38	36	129	82	205	316	85	33	8	26	65	3	2	1108	141
7 :	1	1	44	3	9	22	29	27	30	196	22	8	4	7	18	1		422	214
8 :			21	3	5	19	12	8	10	134	13	2	1	3	7			238	282
9 :			11		2	7	2	2	3	69	6			1	2			105	361
10 :			4		1	2		2	1	20	1							31	428
11 :			2			1		1		7								11	463
12 :			2			2	1			12								17	504
13 :			1			1	1			5								8	567
14 :										7								7	605
15 :										2								2	744
16 :										1								1	429
17 :																			876
18 :																			876
19 :																			-
20 :																			-
21 :																			-
22 :																			-
23 :																			-
24 :																			-
25+:																			-

Table 25 - Juvenile redfish (Sebastes sp.) catch (Kg) by strata.

stratum	area squa. miles	tow number	catch per tow mean	catch per tow s.deviat.	catch per mile towed mean	catch per mile towed s.deviat.
1 -	342	4	-	-	-	-
2 -	838	11	0,04	0,14	0,02	0,08
3 -	628	7	0,12	0,17	0,06	0,09
4 -	348	4	0,03	0,07	0,02	0,03
5 -	703	8	0,88	1,05	0,49	0,59
6 -	496	6	1,37	1,63	0,75	0,91
7 -	822	9	0,47	1,11	0,26	0,60
8 -	646	7	0,03	0,08	0,02	0,04
9 -	314	3	-	-	-	-
10 -	951	11	0,74	0,72	0,40	0,39
11 -	806	9	0,89	0,95	0,48	0,52
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	121				

	catch per tow	catch per mile towed
mean	0.31	0.17
standard error	0.06	0.03

(Kg)

Stock biomass estimated by swept area method = 235 tons

Table 26 - Juvenile redfish (Sebastes sp.) length frequency by strata (x 1000).

length (cm)	stratum 2	3	4	5	6	7	8	10	11	total
7-					6					6
8-		7		19	47	7		25	32	137
9-	6	20		121	195	98		87	64	591
10-	22	39	6	204	302	33		118	84	808
11-	39	52		344	225	151		373	279	1463
12-	34	52	6	542	432	386	20	1096	1001	3569
13-	22	59	6	319	397	327	20	263	619	2032
14-			6	96	154	39		98	84	477
15-				26	36	20		37	13	131
16-				6						6

Table 27 - Greenland halibut (Reinhardtius hippoglossoides) catch (Kg) by strata.

stratum	area squa. miles	tow number	catch per tow mean	catch per tow s.deviat.	catch per mile towed mean	catch per mile towed s.deviat.
1 -	342	4	-	-	-	-
2 -	838	11	1,91	6,33	1,06	3,52
3 -	628	7	0,47	0,96	0,26	0,52
4 -	348	4	0,21	0,24	0,11	0,13
5 -	703	8	0,39	1,04	0,22	0,59
6 -	496	6	0,91	1,12	0,48	0,58
7 -	822	9	15,12	13,28	8,12	7,09
8 -	646	7	6,94	9,56	3,80	5,20
9 -	314	3	7,50	0,72	4,19	0,48
10 -	951	11	7,47	4,18	4,08	2,32
11 -	806	9	8,33	6,43	4,50	3,48
12 -	670	8	22,74	9,65	12,63	5,19
13 -	249	3	6,83	1,13	3,77	0,58
14 -	602	7	8,55	2,21	5,03	1,25
15 -	666	8	34,56	7,81	19,59	4,88
16 -	634	7	37,67	28,70	21,67	16,04
17 -	216	2	43,07	59,16	25,35	34,77
18 -	210	2	54,03	48,83	33,67	31,08
19 -	414	5	39,48	27,44	21,93	13,92
total	10555	121				

	catch per tow	catch per mile towed
mean	13.43	7.61
standard error	1.47	0.85

(Kg)

Stock biomass estimated by swept area method = 10,705 tons

Table 28 - Greenland halibut (Reinhardtius hippoglossoides) biomass stimated by sweept area method (tons).

stratum	depth in fathoms	1988	1989	1990	1991	1992	1993	1994	1995
1 -	70- 80	-	-	-	-	-	-	-	-
2 -	81-100	-	3	6	-	-	-	-	119
3 -	101-140	26	31	8	8	18	3	-	21
4 -	"	142	20	-	15	27	10	-	5
5 -	"	73	96	-	28	41	1	2	21
6 -	"	31	18	15	12	8	15	-	31
7 -	141-200	84	62	63	186	242	93	211	890
8 -	"	149	219	63	177	373	138	38	328
9 -	"	177	162	53	75	318	30	42	175
10 -	"	106	81	48	169	356	31	231	518
11 -	"	44	60	20	104	225	230	232	484
12 -	201-300	399	637	290	749	609	918	1200	1129
13 -	"	63	122	214	43	24	141	150	125
14 -	"	362	289	315	775	834	469	610	404
15 -	"	428	166	505	958	633	1356	1469	1740
16 -	301-400	1352	1342	2492	2487	1798	2141	1500	1832
17 -	"	262	118	130	408	39	105	730	730
18 -	"	104	49	449	348	57	208	380	943
19 -	"	3016	919	977	1498	2988	1321	1108	1211
total		6818	4391	5649	8038	8588	7210	7904	10705

Table 29 - Greenland halibut (Reinhardtius hippoglossoides) length frequency by strata (x 1000).

length (cm)	stratum 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	total
12-13						7	7		12	6									32
14-15		7	25	26	12	92	34	8	405	167			27	12					814
16-17		53	31	51	36	556	153	8	1941	701			60	12				13	3616
18-19		27	6	96	36	216	60		980	367	12		13	19					1832
20-21		26		6		33	7		75	6									153
22-23						111			18				7	6					143
24-25			6	6	6	137	60	8	56	83	25		14						402
26-27				6	18	504	47	16	168	180	24		7	13					983
28-29				19	12	150	7		93	110			7		7			12	417
30-31					6	72	27		37	58	6			13	7				225
32-33				6		184	33		50	77	37	12	13	63	14		9	38	536
34-35					12	288	60	8	75	71	81		40	106	35		26	44	846
36-37	11	20	6	6	6	203	80	16	43	109	93	6	27	119	63	26	18	95	948
38-39	33	7				125	80	16	68	96	112	24	67	244	77	52	78	215	1294
40-41	28			6		151	100	39	69	96	267	24	87	413	189	95	94	196	1856
42-43	40	7			6	105	53	54	68	71	192	12	67	420	224	157	172	304	1951
44-45	17					105	47	23	56	58	167	24	60	314	231	96	137	209	1544
46-47	23					33	14	23	37	45	198	24	40	232	189	104	146	158	1267
48-49						20	14	8	31	6	112	12	33	163	231	87	103	95	915
50-51	17					33	7	8	6	12	75	6	14	88	224	60	69	102	719
52-53						7	7	8	12		49		7	56	105	78	68	64	462
54-55						20	7	24		6	19	6	34	12	168	52	35	45	425
56-57							7				6	12		25	49	17	43	32	191
58-59									6		12			19	77	9	26	12	162
60-61					6						6		7	12	21		9	12	74
62-63											12				35			12	60
64-65													7	12	7	17			43
66-67											6			6					12
68-69																			
70-71															7				7

Table 30 - Greenland halibut (Reinhardtius hippoglossoides) age-length key.

MALES

length (cm)	ages 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	no id	tot n.
10-11																		
12-13																		
14-15	3																	3
16-17	10																	10
18-19	12	1																13
20-21	1	2																3
22-23		8	1															9
24-25		5	4														1	10
26-27		11	6	1														18
28-29		4	6	2														12
30-31			8	2													1	11
32-33			6	4	2													12
34-35			1	5	3												1	10
36-37			1	2	4	2											3	12
38-39				1	1	4	1										6	13
40-41					1	6	2										8	17
42-43					2	10	9	1									10	32
44-45						4	6										8	18
46-47						3	6	6	1								3	19
48-49						3	2	7	4								3	19
50-51							1	6	2								2	11
52-53								3	3	1							1	8
54-55							1	1	8	1							1	12
56-57								1	7									8
58-59									2	1	1							4
60-61								1	2			1						4
62-63									1	1								2
64-65									1									1
66-67												1						1
total:	26	31	33	17	13	32	28	26	31	4	1	2					48	292

FEMALES

length (cm)	ages 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	no id	tot n.
10-11																		
12-13																		
14-15	6																	6
16-17	5																	5
18-19	17	3																20
20-21	7	1															2	10
22-23		4																4
24-25		11	3															14
26-27		5	5															10
28-29		5	6															11
30-31			7	6														13
32-33			6	5	1													12
34-35			2	9	5												1	17
36-37			2	7	10	2											2	23
38-39				1	9	10											4	24
40-41				1	8	19	4										2	34
42-43					1	13	9										5	28
44-45					1	8	11	4									12	36
46-47						1	11	8									7	27
48-49						1	6	8	4								2	21
50-51						1	4	7	3								4	19
52-53							1	2	9								3	15
54-55							2	3	3	3							2	13
56-57								2	5	3	1							11
58-59								1	7	2	1							11
60-61									1	5								6
62-63										3	3							6
64-65										2	1	1						4
66-67											1	1						2
68-69																		
70-71														1				1
total:	35	29	31	29	35	55	48	35	32	18	7	2		1			46	403

Table 31 - Greenland halibut (Reinhardtius hippoglossoides) age composition (x 1000).

age	stratum 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	total	mean weight (g)
1 :		107	61	165	79	866	249	16	3264	1195	11		98	41				13	6165	32
2 :		6	4	30	24	576	82	15	322	254	33		25	16	2			5	1394	110
3 :	1	2	3	18	21	526	93	11	204	253	58	7	26	67	27	3	9	40	1369	196
4 :	7	5	1	6	12	360	89	12	109	142	106	9	45	154	56	14	30	92	1249	314
5 :	25	13	3	4	7	283	118	28	91	143	180	18	71	283	125	54	75	188	1709	420
6 :	68	11	1	5	5	290	160	72	145	188	437	45	157	776	416	233	273	511	3793	555
7 :	45	3		1	2	160	73	59	100	105	349	42	112	595	468	223	274	415	3026	697
8 :	18				2	63	27	29	44	37	201	25	54	273	390	159	193	214	1729	907
9 :	4				3	25	15	20	17	6	112	11	30	141	342	122	143	143	1134	1178
10:						4	4	5	3	2	12	5	17	20	93	30	30	29	254	1541
11:							1		1		5	1	2	8	31	8	5	6	68	1802
12:					2						8		2	6	2	4		2	26	2129
13:																				-
14:															7				7	2833
15:																				-
16+:																				-

Table 32 - Shrimp (Pandalus borealis) catch (Kg) by strata.

stratum	area squa. miles	tow number	catch per tow mean	catch per tow s.deviat.	catch per mile towed mean	catch per mile towed s.deviat.
1 -	342	4	-	-	-	-
2 -	838	11	2,61	8,65	1,45	4,81
3 -	628	7	0,04	0,09	0,02	0,05
4 -	348	4	-	-	-	-
5 -	703	8	0,12	0,25	0,06	0,14
6 -	496	6	0,32	0,46	0,17	0,24
7 -	822	9	5,07	3,21	2,73	1,74
8 -	646	7	3,89	7,72	2,13	4,19
9 -	314	3	21,33	20,73	12,09	12,08
10 -	951	11	12,66	6,78	6,88	3,64
11 -	806	9	7,80	4,03	4,21	2,18
12 -	670	8	15,56	13,61	8,70	7,64
13 -	249	3	1,57	2,71	0,86	1,48
14 -	602	7	13,12	11,07	7,87	6,56
15 -	666	8	20,49	18,62	11,49	10,05
16 -	634	7	0,96	1,60	0,56	0,94
17 -	216	2	-	-	-	-
18 -	210	2	0,07	0,10	0,04	0,06
19 -	414	5	12,38	9,54	7,46	6,15
total	10555	121				

	catch per tow	catch per mile towed
mean	6.85	3.85
standard error	0.78	0.44

(Kg)

Stock biomass estimated by swept area method = 5,413 tons

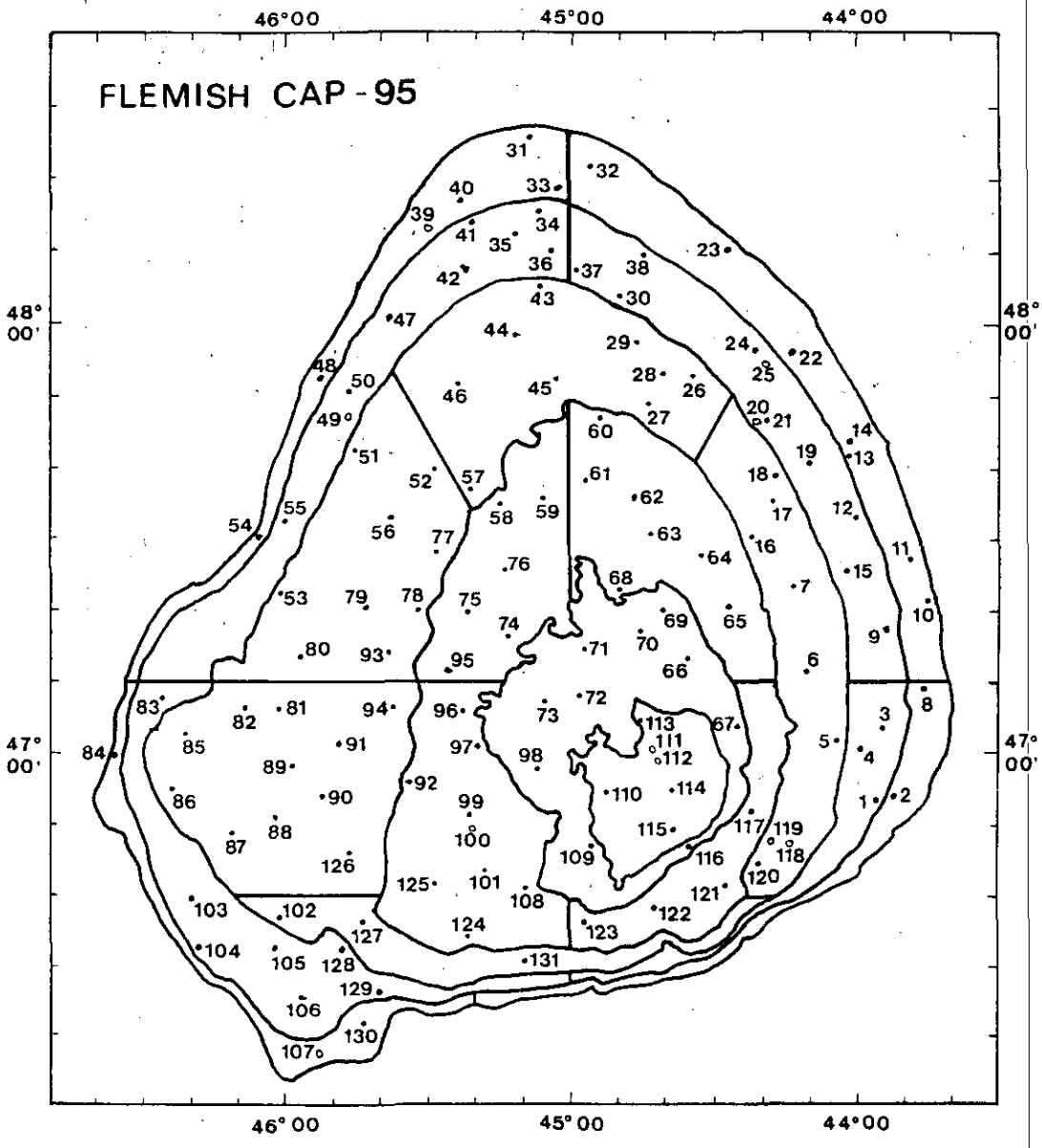

Figure 1 - Tow position of Flemish Cap-95 survey

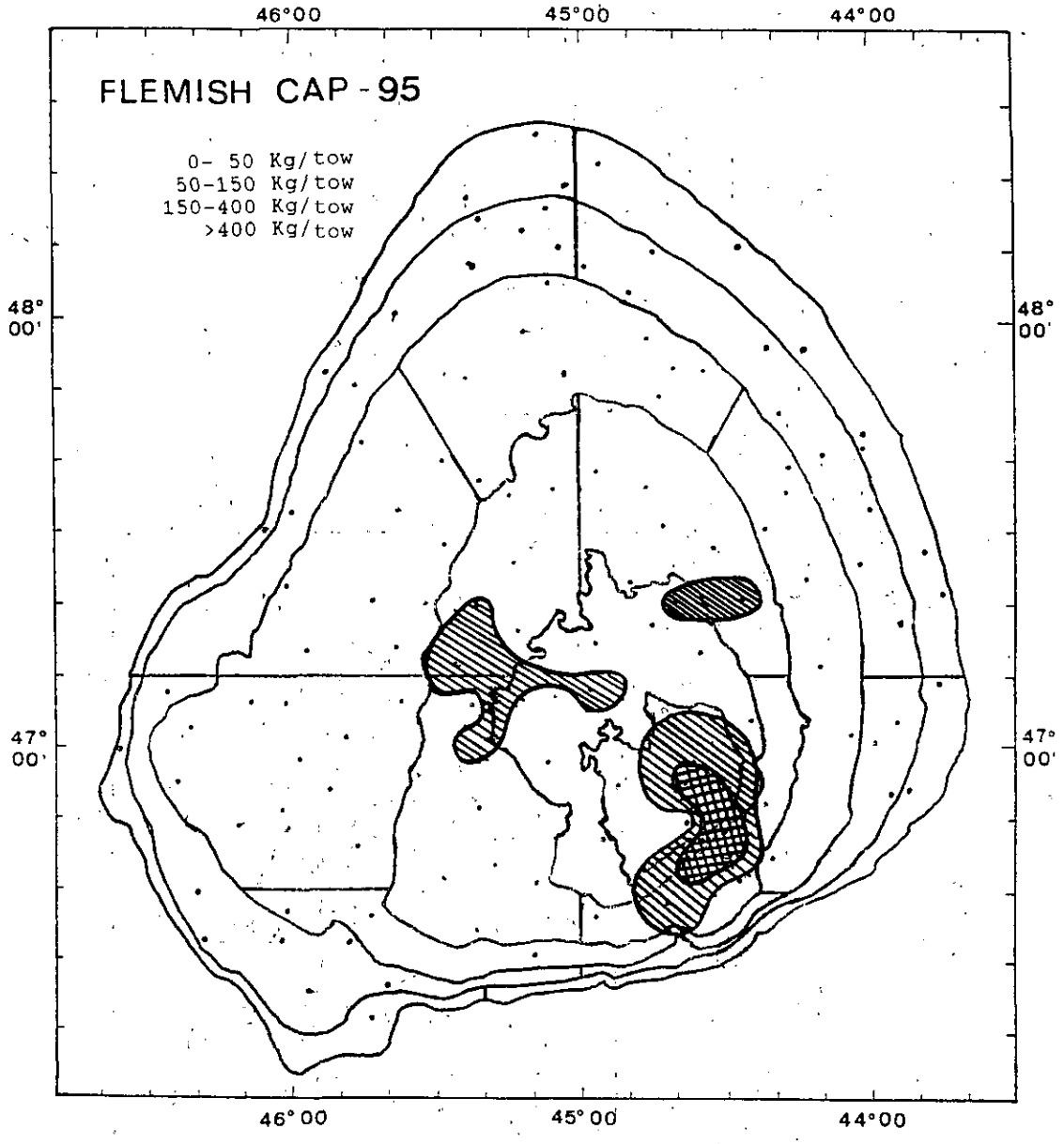

Figure 2 - Cod (Gadus morhua) catch distribution.

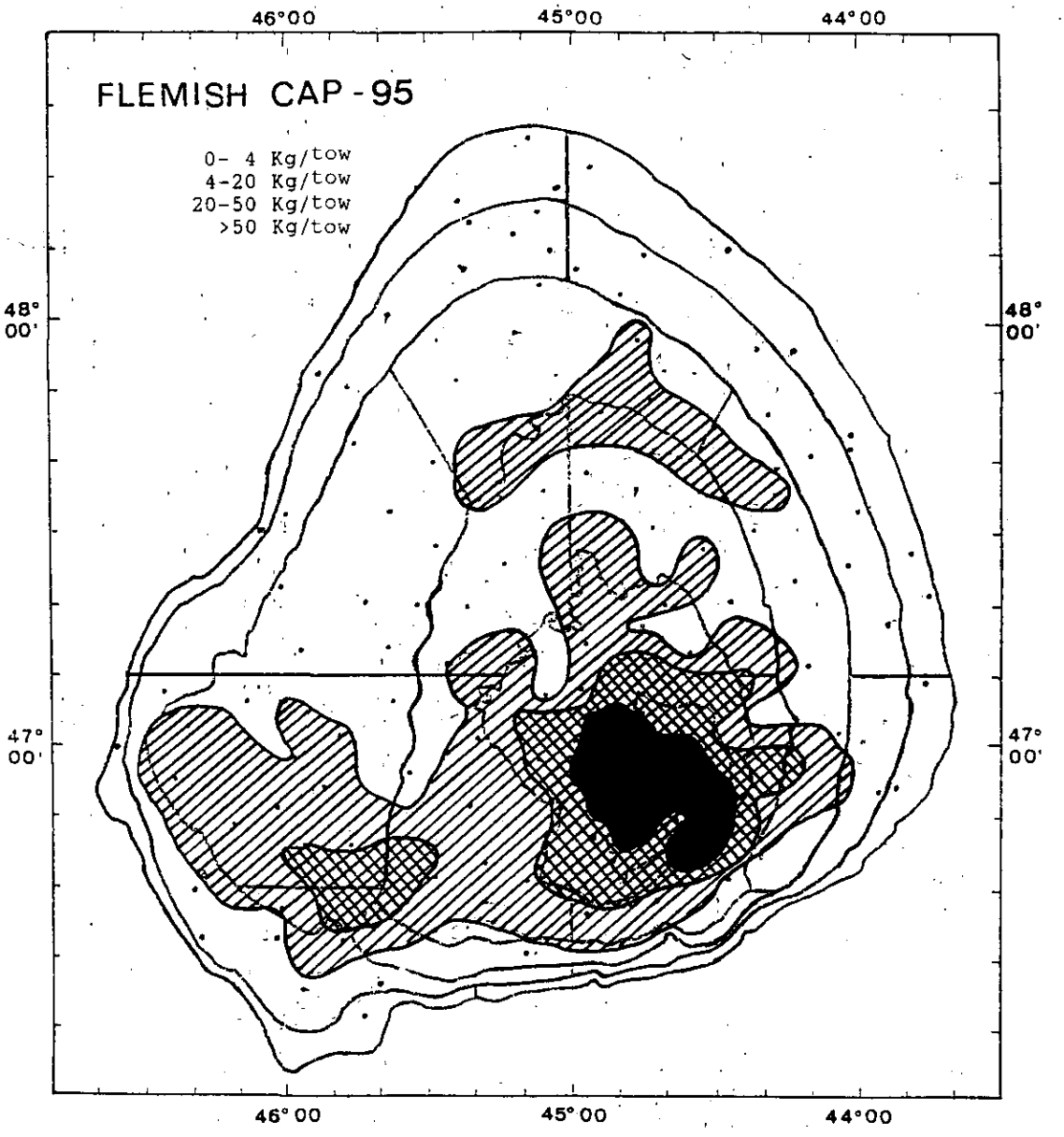

Figure 3 - American plaice (Hippoglossoides platessoides) catch distribution.

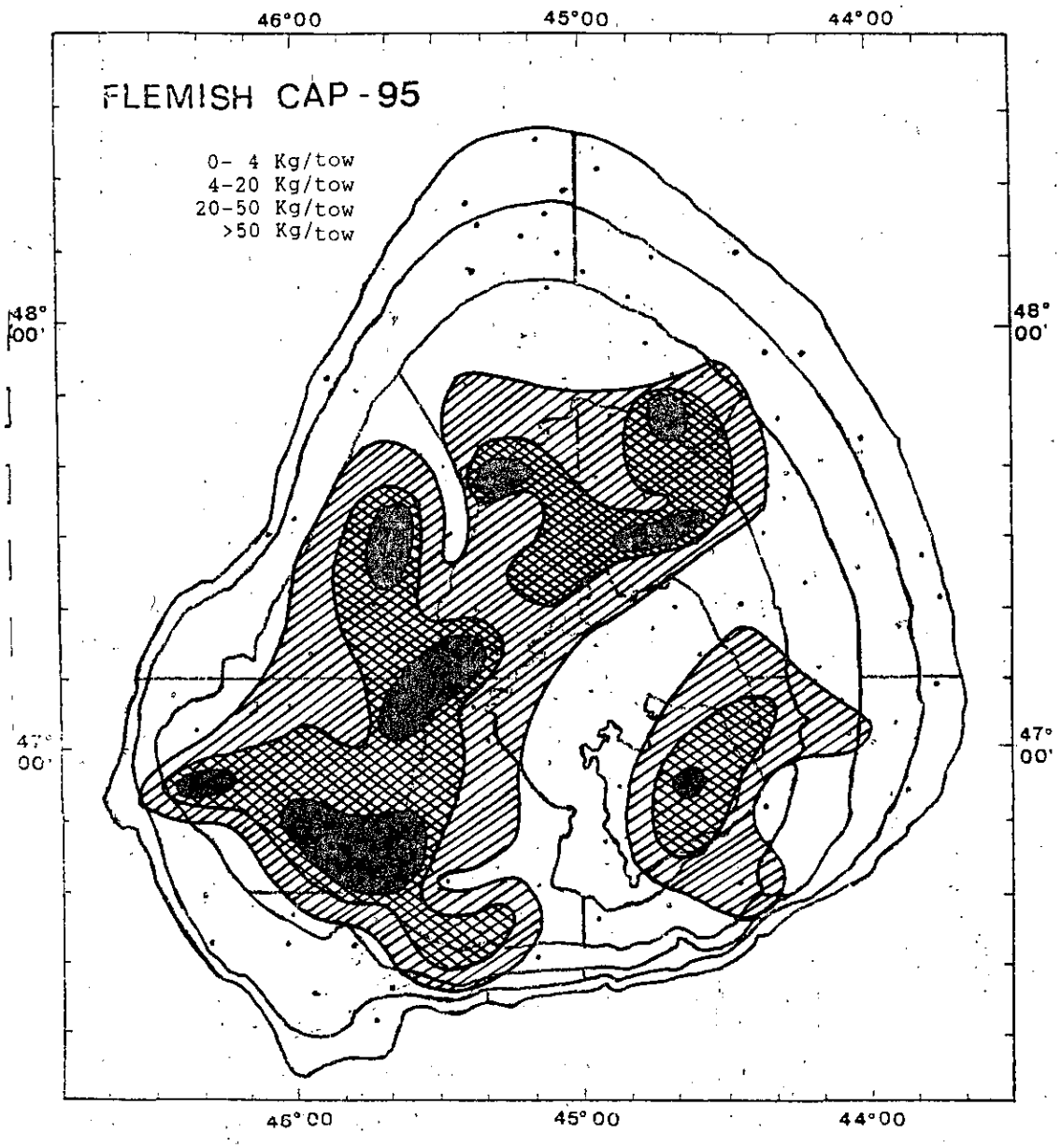

Figure 4 - Redfish (Sebastes marinus) catch distribution.

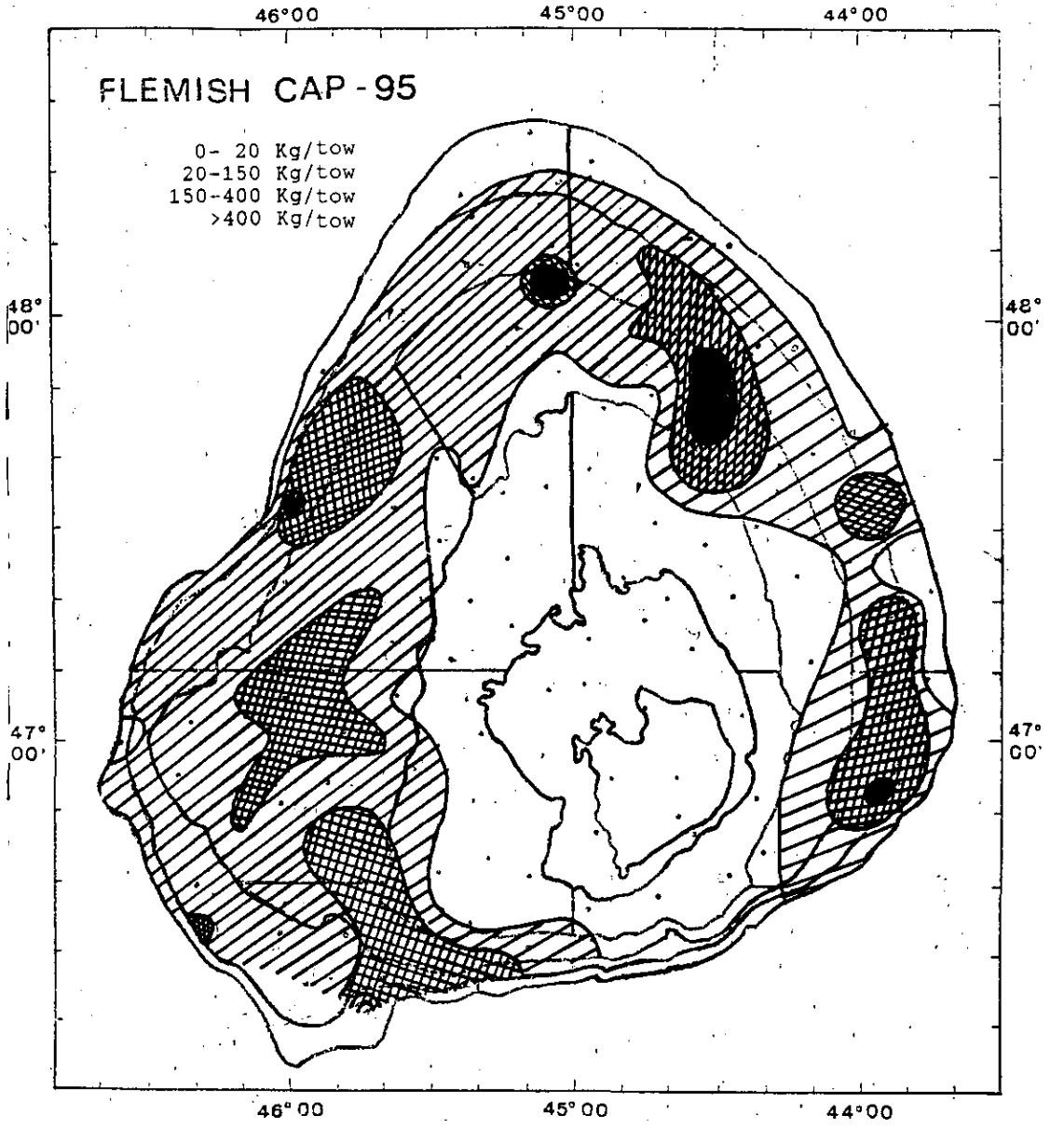

Figure 5 - Redfish (Sebastes mentella) catch distribution.

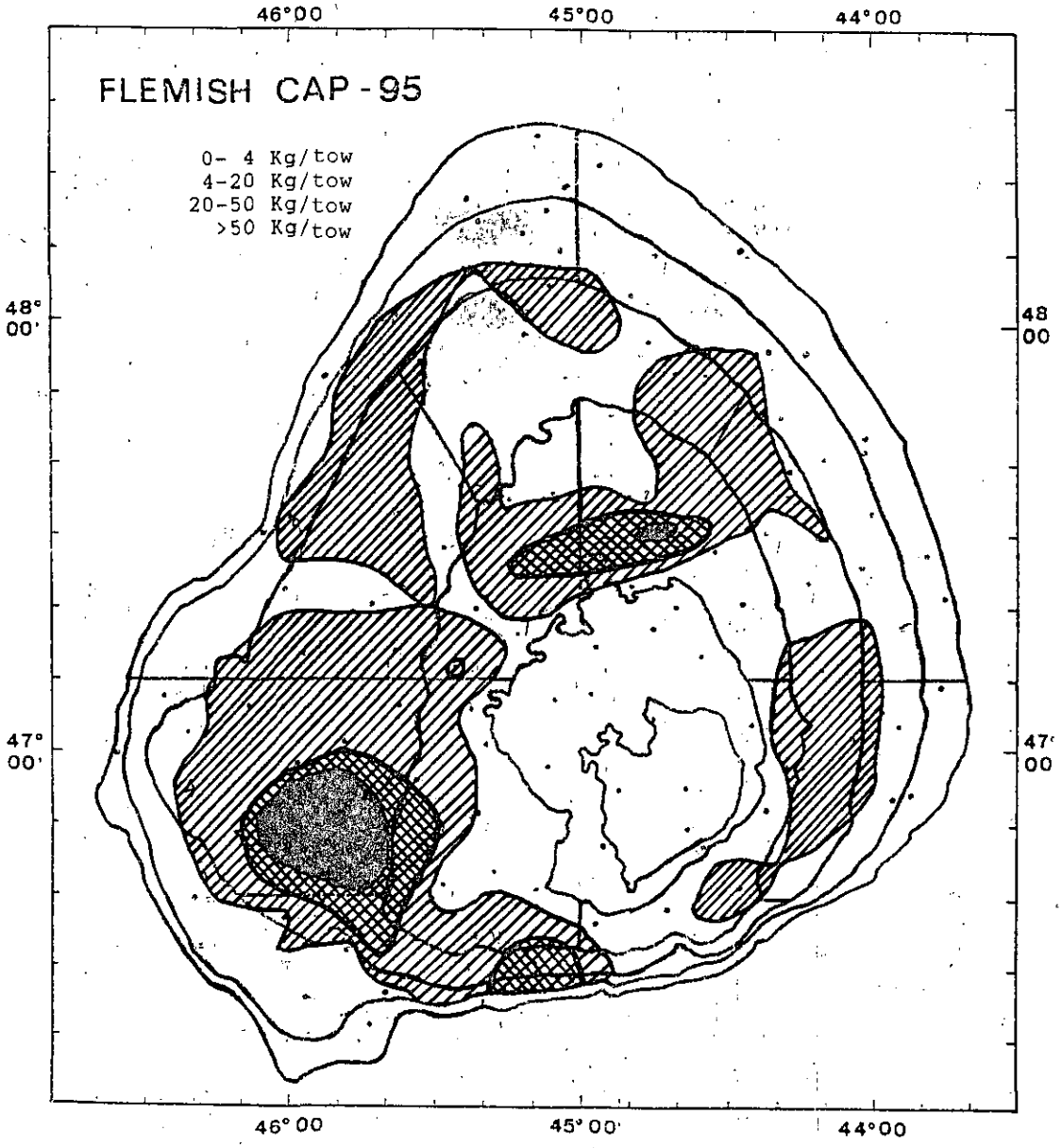

Figure 6 - Redfish (Sebastes fasciatus) catch distribution.

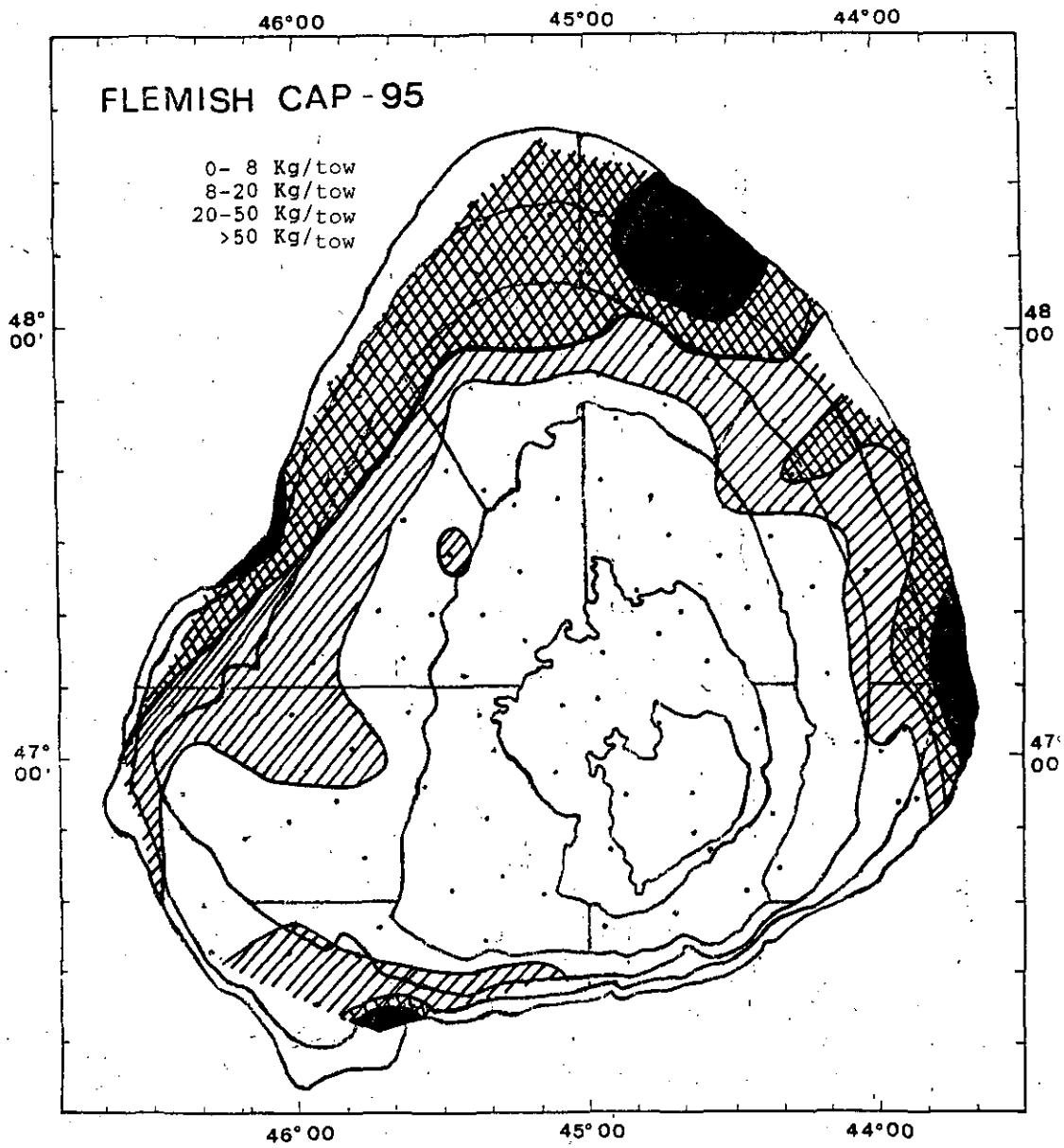

Figure 7 - Greenland halibut (Reinhardtius hippoglossoides) catch distribution.