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Results from Bottom Trawl Survey on Flemish Cap of July 2000

by

F. Saborido-Rey and A. Vázquez

Instituto de Investigaciones Marinas, Eduardo Cabello 6, 36208 Vigo, Spain
e-mails: fran@iim.csic.es - avazquez@iim.csic.es

Abstract

A stratified random bottom trawl survey on Flemish Cap was carried out on July 2000 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 are presented for cod, American plaice, redfish and Greenland halibut. Results from a comparative trial between the survey gear (Lofoten) and a Campelen 1800 shrimp trawl are presented.

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

Introduction

The survey on Flemish Cap was carried out in 2000 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) (Figure 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 13th 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

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	37127	11887	158419	6818	2390	2164
1989	103644	10533	136658	4391	1024	1923
1990	55360	9101	104193	5649	996	2139
1991	36597	7565	63845	8038	1587	8211
1992	24295	6492	104477	8588	1817	16531
1993	55642	5949	62589	7210	3757	9256
1994	24062	6173	126011	7904	2350	3338
1995	8815	5087	73641	10705	1855	5413
1996	8196	3073	100544	11409	1619	6502
1997	9063	2268	139241	15846	1425	5096
1998	4532	2577	59316	23849	2014	16620
1999	2596	1940	82894	20877	1488	12430
2000	2782	1204	149213	16690	1249	9396 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 2000 is at an intermediate level in comparison with previous years. 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. American plaice and skates reached their biomass minimum in 2000. Greenland halibut maintained a continuous biomass increase along the period and reached 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 (Figure 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	37,127	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	2,490	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	-	-	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 8 or less in 2000) were weak, weaker than the ones observed in the previous period. The 1995 to 1997 year-classes (ages 5 to 3 in 2000) failed almost completely and, according to the results of the present survey, the same failure appears to have occurred to the 1998 year-class (ages 2 in 2000).

Age	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	
1	458	2418	237	13780	7118	438	315	155	4	4	3	1	18	
2	7196	6062	1179	2560	3706	13274	385	1137	297	14	8	8	1	
3	4037	6964	467	1538	475	2852	2459	123	613	315	9	10	28	
4	1085	2819	1588	193	203	102	456	361	82	436	114	10	17	
5	128	227	1453	628	33	127	12	90	225	36	145	66	8	
6	22	33	394	168	127	17	6	1	19	90	7	41	41	
7	28	12	32	31	21	50		2	1	2	14	2	16	
8	11	7	13	7	1	10	12		1			1	1	
9		1	8	4				1			1		2	
10			3	1			1	1						
11				2	1									
12										1			1	
13														
14													1	
Total	12965	18543	5374	18906	11685	16870	3646	1873	1240	898	300	139	133	
Biomass	37127	103644	55360	36597	24295	55642	24062	8815	8196	9063	4532	2596	2782	t
SOP *	33474	100217	51388	37231	22734	54945	22867	8841	8138	8873	4502	2582	2767	t

abundance (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 2000 respectively. Catch per tow distribution is presented in Figure 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	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 16, 14 and 10 in 2000, were the most abundant cohorts of the last years. Their growth can be easily followed in the table, confirming the suitability of the ageing criterion. It is interesting to note that good year-classes can be recognised at ages 2 and 3, long before recruitment is completed at ages 4 to 7. 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.

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

abundance (×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 2000 are around 10 times lower than in 1988. 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 should be the first weak cohort. Neither do the results indicate some signal for a improvement of abundance in future years: all youngest year-classes, those with less than 10 years old in 2000, were among the weakest observed in this survey. The 1990 year-class (age 10 in 2000), the most abundant cohort of recent years, was less abundant than the 1986 year-class at the same age.

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 Figure 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, 17, 21 and 25 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.

	Sebastes:	spp.				Russia	
Year	*marinus*	*mentella*	*fasciatus*	juvenile	EU total	bottom (1)	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	104,192	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	-	-

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

Tables 14, 18, 22 and 26 show length frequency for the four groups. Age-length keys are presented in Tables 15, 19 and 23, and abundance at age in Tables 16, 20 and 24. Catches per tow distributions of the three species are presented in Figures 5, 6 and 7; their abundance at age is given together in the table below.

	S. marinus			*S. mentella*			*S. fasciatus*		
age	frequency	m.w.	m.l.	frequency	m.w.	m.l.	frequency	m.w.	m.l.
1									
2									
3	5	50	14	349	69	17	159	63	15
4	3	75	17	1250	87	18	308	111	19
5	24	176	22	2565	116	20	1194	116	19
6	110	244	25	2041	162	22	2428	159	22
7	313	301	27	3291	221	25	1565	215	24
8	308	349	28	5801	265	26	361	275	26
9	623	476	31	3077	302	28	430	320	28
10	1500	519	32	16404	278	27	107	394	30
11	392	523	32	292	383	30	44	436	31
12	463	658	35	28	509	33	47	502	32
13	209	633	34	23	652	36	30	492	32
14	1099	830	38	199	538	34	56	529	33
15	297	1082	41	11	492	33	3	492	32
16	191	899	39	8	625	35	6	537	33
17	189	1139	42	15	687	37			
18	219	1239	43	7	672	36			
19	196	1135	42	51	688	36			
20	29	1011	40						
21	28	1579	47	4	604	35			
22	24	1679	48	7	723	37			
23				9	676	36			
24				10	653	36			
25+	2	2636	56	12	816	39			

frequency (×10,000), m.w. – mean weight in grams, m.l. – mean length in cm

Frequencies at age of the three redfish stocks in the survey series are presented in Table 27. The 1990 and 1991 year-classes were in general abundant for the three species, causing the juvenile biomass to peak in 1994, when aged 4 and 3 respectively. These two cohorts remain almost as the most abundant in later years for *S. marinus* and *S. mentella*, indicating the weakness of younger year-classes. For *S. fasciatus*, however, some newer year-classes appear relatively strong, exceeding in abundance to the other two species.

Greenland halibut

Mean catch by strata and whole bank estimates are presented in Table 28. Total biomass estimates by the swept area method by strata and its comparison with results of previous surveys are presented in Table 29 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 tons

Length frequency, age-length keys and abundance at age of the population were calculated (Tables 30, 31 and 32). Catch per tow distribution is presented in Figure 8. Abundance at age of the stock was calculated in surveys as follows:

age	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	
1	349	922	937	832	6165	2874	1597	1434	525	1602	
2		800	933	706	1394	4613	2113	1268	426	147	
3	235	286	599	1082	1369	1527	4396	5149	1904	312	
4	993	861	566	1224	1249	2066	5157	7835	7178	1405	
5	1956	1600	960	1365	1709	3070	5216	9168	9818	5557	
6	1253	1996	1574	2233	3793	4394	6045	8821	9599	11591	
7	2283	1793	1732	2096	3026	2020	3885	6334	4382	4093	
8	545	991	1388	1213	1729	1378	1709	2339	1544	1701	
9	464	473	905	689	1134	392	593	703	322	351	
10	388	266	257	264	254	75	200	201	101	98	
11	122	139	141	95	68	31	33	27	8	49	
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	8588	10225	10072	11860	21925	22483	31091	43217	35823	26906	
biomass	8038	8588	7210	7904	10705	11409	15846	23849	20877	16690	t
SOP	8329	8084	7136	7406	9782	11005	15367	23627	20094	16264	t
N 10+	510	503	478	432	355	149	300	256	125	147	

abundance × 1000

Shrimp

Bruno (2000) 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	tons

Ageing of fish was started in the 1994 survey. Detailed results were presented by Murua (2001).

Oceanographic conditions

A CTD station was made after each tow. Cerviño (2001) analysed the results and compared them with those observed in 1999.

Gear catchability comparison trial

During the last days of the survey, a comparative trial was carried out between the Lofoten gear used in the survey, and a Campelen gear. It was an extension of the same trial in 1999. The Campelen 1800 shrimp trawl gear has been manufactured according to the specifications (McCallum and Walsh 1994). The method used was to make alternative tows with both gears in the same geographical position. Tows made with a gear were repeated the next day with the other one, so a total of 20 valid tows for both gears were available for comparison. Positions of the tows were selected with the following criterion: to maximise the number of visited strata and to maximise the depth range. Those 20 tows as a pull were the basis for the comparison: no variations among strata were taken into account. This procedure was the same as used in 1999.

The comparison of the catchability of these gears needs to take into account two factors: first, the difference in gear geometry and rigging, the main factor of catchability, and second, the difference in cod-end mesh size: 30 mm in the Lofoten gear and 20 mm for the Campelen, which implies different retention of species with fish length in the selection range. Catchability differences by fish length not attributed to different mesh sizes were also observed, so not only crude comparison of catches were carried out but also differences by length groups were considered.

Table 33 summarises results from 1999 and 2000, and Figure 9 contains explanatory graphics for main species in 2000. Species caught in larger amount by the Campelen gear in 1999 were also best caught in 2000, as a norm. This can be clearer observed in non-commercial species. The observation made last year, that the Campelen gear appears more efficient for the bulk of species considered, exception of Greenland halibut and large redfish, seems to be confirmed

The length modal group of cod with the smallest size had 35 cm modal length (age 2) in 1999 and 22 cm modal length (age 1) in 2000. The Campelen gear caught them more efficiently in both years, but the catch ratio was higher in 1999, at age 2, than in 2000, at age 1. This apparent contradiction is in favour of the conclusion made last year that differences in catchability at age 2 were a spurious result, consequence of the random variability of the results. The remaining cod in the catch has a discrete distribution and catchability of both gears seems to be equivalent in both years.

The catch ratio for redfish as a whole seems to be quite dependent of the fish length: the Campelen gear being more efficient for small fish which have a wider pelagic distribution, and the Lofoten gear being more efficient for fish larger than 20 cm, approximately. The catchability for juvenile redfish is bigger with the Campelen gear, but the catch ratio decreased from 1999 to 2000 at the same time modal length increased from 9 cm in 1999 to 13 cm in 2000. Catches of *S. mentella* showed two modal length groups around 19-20 and 27 cm (16-18 and 25 cm in 1999) (Table 22). As in 1999, both gears fished similarly the smallest length class but the Lofoten gear fished better on largest lengths. *S. fasciatus* had a modal length group around 20 cm (Table 26) and both gears fished them similarly, even the Lofoten gear fished better on large sizes and the Campelen gear on small sizes. The difference in catch ratio is probably due to the random variability of these results. For *S. marinus* the difference is much higher due to the occurrence of a single extraordinary catch.

The Campelen gear caught Greenland halibut more efficiently and variations by fish length were not observed. The sample was wide and quite homogeneous.

For shrimp there were two factors: bigger catchability of he Campelen gear for all lengths and greater retention of the small lengths by the small mesh size of the cod-end of that gear.

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Table 1 – Technical data of the 2000 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	2.3 times the depth + 140 m
mesh size in cod-end	35 mm nominal (30 mm effective)
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 1988-2000 surveys (tons).

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Rajidae	4495	1908	2824	4064	3765	6279	3462	2267	2052	1839	1981	1610	1149
Synaphobranchus sp.	219	88	42	77	70	70	8	16	3	11	37	1	
Urophycis sp.	654	167	169	261	69	161	214	83	81	32	229	246	165
Antimora sp.	392	302	284	560	720	594	799	195	186	235	488	292	263
Macrouridae	3088	1438	1223	2249	2592	6183	3230	2604	2342	2289	2833	2332	1805
Notacanthus sp.	501	408	65	478	449	705	455	346	180	287	169	62	100
Illex sp.	5	8	1647	1159	66	1	210	1	87	64	71	18	3
Anarhichadidae	7973	7478	8120	10097	9095	14304	15516	19217	20559	14036	10987	5583	4475
Witch flounder	909	335	420	769	823	1048	776	705	509	319	240	379	412
Greenland halibut	6818	4391	5649	8038	8588	7210	7904	10705	11409	15846	23849	20877	16690
Zoarcidae	559	923	1202	1978	1356	3277	1869	2182	1702	1730	2055	896	777
Cod	37127	103644	55360	36597	24295	55642	24062	8815	8196	9063	4532	2596	2782
American plaice	11887	10533	9101	7565	6492	5949	6173	5087	3073	2268	2577	1940	1204
Redfish	158419	136658	104193	63845	104477	62589	126011	73641	100544	139241	59316	82894	149213
Shrimp*	2164	1923	2139	8211	16531	9256	3338	5413	6502	5096	16620	12430	9396
Others	624	206	1138	664	439	779	503	395	692	584	1109	618	1588
Total	235834	270410	193576	146611	179828	174047	194529	131671	158114	192943	127093	132774	190022

*) 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 2000 survey.

	area	tow	catch per tow		catch per mile towed	
stratum	sq. miles	number	mean	s. deviat.	mean	s. deviat.
1	342	4	8.72	8.69	4.97	4.95
2	838	10	10.63	5.27	6.03	3.08
3	628	7	6.82	6.76	3.90	3.86
4	348	4	15.75	28.27	8.68	15.49
5	703	8	7.25	11.54	4.12	6.58
6	496	6	12.77	16.93	7.03	9.30
7	822	9	0.08	0.24	0.04	0.13
8	646	7	1.39	1.73	0.77	0.97
9	314	3	1.58	2.73	0.89	1.54
10	951	11	1.36	1.93	0.76	1.08
11	806	9	1.60	2.76	0.89	1.54
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				

	catch per tow (kg)	catch per mile towed (kg)
mean	3.52	1.98
standard error	0.68	0.38

	ind.	total
Stock biomass estimated by swept area method (t)		2,782

Table 4 – Cod biomass estimated by the swept area method (tons) 1988-2000.

stratum	depth in fathoms	year												
		1988	1989	1990	1991	1992	1993	1984	1995	1996	1997	1998	1999	2000
1	70- 80	1223	590	751	5078	69	469	1969	1421	915	221	114	90	227
2	81-100	9229	9386	1876	4988	4683	8223	7443	2764	3629	1863	1727	1366	673
3	101-140	4065	9344	1994	2236	7704	7670	5539	1042	958	1029	639	132	327
4	"	2846	4404	2355	2637	3131	12885	1714	678	971	779	127	23	403
5	"	1937	9731	7738	9685	4155	6205	840	1158	851	1045	887	233	386
6	"	2932	6173	3007	1392	866	3837	1284	1191	564	977	557	341	465
7	141-200	2022	14571	3582	2308	859	5595	779	111	50	970	71	47	5
8	"	8121	14943	15313	4644	2136	7241	3287	317	85	1464	70	21	67
9	"	167	4784	5895	171	130	907	217	8	94	158	-	18	37
10	"	1217	4454	4255	1417	297	851	460	53	42	274	181	93	97
11	"	2278	12020	3706	1625	204	1526	529	71	37	282	160	232	96
12	201-300	305	2245	1478	115	-	22		-	-	-	-	-	-
13	"	8	2304	689	85	-	-		-	-	-	-	-	-
14	"	97	686	584	119	61	211		-	-	-	-	-	-
15	"	680	7671	2137	98	-	-		-	-	-	-	-	-
16	301-400	-	60	-	-	-	-		-	-	-	-	-	-
17	"	-	5	-	-	-	-		-	-	-	-	-	-
18	"	2	-	-	-	-	-		-	-	-	-	-	-
19	"	-	91	-	-	-	-		-	-	-	-	-	-
total		37127	103644	55360	36597	24295	55642	24062	8815	8196	9063	4532	2596	2782

Table 5 – Cod length frequency by strata (×1,000) in the 2000 survey.

length	stratum											
cm	1	2	3	4	5	6	7	8	9	10	11	total
15-17	7											7
18-20	7	19										25
21-23	20	69		7								95
24-26	7	13	7	13								39
27-29		6										6
30-32												
33-35												
36-38				7								7
39-41		6		20								26
42-44	7			20			7					33
45-47		25		72	7	6						110
48-50	7	25	20	26								78
51-53	13	6	7	20		6						52
54-56	7	38	14	20	13	19					7	116
57-59	7	25	7	33		12			8			92
60-62	13	19	7	13	13							65
63-65		19		26		37					13	96
66-68	33	19	34	13	13	25		7	8	7		158
69-71		38	27	13	20	43				7		148
72-74	7	13	14			12		14		7	7	72
75-77		13			7	6				7		32
78-80					13	6					7	26
81-83						6						6
84-86	7											7
87-89												
90-92		6										6
93-95					7							7
96-98												
99-100												
102-104												
105-107												
108-110												
111-113		6			7							13

Table 6 – Cod age-length key in 2000.

length	age																no	
cm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	id.	total
12-14																		
15-17	1																	1
18-20	7																	7
21-23	24																	24
24-26	6																	6
27-29	1																	1
30-32																		
33-35																		
36-38			1															1
39-41		2	2															4
42-44			5															5
45-47			18														1	19
48-50			13	1														14
51-53			7	4														11
54-56			1	15	2													18
57-59				5	7	3	1											16
60-62				3	4	5	1											13
63-65				1	2	14	1											18
66-68						24	3											27
69-71						18	9											27
72-74						8	5											13
75-77						1	5											6
78-80							4	1	1									6
81-83							3											3
84-86								2										2
87-89																		
90-92									1									1
93-95									1									1
96-98																		
99- 100																		
102-104																		
105-107																		
108-110																		
111-113												1		1				2
total	39	2	47	29	15	73	32	3	3			1		1			1	246

no id. – no identified

Table 7 – Cod abundance at age by strata (×1,000) in the 2000 survey.

	stratum											mean	weight	mean length
age	1	2	3	4	5	6	7	8	9	10	11	total	g	cm
1	41	107	7	20								175	102	22
2		3		10								13	583	40
3	22	57	24	147	8	11	7					276	958	47
4	16	49	19	41	14	24			3		7	173	1611	56
5	8	23	7	24	5	11			4		2	84	1906	59
6	40	79	61	52	31	90		15	9	16	14	407	2834	67
7	8	35	19	10	24	40		6	1	12	8	163	3473	72
8	7				2	1					1	11	5284	83
9		6			9	1					1	17	6712	89
10														
11														
12		3			4							7	13186	112
13														
14		3			4							7	13186	112

Table 8 – American plaice catch (Kg) by strata in the 2000 survey.

	area	tow	catch per tow		catch per mile towed	
stratum	sq. miles	number	mean	s. deviat.	mean	s. deviat.
1	342	4	9.95	5.06	5.68	2.89
2	838	10	11.49	11.89	6.55	6.80
3	628	7	0.34	0.58	0.19	0.32
4	348	4	2.83	2.14	1.62	1.22
5	703	8	0.80	0.98	0.45	0.56
6	496	6	0.50	0.60	0.28	0.34
7	822	9	0.17	0.36	0.10	0.21
8	646	7	-	-	-	-
9	314	3	-	-	-	-
10	951	11	0.47	0.57	0.27	0.31
11	806	9	0.28	0.23	0.15	0.13
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				

	catch per tow (kg)	catch per mile towed (kg)
mean	1.50	0.86
standard error	0.31	0.18

	ind.			total
Stock biomass estimated by swept area method (t)	8	503	693	1,204

Table 9 – American plaice biomass estimated by swept area method (tons) 1988-2000.

	depth in	year												
stratum	fathoms	1988	1989	1990	1991	1992	1993	1984	1995	1996	1997	1998	1999	2000
1	70- 80	979	750	448	808	532	809	496	1672	1096	286	117	279	259
2	81-100	1990	2701	1040	1997	1285	950	899	1001	707	555	1190	1357	732
3	101-140	1025	838	1207	935	473	333	244	189	126	371	213	73	16
4	"	1649	346	661	240	418	429	640	367	201	152	257	40	75
5	"	1949	2319	1406	1055	628	968	922	412	375	464	558	55	42
6	"	358	847	720	376	451	229	606	92	24	10	26	30	19
7	141-200	880	398	562	292	479	239	237	187	54	62	35	14	11
8	"	313	123	209	188	545	365	132	99	42	92	124	2	
9	"	77	122	262	-	280	154	15	375	41	27	-	-	
10	"	1742	1118	1555	981	1054	1094	1677	531	311	215	27	54	34
11	"	889	876	973	301	279	219	227	82	51	24	22	28	17
12	201-300	7	14	35	13	8	11	25	9	24	5	-	-	
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		11887	10533	9101	7565	6492	5949	6173	5087	3073	2268	2577	1940	1204

Table 10 – American plaice length frequency by strata (×1,000) in the 2000 survey.

length	stratum									
cm	1	2	3	4	5	6	7	10	11	total
10-11								7		7
12-13		6								6
14-15										
16-17										
18-19						6				6
20-21					7					7
22-23					7			7		14
24-25								7		7
26-27									7	7
28-29	7	19							13	38
30-31		6	7				14			27
32-33	20	13	7	7		6		7		59
34-35	33	75				6				114
36-37	65	57		7				26	20	175
38-39	98	57		14				13		181
40-41	65	113		7	14			7		204
42-43	52	101	7			6	7		7	179
44-45	20	75								95
46-47	33	101	7	20	7					166
48-49	14	94		7				7		121
50-51	7	88		7	7					107
52-53	7	31		7	13	6				64
54-55		19								19
56-57				7						7

Table 11 – American plaice age-length key in the 2000 survey.

INDETERMINATE

length	age																no	
cm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	id.	total
6-7	1																	1
10-11	1																	1
12-13	1																	1
14-15	1																	1

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		1																1
22-23		2	1															3
24-25				1														1
26-27				1														1
28-29				3	1													4
30-31				2	3													5
32-33				1	2	4											3	10
34-35					3	2	2	1	2	2	1						3	16
36-37					2	2	2	4	8	10	3	2					8	41
38-39					1	3	4	5	12	12	4	4						45
40-41							3	6	8	10	5	5		1			4	42
42-43						1	2	1	3	10	3	2	1	1	1		4	29
44-45								1	3	2	1	2	1				1	11
46-47									1				1					2
48-49														1				1
total		4	1	8	12	12	13	18	37	46	17	15	3	3	1		23	213

FEMALE

length	age																no	
cm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	id.	total
22-23		1	1															2
24-25		1																1
26-27																		
28-29				2														2
30-31				1													1	2
32-33						1												1
34-35					1												1	2
36-37					1	2	1											4
38-39						1	1											2
40-41					1	3			1									5
42-43						4	2	2	4	2								14
44-45								1	6	2	3						2	14
46-47							1	2	11	10	11	2	1				2	40
48-49								1	4	6	5	7	4	1	2	2	1	33
50-51									3	4	1	7	2	4	3	4	1	29
52-53											1	3	8	1	3	7	1	24
54-55												1	1	3	2	5		12
56-57												1		1	2			4
58-59													1			1		2
total		2	1	3	3	11	5	6	29	24	21	21	17	10	12	19	9	193

Table 12 – American plaice abundance at age by strata (×1,000) in the 2000 survey.

	stratum										mean weight	mean length
age	1	2	3	4	5	6	7	10	11	total	g	cm
1		6						7		13	12	11
2					12	6		4		22	78	20
3					2			4		6	100	22
4	8	19	8			1	10	8	20	74	221	28
5	27	34	2	1	1	8	4	8	3	88	370	34
6	28	40	6	11	4	5	2	16	6	118	473	36
7	27	42	1	6	1	1	1	5	4	88	567	39
8	37	60	1	4	1	1	1	3	3	111	629	40
9	83	166	4	12	6	2	2	9	5	289	713	41
10	103	174	3	13	5	1	1	9	5	314	707	41
11	45	102	2	10	4			3	1	167	790	43
12	35	87		9	5	1		3	1	141	909	45
13	9	38		4	5	2		1		59	1173	49
14	12	27		3	2					44	1140	48
15	4	25		6	2	1				38	1250	50
16+	4	36		4	5	2				51	1323	51

Table 13 – Redfish (*Sebastes marinus*) catch (Kg) by strata in the 2000 survey.

	area	tow	catch per tow		catch per mile towed	
stratum	sq. miles	number	mean	s. deviat.	mean	s. deviat.
1	342	4	1.75	2.99	1.00	1.72
2	838	10	8.24	22.66	4.76	13.29
3	628	7	7.33	17.85	4.18	10.19
4	348	4	9.83	18.67	5.40	10.24
5	703	8	710.05	1964.59	413.31	1145.47
6	496	6	7.60	12.74	4.31	7.28
7	822	9	6.22	13.00	3.53	7.37
8	646	7	4.89	7.27	2.72	4.04
9	314	3	32.12	44.20	18.17	25.05
10	951	11	32.68	49.45	18.82	28.55
11	806	9	11.54	12.85	6.49	7.17
12	670	8	0.80	0.99	0.45	0.56
13	249	3	0.90	0.80	0.51	0.45
14	602	7	2.34	2.26	1.35	1.30
15	666	8	1.05	1.15	0.61	0.68
16	634	7	-	-	-	-
17	216	2	-	-	-	-
18	210	2	-	-	-	-
19	414	5	-	-	-	-
total	10555	120				

	catch per tow (kg)	catch per mile towed (kg)
mean	54.96	31.90
standard error	46.30	26.99

	ind.		total
Stock biomass estimated by swept area method (t)	16,064	28,824	44,888

Table 14 – Redfish (*Sebastes marinus*) length frequency by strata (×1,000) in 2000.

length	stratum															
cm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	total
12	7															7
13		6	7			6										19
14		12	14			24										51
15		6	7								7					20
16			7		7	6										20
17		6	21			6				12						45
18			7			6										13
19			14		7					14						33
20		6			7	12										26
21	20	12			7	12										51
22	7	31	27		40	6	7	7		15	40					180
23	20	31	20	7	17	43	14	7	122	32	40					352
24		50	75		50	37	14	21	244	145	60				6	704
25	13	56	55		97	68	49	7	63	141	68			34	32	682
26	14	57	81	7	322	68	62	14	130	345	155			13	13	1280
27	26	82	129	20	234	68	103	35	48	519	155	6		33	32	1491
28	7	100	149	27	755	99	138	89	8	517	182		13	40	13	2136
29		113	149	53	1462	61	83	54	96	752	162	25	6	47	25	3091
30		88	82	73	1730	62	103	76	260	624	149	6	6	14	6	3277
31	20	95	41	46	2722	37	96	89	186	536	134		13	33		4049
32	7	75	48	59	5415	25	83	48	138	614	108	12		14		6646
33	7	82	27	86	5506	25	62	41	260	239	101	6		20	6	6468
34		62	20	46	3671	24	49	21		287	87	6	6	27		4308
35	7	38	7	20	3994	43	41	14		224	47	6			13	4453
36		57	7	20	2562	18	7	21		102	54	6		7		2859
37		19		7	4368				122	22	33					4570
38		19	7	33	2552	6	7	7	122	15	20				6	2795
39		6			2724	6				41	14	6				2796
40					2542		7			15	13					2578
41					1634					51	7					1691
42					1271											1271
43					182						7					188
44					1271					15						1286
45					1089											1089
46					545											545
47					545					15						560
48					726											726
49					182											182
50																
51																
52																
53																
54																
55																
56										15						15

Table 15 – Redfish (*Sebastes marinus*) age-length key in the 2000 survey.

MALE

length	age																						no	
cm	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
14	2																							3	5
15	1																							2	3
16																								1	1
17		2																							2
18																								2	2
19																								2	2
20																								1	1
21																								5	5
22			1	2																				7	10
23				2	1	1																		10	14
24			1	2	1																			12	16
25					1			1																24	26
26				1	2	1																		21	25
27					3	1																		28	32
28					3	2																		22	27
29						2	1																	25	28
30							2	1																28	31
31							1	2	2															24	29
32								4																23	27
33							1	3		1														20	25
34							2				1	1												14	18
35										1		1												9	11
36										2		2					1							9	14
37														2	1									4	7
38													1		1	1								4	7
39																2	1							3	6
40																	1	1						2	4
41																	1	1							2
total	3	2	2	7	11	7	7	11	2	4	1	4	1	2	2	3	4	2						306	381

Table 15 – (continued)

FEMALE

length	age																						no	
cm	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
14																								3	3
15																									
16		1																						1	2
17			1																					3	4
18																								2	2
19			3																					1	4
20			1																					2	3
21			2																					1	3
22			1	2	1																			6	10
23				1		1																		10	12
24					3																			14	17
25				1	1																			17	19
26				1	2	1	2	1																8	15
27				1		1	2																	20	24
28						1				1														19	21
29					1	1	1	3																23	29
30								1	2			1												14	18
31							2	4	1															15	22
32							1	2																12	15
33							1	2	3															17	23
34								1		1	1													17	20
35								3	1	2	2													18	26
36												3												17	20
37										1		1												10	12
38												3												11	14
39												3												6	9
40												1	1											3	5
41												1	1				1							4	7
42													2			1									3
43												1												1	2
44															1	1	1							1	4
45													1	1		1									3
46																1	2								3
47															1				1					1	3
48															1	1				1					3
49																									
50																							1		1
51																									
52																									
53																									
54																									
55																									
56																							1		1
total		1	8	6	8	5	9	17	7	5	3	14	5	1	3	5	4		1	1			2	278	383

Table 16 – Redfish (*Sebastes marinus*) abundance at age by strata (×10,000) in the 2000 survey.

	stratum																mean	mean
age	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	total	weight g	length cm
1																		
2																		
3		1	2			1					1					5	50	14
4			1			1				1						3	75	17
5		4	4		1	4			6	3	2					24	176	22
6	2	9	8	1	15	8	5	2	21	22	12			3	2	110	244	25
7	3	13	24	2	86	18	19	7	18	82	31	1	1	5	3	313	301	27
8	2	14	18	5	111	12	15	8	11	77	24	1	1	6	3	308	349	28
9	2	16	11	10	408	8	15	10	27	84	23	1	1	5	2	623	476	31
10	2	23	19	15	1158	11	22	15	50	141	33	3	1	5	2	1500	519	32
11	1	8	4	5	286	3	6	5	16	44	10	1	1	2		392	523	32
12		7	4	4	401	3	4	3	3	21	10	1		1	1	463	658	35
13		3	1	2	181	2	2	1		13	3			1		209	633	34
14		10	2	7	1023	4	3	3	3	31	10	1		1	1	1099	830	38
15					290		1		4	2						297	1082	41
16					182				8		1					191	899	39
17					179				8	1	1					189	1139	42
18					212				4	2	1					219	1239	43
19					191					3	2					196	1135	42
20					27					1	1					29	1011	40
21					27					1						28	1579	47
22					24											24	1679	48
23																		
24																		
25+										2						2	2636	56

Table 17 – Redfish (*Sebastes mentella*) catch (Kg) by strata in the 2000 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	-	-	-	-
3	628	7	0.96	2.03	0.55	1.16
4	348	4	0.71	0.85	0.40	0.48
5	703	8	1.15	2.24	0.63	1.20
6	496	6	0.56	0.44	0.31	0.25
7	822	9	8.33	11.66	4.65	6.41
8	646	7	12.73	11.32	6.95	5.94
9	314	3	2208.87	2816.83	1241.99	1600.35
10	951	11	144.72	234.27	79.28	122.31
11	806	9	14.58	18.97	8.26	10.81
12	670	8	46.92	44.56	26.54	25.15
13	249	3	68.87	28.51	39.31	15.95
14	602	7	394.46	675.54	224.92	381.45
15	666	8	48.70	42.91	28.42	25.34
16	634	7	6.84	6.24	4.11	3.81
17	216	2	6.01	8.50	3.45	4.88
18	210	2	5.72	0.66	3.35	0.03
19	414	5	11.79	21.43	6.90	12.59
total	10555	120				

	catch per tow (kg)	catch per mile towed (kg)
mean	112.76	63.50
standard error	50.95	28.90

	ind.			total
Stock biomass estimated by swept area method (t)	3	40,152	49,210	89,365

Table 18 – Redfish (*Sebastes mentella*) length frequency by strata (×10,000) in 2000.

length	stratum																	
cm	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	total
13			1			2		3	4				2				1	15
14	1	1	12	3		4		12	7									40
15	3	1	1	6		4		33	19									67
16	1	1	4	1	1	16		75	14	1			2					116
17		1	4	3	11	27	14	170	39	1		1	6					277
18	2	1	4	1	22	56	28	604	94	2			32		1			849
19	1	2		1	42	56	84	856	115	6			47					1207
20	2	1	2	1	34	72	151	725	90	11		20	52	1				1166
21	5		7	3	22	77	163	550	62	26	1	5	57					976
22	3	1	1	1	12	44	119	411	30	36	2	38	56	1	1		1	754
23	1		1	1	8	26	237	292	22	60	7	72	58	1				786
24	3	1	3	1	9	22	891	327	22	88	15	482	97	4			2	1965
25	2		4	1	13	17	2152	568	27	133	47	1289	153	3			2	4411
26	2	2	2		14	21	3921	645	29	183	69	1618	231	10	2		2	6748
27	2	1	3		18	10	5123	468	23	134	64	1437	174	3	1	1	3	7462
28	1	1			21	9	3984	257	14	90	68	872	89	9	1	2	10	5425
29	1	1			12	2	1470	95	6	62	43	423	46	8	4	1	12	2185
30					5		170	26	2	26	21	173	11	14	2	3	7	460
31					3		57		1	13	16	42	2	6	2		7	149
32					1			1		8	9	19	3	6	3	3	5	55
33					3		57	1		5	10	38	3	6	2	2	6	132
34					3					9	8	19	2	6	3	1	8	61
35					2				1	7	6	15	1	2	2	3	5	43
36										4	9	32	2	1	2	2	4	54
37					1					2	5	35		1			5	48
38										2	1	4	1		1		2	9
39								4		1	3	2	1	1		1		11
40										2	1	3	1	1				7
41												2		2			1	4
42																		
43												1					1	2
44																1		1

Table 19 – Redfish (*Sebastes mentella*) age-length key in the 2000 survey.

MALE

length	age																						no	
cm	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
13																								6	6
14	2																							10	12
15	4																							8	12
16	4	3																						11	18
17	1	6																						14	21
18	2	5																						14	21
19		1	6																					13	20
20		1	7	2																				12	22
21			6	3	1																			12	22
22			4	6	1			1																13	25
23				7	3	1		1																14	26
24				4	5			5																18	32
25					6	3		7																15	31
26						3	1	13																14	31
27					1	7	1	7																12	28
28					1	1	5	6																16	29
29						2	6	4																13	25
30							3	7	2															13	25
31							3		3	1			1											10	18
32								3	2			3												11	19
33									1			6												11	18
34									1	2		1		1			1				1	1		12	20
35											1	3					1							12	17
36												2					2						1	9	14
37														1			1				1	1		7	11
38																	2			1		1		4	8
39																	1							8	9
40																							2	2	4
41																							1	2	3
42																									
43																				1	1				2
total	13	17	23	22	18	17	19	54	9	3	1	15	1	2			8			2	3	3	4	315	549

Table 19 – (continued)

FEMALE

length	age																						no	
cm	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
13																								4	4
14																								7	7
15	3	2																						8	13
16	2	2																						4	8
17	2	1	1																					11	15
18		7	1																					16	24
19		3	6																					13	22
20			7	3																				10	20
21			6	8																				15	29
22			3	8	4																			7	22
23			1	4	5	1																		10	21
24				2	6	2		3																17	30
25				1	4	4		6																15	30
26						7	2	9																20	38
27					1	4	2	10																16	33
28						2	3	10																15	30
29							1	15	2															11	29
30							2	6																15	23
31							1	3	2			1												9	16
32								3	4			1												8	16
33								1		3		2					1							11	18
34									1	1	1	4					1							8	16
35												2	1						1	1				14	19
36											1	2			1	1								10	15
37											1	1			1		1							7	11
38																1								2	3
39																	1							3	4
40																							2	1	3
41																								2	2
42																									
43																									
44																								1	1
total:	7	16	25	26	20	20	11	66	9	4	3	13	1		2	2	4		1	1			2	289	522

Table 20 – Redfish (*Sebastes mentella*) abundance at age (× 100,000) in the 2000 survey.

	stratum																		mean	mean
age	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	total	weight g	length cm
1																				
2																				
3			1	1	1	4		22	5				1					35	69	17
4			1		4	8	6	86	14	1			4					124	87	18
5	1		1		7	15	29	164	20	4		3	12					256	116	20
6	1		1		3	9	56	85	8	9	1	20	12					205	162	22
7					2	4	158	55	3	12	3	78	13					328	221	25
8					2	2	355	53	2	15	6	126	17	1				579	265	26
9					2		204	19	1	8	5	59	7	1			1	307	302	28
10	1		1		5	4	1033	127	7	39	19	356	44	3	1	1	2	1643	278	27
11							16	1		1	1	7	1	1			1	29	383	30
12												1						1	509	33
13												1						1	652	36
14							6			1	2	7		1			1	18	538	34
15												1						1	492	33
16																			625	35
17												1						1	687	37
18												1						1	672	36
19										1	1	2						4	688	36
20																				
21																				
22																				
23																				
24																				
25+																				

Table 21 – Redfish (*Sebastes fasciatus*) catch (Kg) by strata in the 2000 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	1.28	3.30	0.74	1.93
3	628	7	4.39	9.12	2.50	5.21
4	348	4	1.03	1.56	0.57	0.86
5	703	8	9.37	14.18	5.30	8.07
6	496	6	3.78	3.87	2.13	2.21
7	822	9	17.47	28.19	9.91	15.99
8	646	7	19.57	16.39	10.83	9.06
9	314	3	137.82	211.98	77.82	120.22
10	951	11	52.06	53.90	29.86	31.31
11	806	9	14.25	12.34	8.01	6.93
12	670	8	3.51	2.57	2.00	1.46
13	249	3	2.43	2.28	1.38	1.31
14	602	7	29.22	51.75	17.03	30.27
15	666	8	8.41	6.82	4.89	4.02
16	634	7	0.04	0.06	0.02	0.03
17	216	2	-	-	-	-
18	210	2	-	-	-	-
19	414	5	0.29	0.34	0.17	0.20
total	10555	120				

	catch per tow (kg)	catch per mile towed (kg)
mean	16.13	9.18
standard error	4.20	2.39

	ind.			total
Stock biomass estimated by swept area method (t)	2	6,349	6,564	12,915

Table 22 – Redfish (*Sebastes fasciatus*) length frequency by strata (×1,000) in the 2000 survey.

length	stratum																
cm	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	19	total
10		7															7
11	6			62						7		6					81
12	31	14						24									70
13	56	41	20	136	18		7	24	51	20	6		7				388
14	32	28	20	122	68	14	14	170	78	47			7	6			603
15	19	41	7	208	136	7	14	146	95	74			7				753
16	19	61		93	87	39	14	56	127	115	6			13			629
17		109		169	117	126	53	569	517	209			24	6			1898
18	6	122	7	160	142	307	222	585	1346	310	13	6	43	103			3373
19		252	13	495	74	786	399	763	2150	627	50	6	194	168	7	26	6009
20	26	258	20	392	105	1002	570	2651	2457	809	38	13	226	329		19	8912
21	75	210	26	242	99	1139	678	1773	2642	809	70	31	232	336	7	19	8389
22	57	156	20	261	118	978	1200	2271	2760	896	202	32	424	394			9768
23	56	95	27	378	68	717	810	1782	2379	552	209	44	304	304			7726
24	44	81		60	37	484	521	1637	1567	270	127	44	606	252		6	5735
25	31	34	7	107	6	227	375	1491	970	202	57	32	441	155			4133
26	6	14	7	225	12	147	243	1001	910	155	69	12	697	90			3590
27	13	7		62	12	126	87	611	678	61	44		422	71			2194
28	12		7		6	126	40	122	551	47	32	6	462	58			1470
29	12	7				32	47	619	280	27	6		434	51			1517
30						37	27	268	139	13	6	6	165	13			673
31				7	6		7	367	154		6		83	6			636
32				7			13	367	138	7			112	6			649
33							7		46	20			80	6			160
34				62					70				74				206
35					6				68				49	6			129
36									31				11				42
37					6				62								68
38									15								15

Table 23 – Redfish (*Sebastes fasciatus*) age-length key in the 2000 survey.

MALE

length	age																	no	
cm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18+	id.	total
13																			15	15
14			1																17	18
15			1																21	22
16			1																14	15
17																			21	21
18					2														28	30
19				2	1														29	32
20					1	2													27	30
21						3													31	34
22						2	1												34	37
23						1	2												30	33
24							3												26	29
25							2	1											20	23
26								2											20	22
27								2											17	19
28									2										8	10
29									1	1									6	8
30											1								4	5
31														1					1	2
32															1				2	3
33														1						1
34																				
total			3	2	4	8	8	5	3	1	1			2	1				377	415

Table 23 – (continued)

FEMALE

length	age																	no	
cm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18+	id.	total
9																				
10																			1	1
11																			2	2
12																			2	2
13																			13	13
14																			14	14
15																			12	12
16																			19	19
17			1		1														22	24
18					1														24	25
19				1	2														20	23
20					1	1													34	36
21					1	1													33	35
22						1													27	28
23						1	1												26	28
24						1	1												24	26
25							1												23	24
26							1		1										24	26
27									2										16	18
28									2										22	24
29									1	1									18	20
30							1				1								16	18
31										1		1							11	13
32													1	1					7	9
33														1		1			9	11
34												1		1					4	6
35												1		1					4	6
36											1								2	3
37																			3	3
38																			1	1
total			1	1	6	5	5		6	2	2	3	1	4		1			433	470

Table 24 – Redfish (*Sebastes fasciatus*) abundance at age (×10,000) in the 2000 survey.

	stratum																	mean	mean
age	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	19	total	weight g	length cm
1																			
2																			
3	3	12	2	27	15	5	2	50	24	15	1		2	1			159	63	15
4		14	1	24	4	42	20	38	110	32	3		9	9		2	308	111	19
5	3	42	3	66	26	139	75	252	395	116	7	2	28	38		2	1194	116	19
6	17	51	6	81	28	275	233	569	736	219	33	7	77	92	1	3	2428	159	22
7	10	16	3	42	9	118	159	442	425	89	37	11	137	67			1565	215	24
8	2	1	1	27	1	8	6	158	56	7	2	2	83	7			361	275	26
9	2	1	1	1	2	28	26	74	152	17	10	1	98	17			430	320	28
10	1					2	3	49	22	1	1		25	3			107	394	30
11						2	2	15	10	1			13	1			44	436	31
12				3	1			18	15				9	1			47	502	32
13								18	7				5				30	492	32
14				4				18	16	1			16	1			56	529	33
15							1			1			1				3	492	32
16									2	1			3				6	537	33
17																			
18+																			

Table 25 – Juvenile redfish (*Sebastes sp.*) catch (Kg) by strata in the 2000 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	0.09	0.21	0.05	0.12
3	628	7	1.45	1.72	0.82	0.97
4	348	4	0.07	0.09	0.04	0.05
5	703	8	6.56	11.42	3.62	6.12
6	496	6	2.73	1.91	1.53	1.07
7	822	9	3.26	4.28	1.85	2.43
8	646	7	1.75	2.20	0.96	1.19
9	314	3	2.60	4.24	1.47	2.40
10	951	11	9.95	8.82	5.67	5.06
11	806	9	7.58	5.34	4.25	2.97
12	670	8	-	-	-	-
13	249	3	-	-	-	-
14	602	7	-	-	-	-
15	666	8	0.11	0.31	0.06	0.18
16	634	7	-	-	-	-
17	216	2	-	-	-	-
18	210	2	0.06	0.09	0.03	0.05
19	414	5	-	-	-	-
total	10555	120				

	catch per tow (kg)	catch per mile towed (kg)
mean	2.58	1.45
standard error	0.41	0.23

	ind.	total
Stock biomass estimated by swept area method (t)		2,045

Table 26 – Juvenile redfish (*Sebastes sp.*) length frequency by strata (×1,000) in the 2000 survey.

length	stratum												
cm	2	3	4	5	6	7	8	9	10	11	15	18	total
7					1					3			3
8	3	1	1	1	12	7	1		8	7			40
9	8	50	3	12	54	27	3	1	3	39			201
10	8	52	7	29	52	13	4		11	19			196
11	3	17	1	59	38	7	3		49	38			214
12	4	37		164	45	127	54	1	421	145	1	1	999
13	4	61	1	304	76	278	112	76	1055	465	5	2	2437
14	1	41		344	73	157	66	50	546	474	9	1	1759
15		12		76	26	26	15	26	155	142	1		479
16				7		7	3	1	41	6	1		66
17						1			8	2			11

Table 27 – Frequencies at age of redfish stocks.

	S. marinus										*S. mentella*									*S. fasciatus*								
age	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	1992	1993	1994	1995	1996	1997	1998	1999	2000	1992	1993	1994	1995	1996	1997	1998	1999	2000
1									4				10	6			6	11				2						9	
2				20	122	51							49	259	280	59	151	237				12	81	235	89	115	71		
3	12	11	65	231	765	139			4	5	132		1074	3040	1620	480	2140	2291	349	5	82	264	400	486	1483	416	232	159
4	225	74	125	770	1342	791	612		6	3	2673	173	5249	19700	11726	3190	1371	3971	1250	469	265	1284	875	1407	2340	922	749	308
5	357	234	228	808	1529	2120	1523		52	24	9884	550	2273	11900	30498	17631	1534	2224	2565	1131	634	1777	1108	2620	1867	1475	1415	1194
6	179	197	254	885	406	1168	4227		263	110	3829	1420	1285	490	4765	10163	3950	2435	2041	417	485	885	422	1064	1714	549	1235	2428
7	175	149	157	1087	281	438	3480		463	313	3048	1013	1915	870	850	794	2713	4089	3291	140	204	353	238	533	784	472	452	1565
8	73	100	119	755	146	170	2062		546	308	2181	637	1178	980	826	331	11249	3836	5801	83	99	118	105	200	300	697	329	361
9	53	65	50	578	76	121	452		450	623	1361	228	778	570	641	217	447	14301	3077	54	47	40	31	127	202	96	296	430
10	72	56	59	431	61	87	897		242	1500	862	317	605	550	374	251	69	596	16404	16	26	23	11	23	79	38	59	107
11	46	56	39	448	57	63	856		77	392	631	335	519	610	281	133	46	24	292	19	12	15	17	27	211	16	32	44
12	44	35	37	324	32	72	915		57	463	465	410	330	280	284	134	275	42	28	13	2		8	34		39	11	47
13	39	32	11	420	48	34	611		96	209	446	259	253	220	168	72	30	99	23	3	5	4	7	4			41	30
14	9	14	14	145	26	25	420		20	1099	321	260	161	250	188	121	40	13	199	9	3		2	13			6	56
15	18	14	6	222	23	28	315		8	297	174	297	172	260	147	34	18	28	11		1	5	1	7			7	3
16	9	2	4	22	14	14	70		11	191	172	69	85	160	106	48	28	30	8		3					3	8	6
17	18	1	4	83	17	10	56		3	189	107	95	59	102	69	44	53	20	15					3				
18		3	1	24	6	3	18		15	219	69	44	84	87	67	11	2	52	7	2							1	
19	6	3	5	50	3		26		2	196	72	34	38	46	32	14	6	8	51	2				2				
20	7	1			7	3	121		5	29	19	26	22	38	41	16		10										
21	3	2		23			13		1	28	13	31	13	25	18	6		9	4									
22		1		10	1	1	3			24			13	11	5	2	3	3	7					1				
23	1			9	1						5	10	7	5	13			5	9									
24															5		2	4	10									
25+	5	1		51	9	4				2	16	3	2	31	17		2	12	12		2						1	

(frequencies × 10,000)

Table 28 – Greenland halibut (*Reinhardtius hippoglossoides*) catch (Kg) by strata in the 2000 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	-	-	-	-
3	628	7	5.09	5.60	2.86	3.15
4	348	4	7.70	7.96	4.39	4.59
5	703	8	5.69	2.58	3.22	1.41
6	496	6	4.68	4.80	2.64	2.72
7	822	9	24.94	10.88	14.10	6.16
8	646	7	26.88	13.03	15.04	7.27
9	314	3	10.41	9.86	5.75	5.28
10	951	11	22.01	8.69	12.43	5.02
11	806	9	17.65	12.01	9.97	6.84
12	670	8	42.32	15.11	23.95	8.39
13	249	3	19.90	7.35	11.33	3.88
14	602	7	10.42	4.53	6.01	2.56
15	666	8	51.43	15.41	29.78	8.21
16	634	7	38.77	25.35	23.47	16.11
17	216	2	29.67	17.01	17.03	9.81
18	210	2	10.35	6.15	6.30	4.29
19	414	5	54.54	24.33	31.63	13.66
total	10555	120				

	catch per tow (kg)	catch per mile towed (kg)
mean	20.66	11.86
standard error	1.11	0.64

	ind.			total
Stock biomass estimated by swept area method (t)	1	6,309	10,380	16,690

Table 29 – Greenland halibut (*Reinhardtius hippoglossoides*) biomass estimated by swept area method (tons) 1988-2000.

	depth in	year												
stratum	fathoms	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	70- 80	-	-	-	-	-	-	-	-	-	-	-	-	-
2	81-100	-	3	6	-	-	-	-	119	-	2	6	3	-
3	101-140	26	31	8	8	18	3	-	21	106	89	361	342	240
4	"	142	20	-	15	27	10	-	5	0	23	40	194	204
5	"	73	96	-	28	41	1	2	21	35	96	170	403	302
6	"	31	18	15	12	8	15	-	31	104	224	355	296	175
7	141-200	84	62	63	186	242	93	211	890	1130	1401	2566	2319	1545
8	"	149	219	63	177	373	138	38	328	353	1048	973	1962	1296
9	"	177	162	53	75	318	30	42	175	157	250	464	348	241
10	"	106	81	48	169	356	31	231	518	705	848	1348	1504	1577
11	"	44	60	20	104	225	230	232	484	660	617	1208	1299	1071
12	201-300	399	637	290	749	609	918	1200	1129	2091	2213	3029	3604	2140
13	"	63	122	214	43	24	141	150	125	293	476	545	963	376
14	"	362	289	315	775	834	469	610	404	888	1564	1438	1063	483
15	"	428	166	505	958	633	1356	1469	1740	1425	2647	3991	2940	2645
16	301-400	1352	1342	2492	2487	1798	2141	1500	1832	2065	1742	3303	1125	1984
17	"	262	118	130	408	39	105	730	730	254	517	725	594	490
18	"	104	49	449	348	57	208	380	943	188	548	763	917	176
19	"	3016	919	977	1498	2988	1321	1108	1211	956	1539	2562	999	1746
total		6818	4391	5649	8038	8588	7210	7904	10705	11409	15846	23849	20877	16690

Table 30 – Greenland halibut (*Reinhardtius hippoglossoides*) length frequency by strata (×1000) in the 2000 survey.

length	stratum																	
cm	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		13	7	6	55	7		144	67			7	19	7				331
16-17		46	53	12	103	21		404	249	6		7	6					907
18-19	14	47	13	12	48	28		98	81									339
20-21		7	14	6	7				13									47
22-23			7		14				7									28
24-25					35	7		13	20									74
26-27	14			18	42	28			7								6	114
28-29	7	7	7	19	42				14									93
30-31	21			12	14			7	7			7					6	72
32-33	14		20	6	48	28		46	26	6			6	7	8			216
34-35	27	13	20	37	220	103	24	79	67	31		13	45	57	8	8	45	799
36-37	54	20	34	62	206	144	32	202	175	95		20	148	129	8	24	90	1442
38-39	82	33	60	24	378	227	70	280	216	278	32	34	472	222	33	8	199	2647
40-41	68	66	127	55	585	454	78	312	290	500	31	112	620	415	50	32	257	4053
42-43	102	79	107	56	495	371	86	599	364	601	89	107	781	515	99	58	456	4963
44-45	34	46	93	44	296	391	47	533	297	678	57	113	698	480	157	33	372	4367
46-47	14	27	40	19	111	199	31	235	230	361	57	73	388	379	116	8	347	2630
48-49		7			117	69	24	111	95	228	38	60	290	272	33	33	314	1689
50-51				6	41	48	8	65	14	159	38	27	181	122	58	8	160	933
52-53		7				21	8	26	13	76	25	7	97	93	33	8	122	536
54-55					21				7	25	6	20	58	43	17		45	241
56-57								7		25	25	20	38	14	8	8	38	186
58-59											25	7	19	14	8			74
60-61										13	6	7		21		8	13	68
62-63										6		7			8		6	28
64-65										6				7				13
66-67																		
68-69						7												7

Table 31 - Greenland halibut (*Reinhardtius hippoglossoides*) age-length key in the 2000 survey.

INDETERMINATES

length	age
cm	1
12-13	1
14-15	1
16-17	2

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	22																1	23
16-17	43																	43
18-19	19	1																20
20-21		4																4
22-23		2																2
24-25		2	1															3
26-27		3	4															7
28-29			4															4
30-31			2	3													1	6
32-33			6	12	2												2	22
34-35			2	16	19	3												40
36-37				12	25	3											1	41
38-39				6	25	9											1	41
40-41				1	18	21											1	41
42-43					9	30	4											43
44-45					2	34	9										1	46
46-47						20	18	4										42
48-49						4	22	11	2								2	41
50-51							16	14	1									31
52-53							3	15	1									19
54-55							1	5	2									8
56-57								3	1									4
58-59								1		1								2
60-61									1									1
total	84	12	19	50	100	124	73	53	8	1							10	534

Table 31 – (continued)

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
14-15	28																	28
16-17	51																	51
18-19	27																2	29
20-21	5																	5
22-23	1	2																3
24-25		3	4															7
26-27		4	6															10
28-29		1	8															9
30-31			5															5
32-33				5	2													7
34-35				15	16												2	33
36-37				15	22	5												42
38-39				6	26	9											2	43
40-41					10	31												41
42-43					12	33	4										1	50
44-45					1	34	11											46
46-47						20	22											42
48-49						7	22	11									1	41
50-51						1	12	24	4									41
52-53							6	23	9								3	41
54-55							5	15	5	2								27
56-57								10	9	2								21
58-59								5	1	1								7
60-61									1	5	2							8
62-63										2	2							4
64-65											2							2
66-67																		
68-69											1							1
total	113	10	23	41	89	140	82	88	29	12	7						11	645

Table 32 – Greenland halibut (*Reinhardtius hippoglossoides*) abundance at age (×10000) in the 2000 survey.

	stratum																			
age	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	total	mean weight gr	mean length cm
1	1	11	8	4	21	6		64	40	1		1	3	1				161	35	16
2	1	1	1	1	5	2		1	4									16	109	23
3	4	1	1	4	11	3		2	4								1	31	191	28
4	5	2	4	5	26	15	3	18	14	9		2	15	11	2	1	8	140	364	36
5	15	8	14	10	78	54	12	59	46	57	5	11	82	52	8	5	40	556	467	39
6	17	16	26	13	114	101	19	123	86	153	17	29	181	126	28	10	102	1161	602	42
7	2	4	5	3	25	28	5	38	27	57	9	12	66	56	15	4	55	411	769	46
8		1			7	7	2	9	5	24	8	6	32	26	8	2	31	168	1010	51
9					1	1		2	1	5	2	2	6	5	2	1	7	35	1151	53
10										1	1	1	1	2	1	1	2	10	1544	58
11						1				1		1		1			1	5	1900	63
12																				
13																				
14																				
15																				
16+																				

Table 33 – Results from two comparative trials between Lofoten and Campelen fishing gears by repeating tows.
Catch ratio: quotient between mean catch per mile Campelen/Lofoten
Occurrence: number of tows where that species occurred in the gears: Lofoten. Campelen and both.
Catch – Catch in number: absolute values.

Species	Catch ratio	Occurrence	Catch (Kg)	Catch in Number	observations
Cod	1.81 1.06	6-9-6 10-10-6	59-89 84-85	31-69 32-40	the smallest sizes was better caught by the Campelen gear
American plaice	1.84 2.76	7-9-7 9-10-7	94-148 54-145	81-138 71-140	no size differences observed
Sebastes (juveniles)	37.78 2.59	4-10-4 16-18-16	0.3-11 110-267	28-936 3452-9353	length < 15 cm
Sebastes marinus	6.71 0.11	13-14-13 19-20-19	20-119 5997-612	53-308 7938-1353	no size differences observed Lofoten: 5500 Kg in one haul
Sebastes mentella	0.42 0.26	8-11-8 14-14-14	560-209 9351-2289	2653-1250 35179-10705	Lofoten: biggest sizes Lofoten: 5400 Kg in one haul
Sebastes fasciatus	1.26 0.69	14-15-14 20-20-20	118-133 904-588	675-892 4651-3576	the smallest sizes was better caught by the Campelen gear
Greenland halibut	0.40 0.58	13-14-13 16-16-16	461-168 231-124	752-284 436-285	no size differences observed
Roughhead grenadier	2.12 3.42	7-7-7 9-10-9	22-41 22-69	43-171 62-245	no size differences observed
Shrimp	5.00 7.14	9-13-9 17-20-17	228-1027 212-1403	37-300 (‘000) 26-148 ('000)	effect of the small cod-end mesh size of the Campelen gear
Raja radiata	5.93 4.39	6-14-5 11-19-10	15-82 26-109	9-50 16-82	
Chauliodus sloani	1.64	6-8-6 0-0-0	2-2 0-0	54-84 0-0	
Stomias boa	1.36	2-2-1 0-1-0	0.1-0.1 0-1	21-44 0-1	
Urophycis chesteri	6.20 2.59	7-10-7 12-13-12	6-35 11-27	113-935 187-768	effect of the small cod-end mesh size of the Campelen gear
Antimora rostrata	2.77	2-2-2 0-0-0	9-22 0-0	75-301 0-0	effect of the small cod-end mesh size of the Campelen gear
Nezumia bairdi	3.41 3.98	9-10-9 10-14-10	10-31 4-16	172-1054 137-626	
Wolffish (*A. lupus*)	3.54 2.06	12-12-11 17-19-17	38-116 41-80	92-359 134-496	the smallest sizes was better caught by the Campelen gear
Wolffish (*A. minor*)	1.60 1.88	11-14-11 12-16-11	64-92 62-109	35-65 29-63	no size differences observed
Lycodes smarki	16.40 3.76	6-11-6 9-12-9	2-31 5-19	11-230 26-121	the smallest sizes was better caught by the Campelen gear
Lycodes reticulatus	5.58 1.55	11-13-11 11-16-11	5-26 24-35	43-362 363-813	sizes <25 cm were better caught by the Campelen gear
Triglops murrayi	11.01 25.57	9-10-9 10-16-10	1-9 1-16	42-646 40-1566	
Witch flounder	4.03 2.31	6-11-6 12-13-10	11-38 25-56	20-62 93-106	no size differences observed
Squid	2.04	11-10-6 0-6-0	0.2-1 0-0	15-85 0-0	effect of the small cod-end mesh size of the Campelen gear

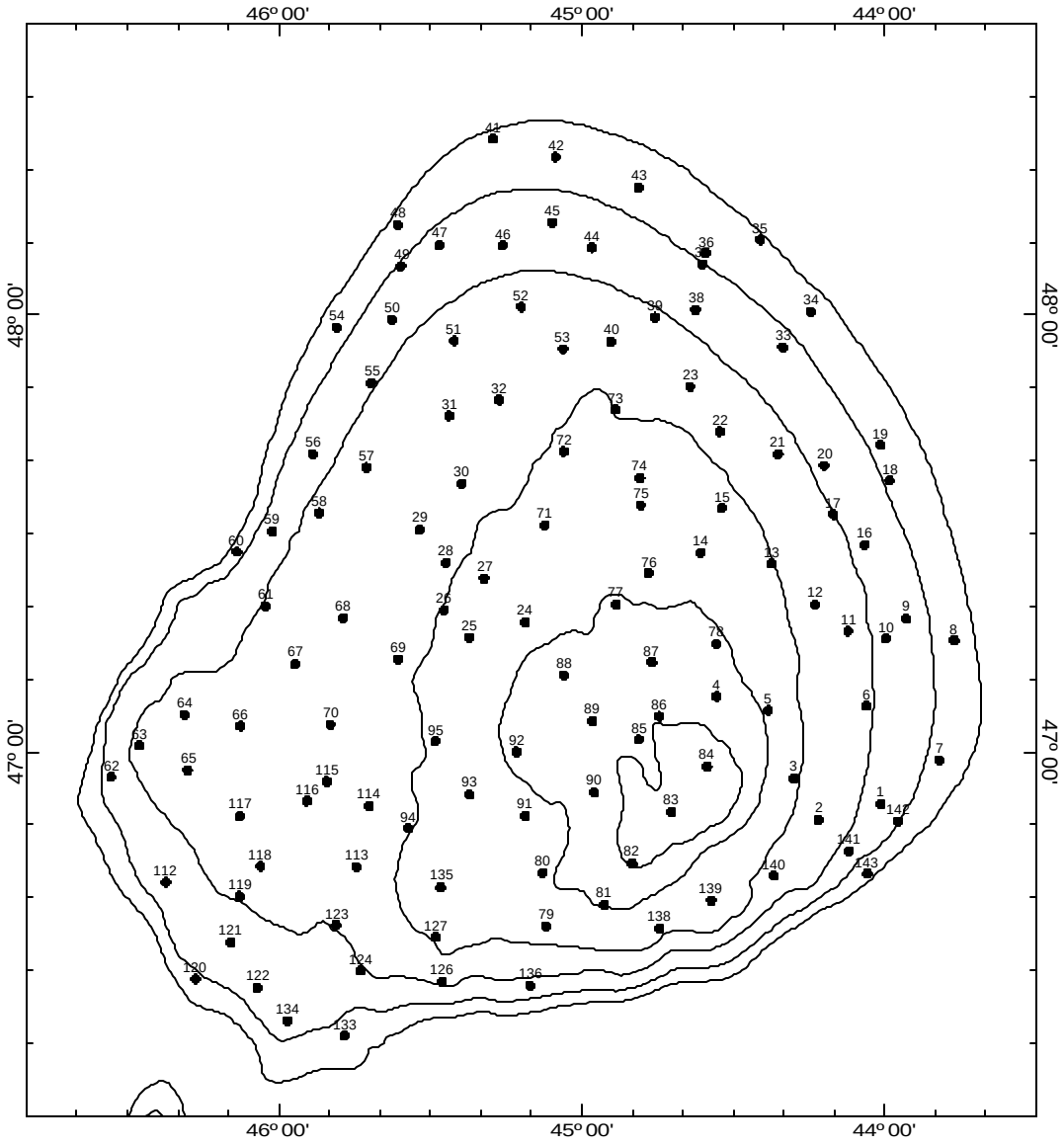


Figure 1 - Hauls position of the Flemish Cap-00 survey.

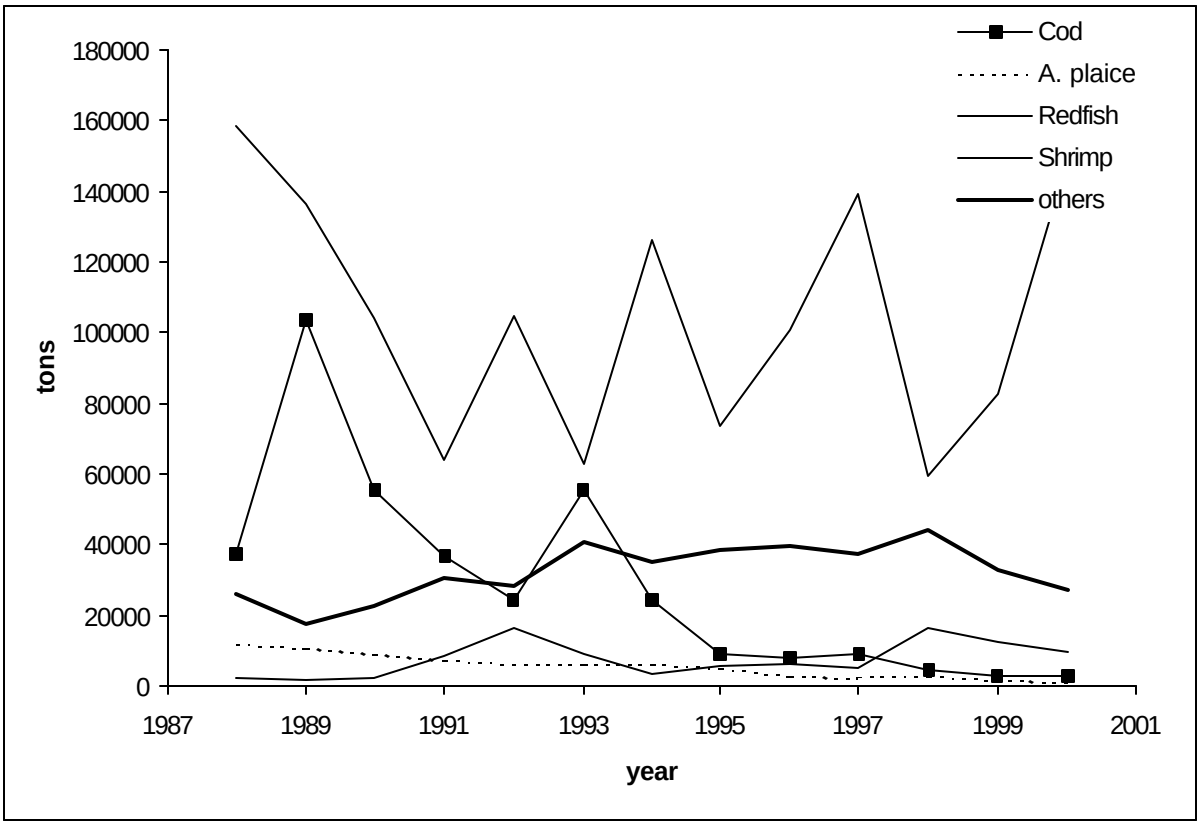


Figure 2 – Total biomass estimated

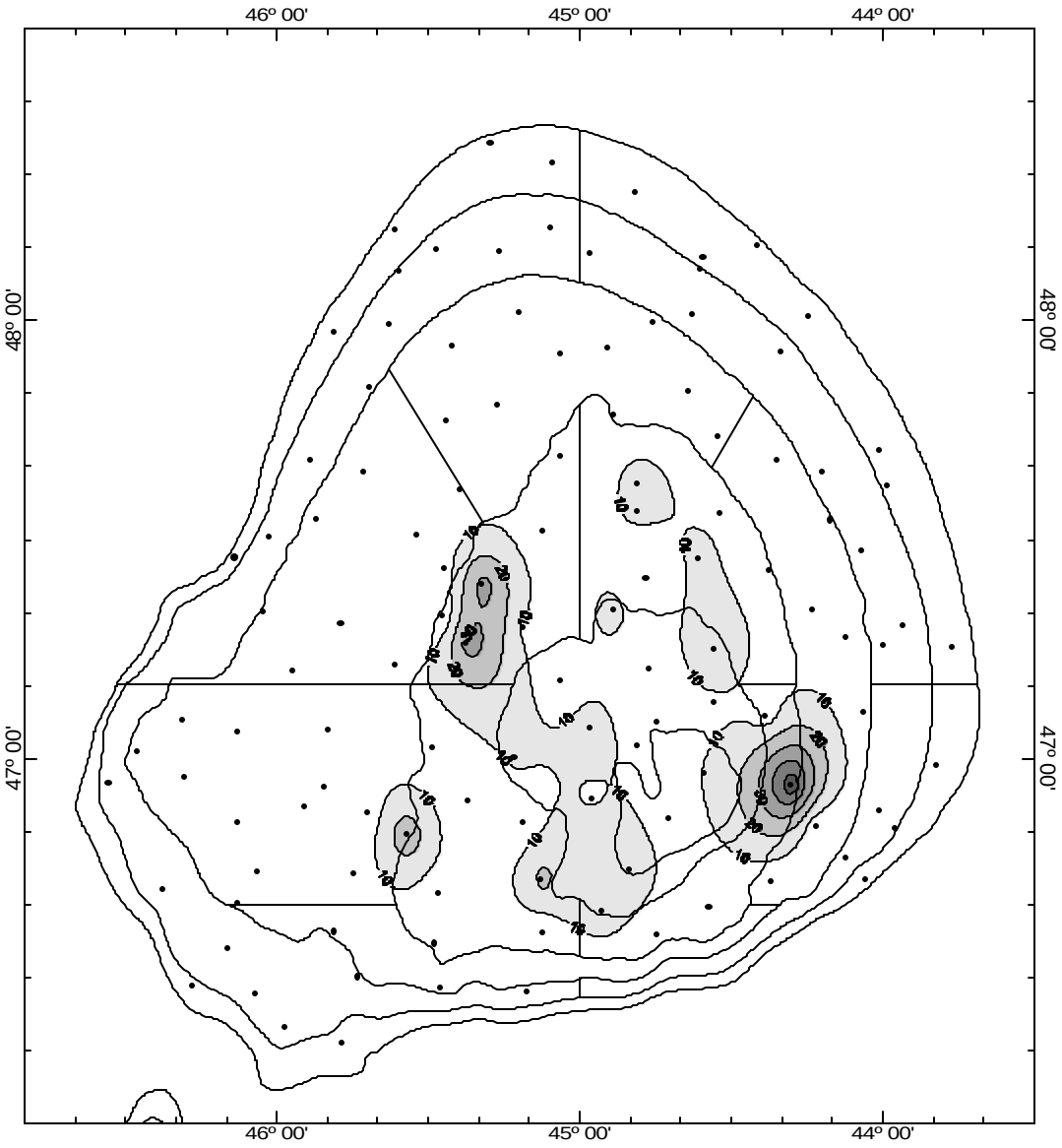


Figure 3 - Cod (*Gadus morhua*) catch distribution in Kg/tow

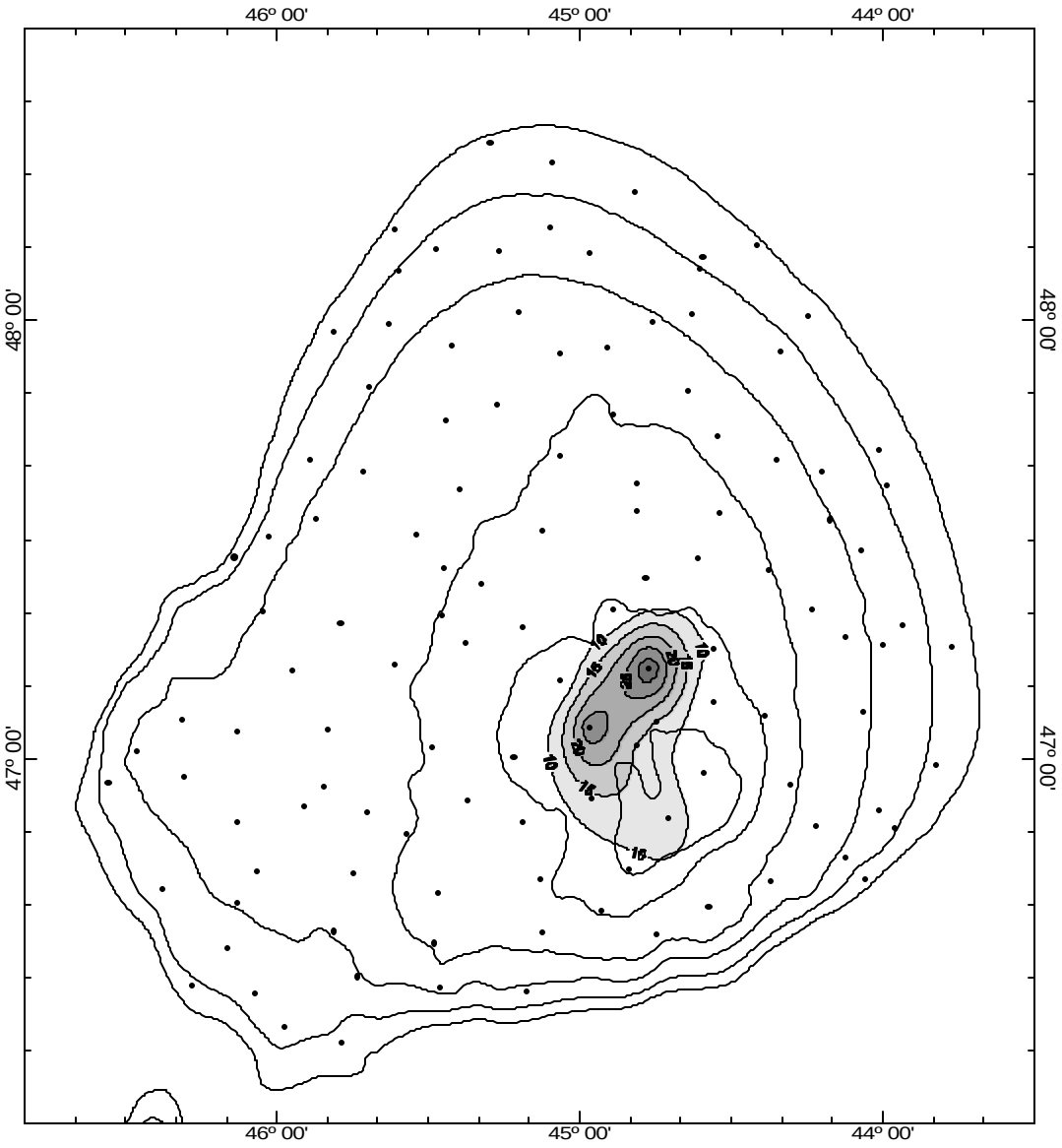


Figure 4 - American plaice (*Hippoglossoide platessoides*) catch distribution in Kg/tow

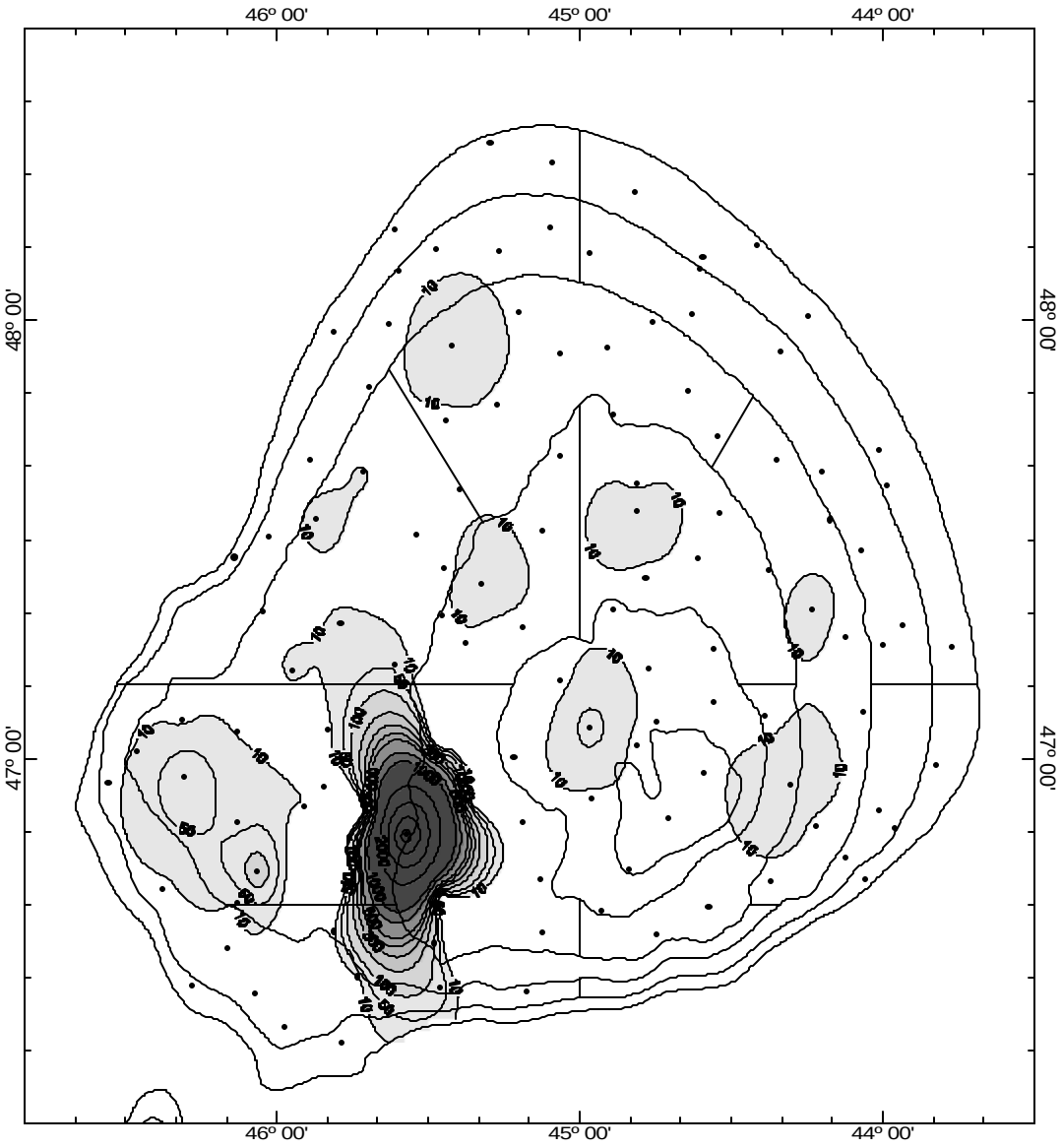


Figure 5 - Redfish (*Sebastes marinus*) catch distribution in Kg/tow

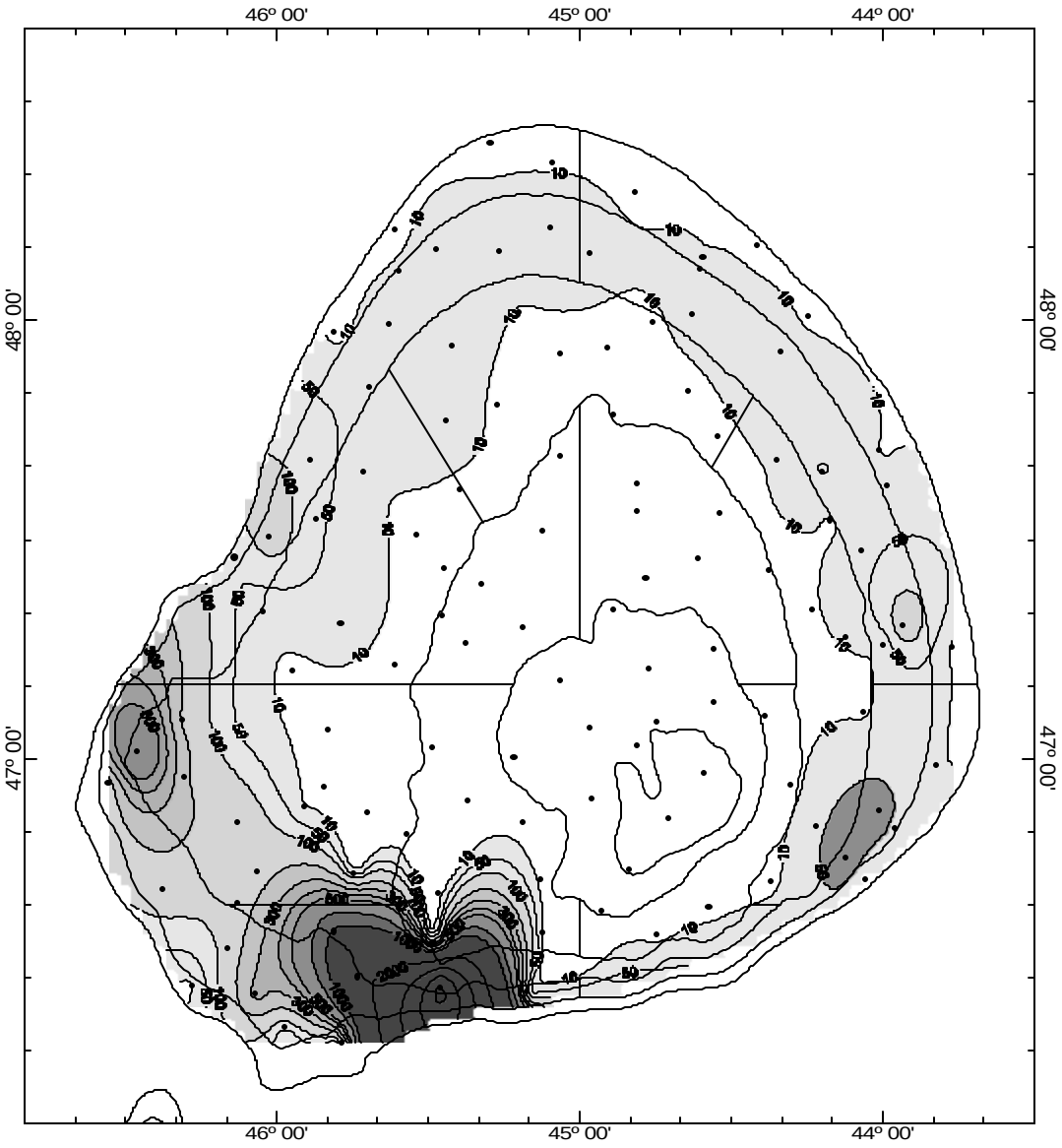


Figure 6 - Redfish (*Sebastes mentella*) catch distribution in Kg/tow

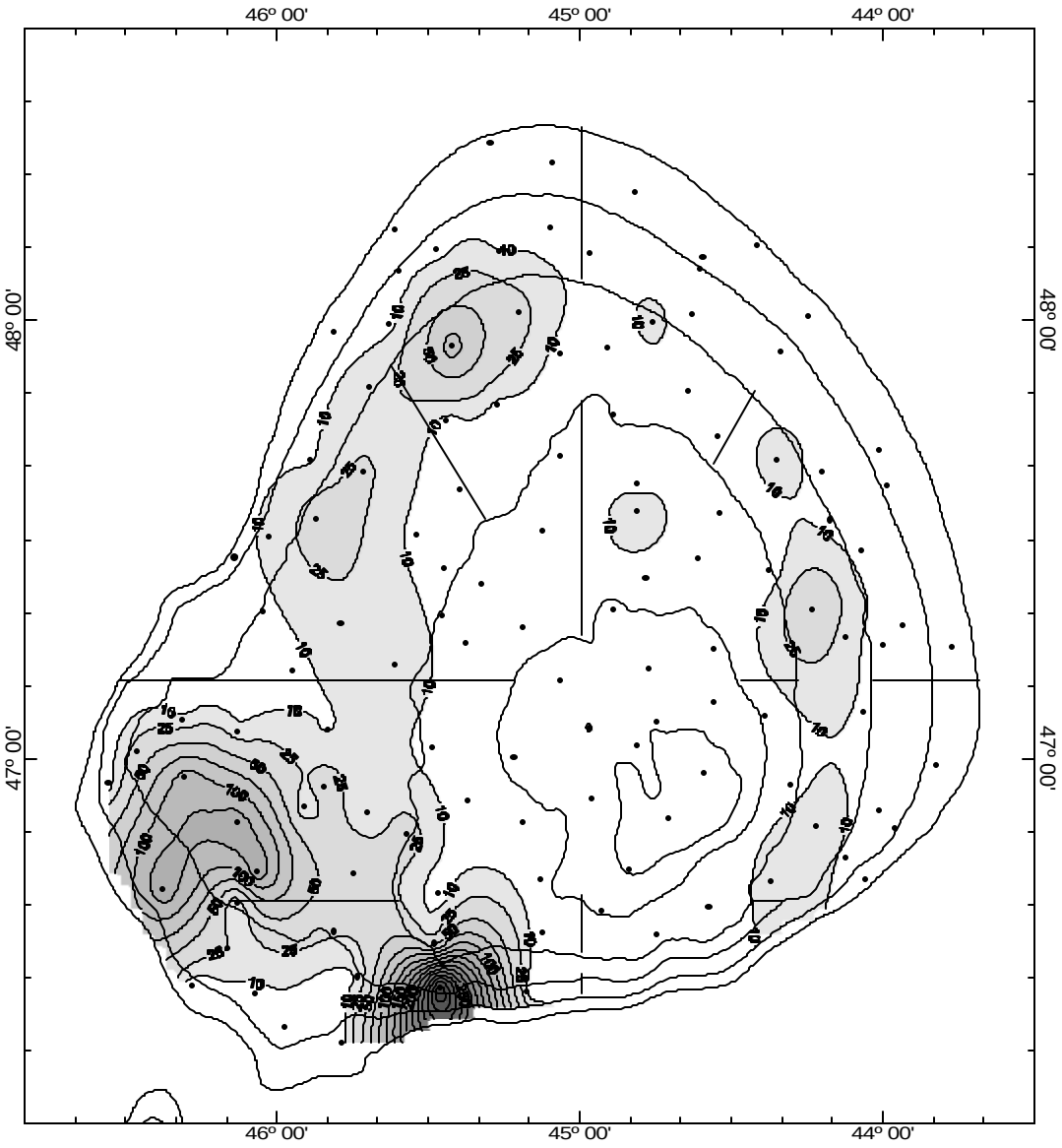


Figure 7 - Redfish (*Sebastes fasciatus*) catch distribution in Kg/tow

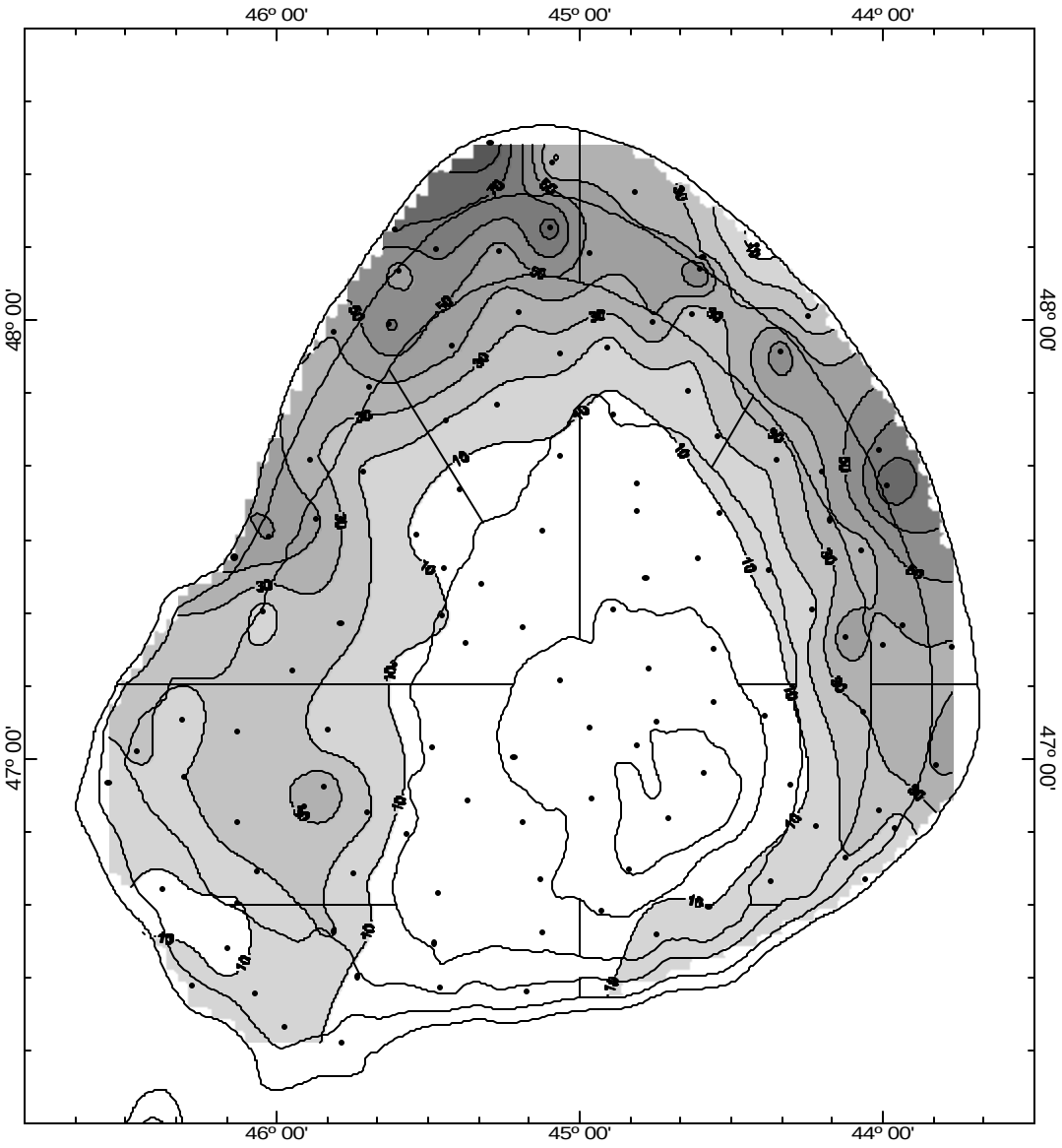


Figure 8 - Greenland halibut (*Reinhardtius hippoglossoides*) catch distribution in Kg/tow.

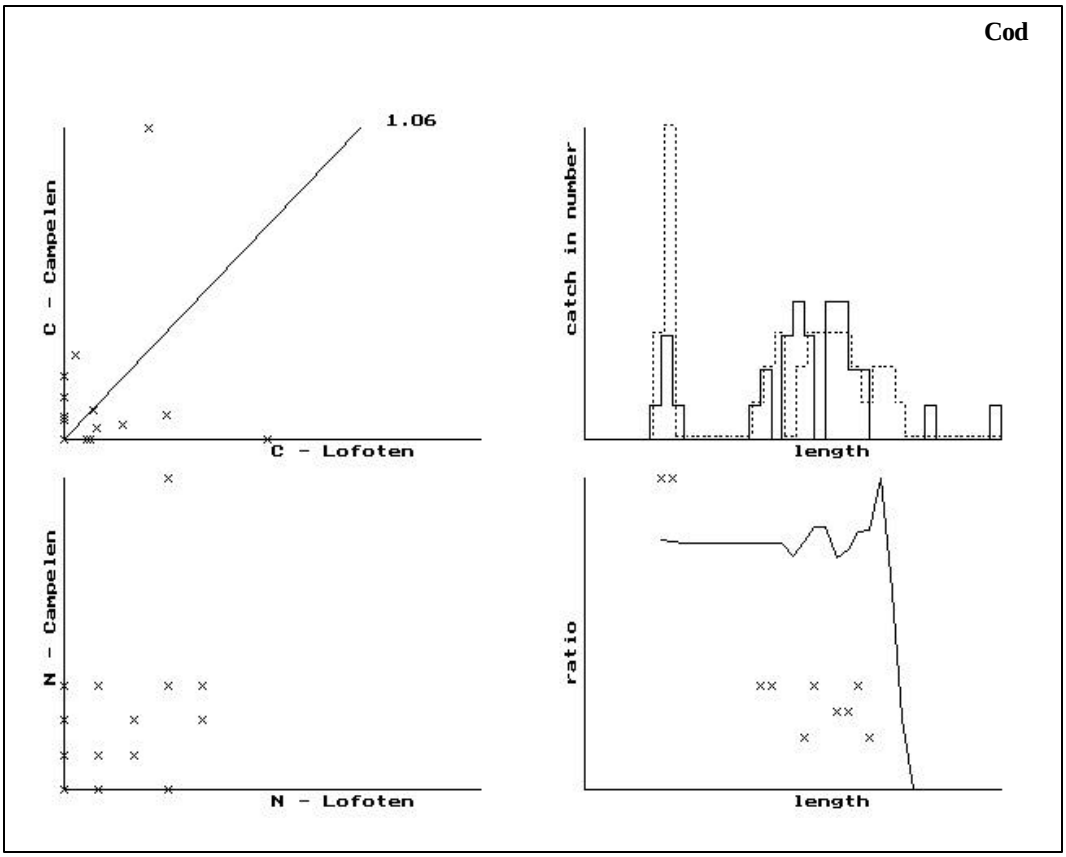


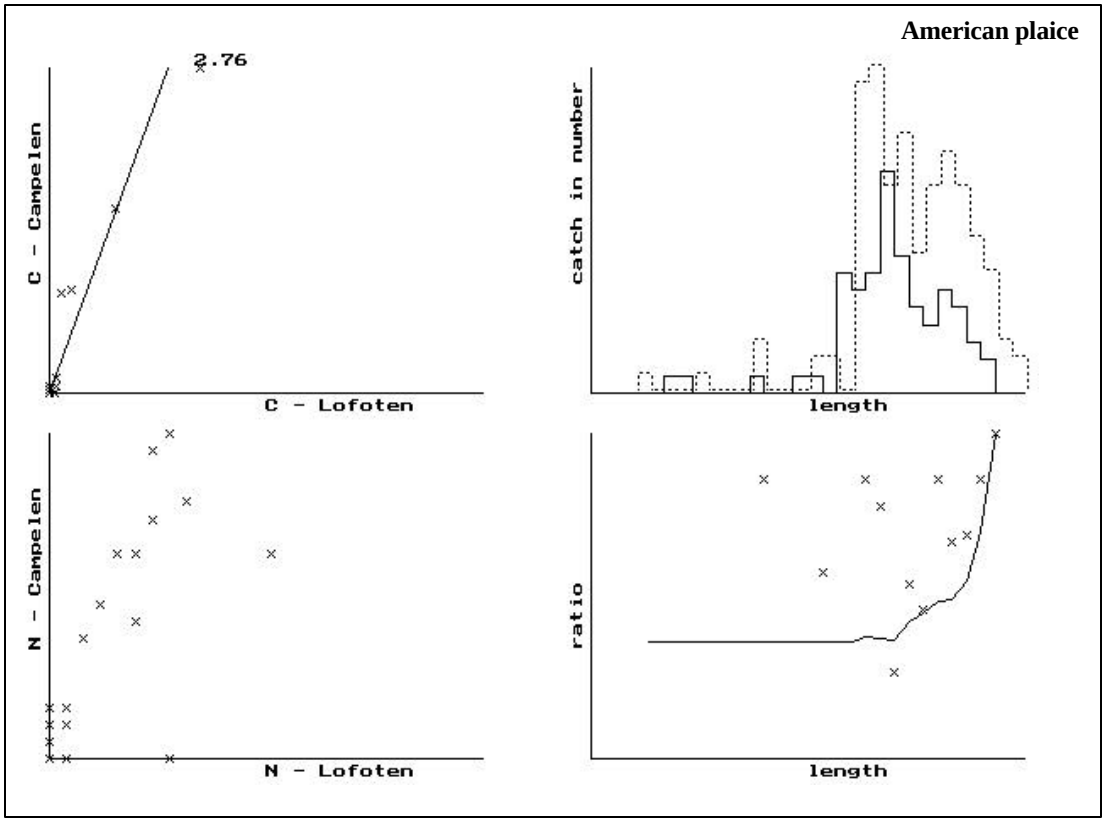
Figure 9 – **C**omparison of catches obtained with the Lofoten and Campelen survey gears fishing both in the same set of 17 geographical positions.

Upper-left square: catch in weight with the Campelen gear (ordinates) vs the catch with the Lofoten (abscissas) gear in the same geographic position. The ratio between the whole catch for each gear (Campelen / Lofoten) is written, and it is also represented with a straight line with such slope.

Bottom-left square: catch in number with both gears in the same geographic position.

Upper-right square: length frequency distribution with the gears Lofoten (solid line) and Campelen (dot line). It allows identifying catchability differences by length.

Bottom-right square: quotients of total catch in number for both gears (Campelen / Lofoten) (only when the Lofoten catch was not zero). Graphic (solid line) of cumulative catch in weight by length, in decreasing order: from the biggest length to the reference one, calculated as sum of products (frequency × mean weight). At its left end this line points to the same ratio as indicated in the upper-left square. It would be a horizontal straight line only if catchability ratio by length-class was constant.



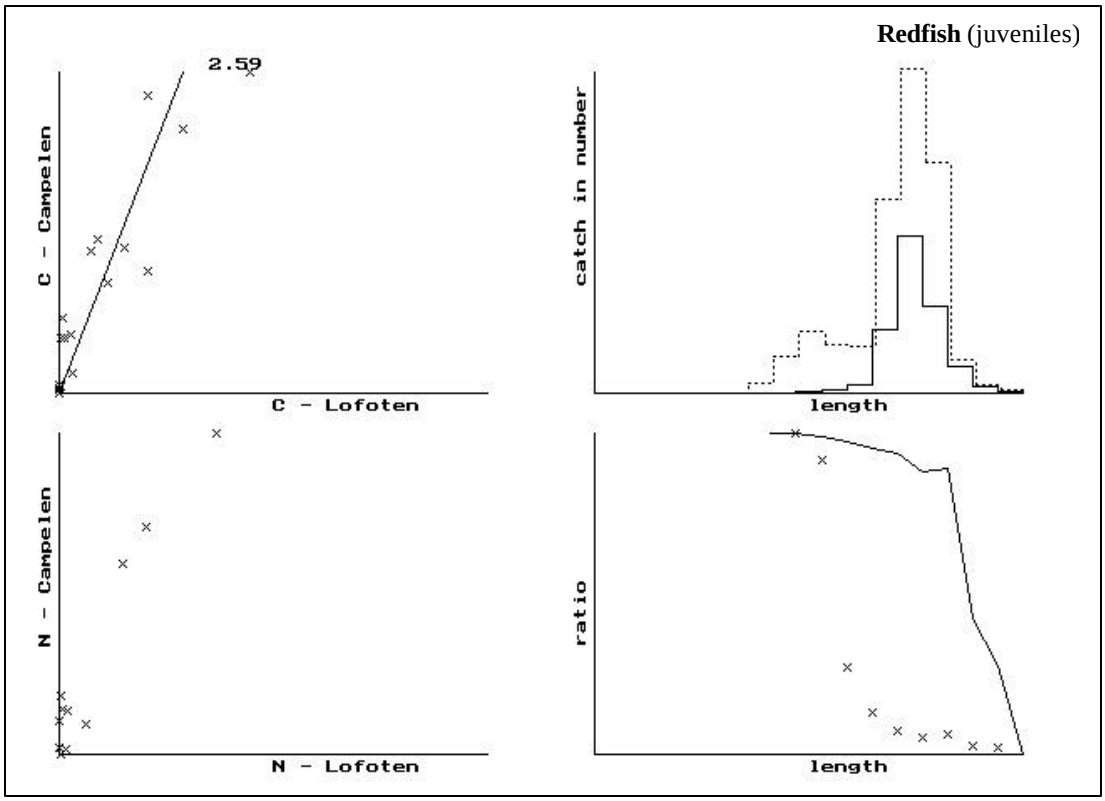
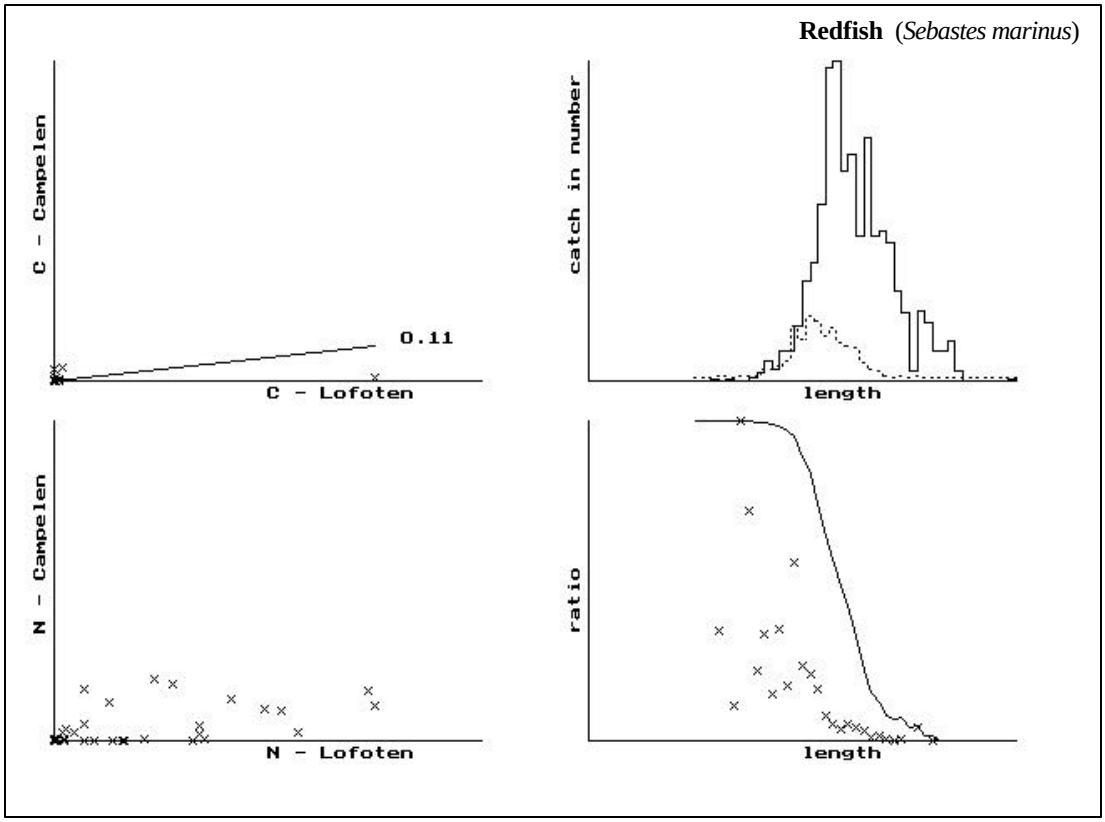


Figure 9 – (continued)



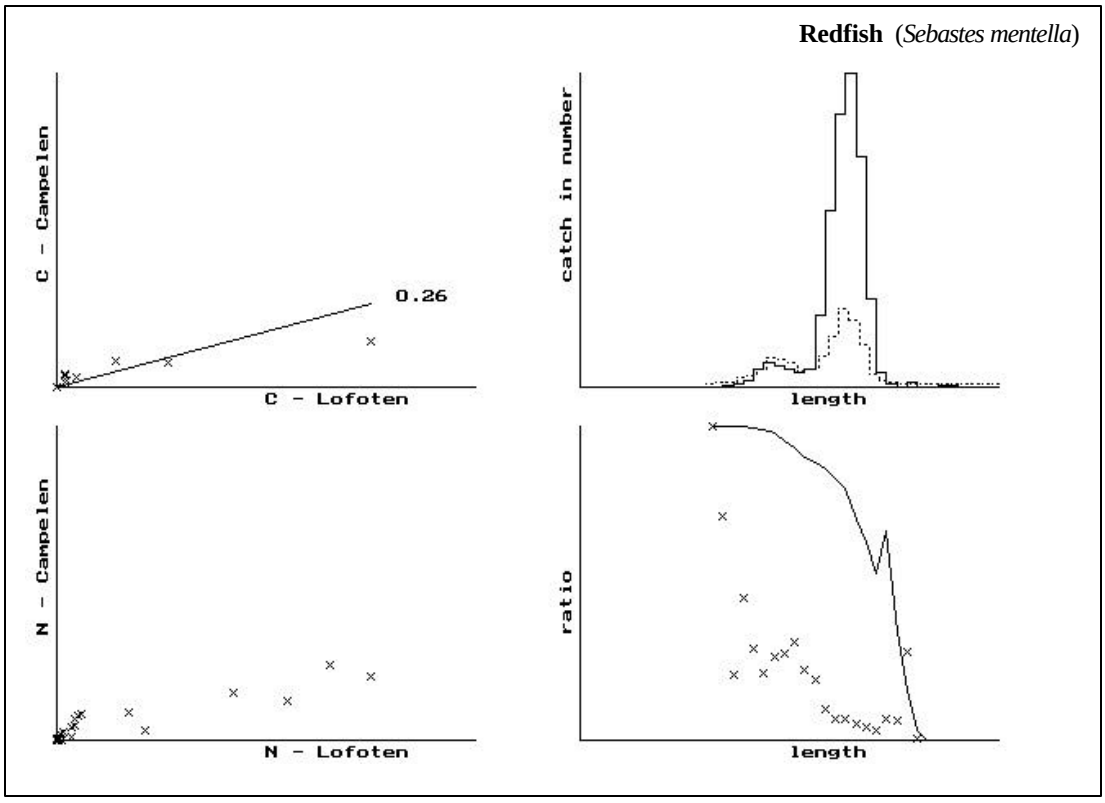
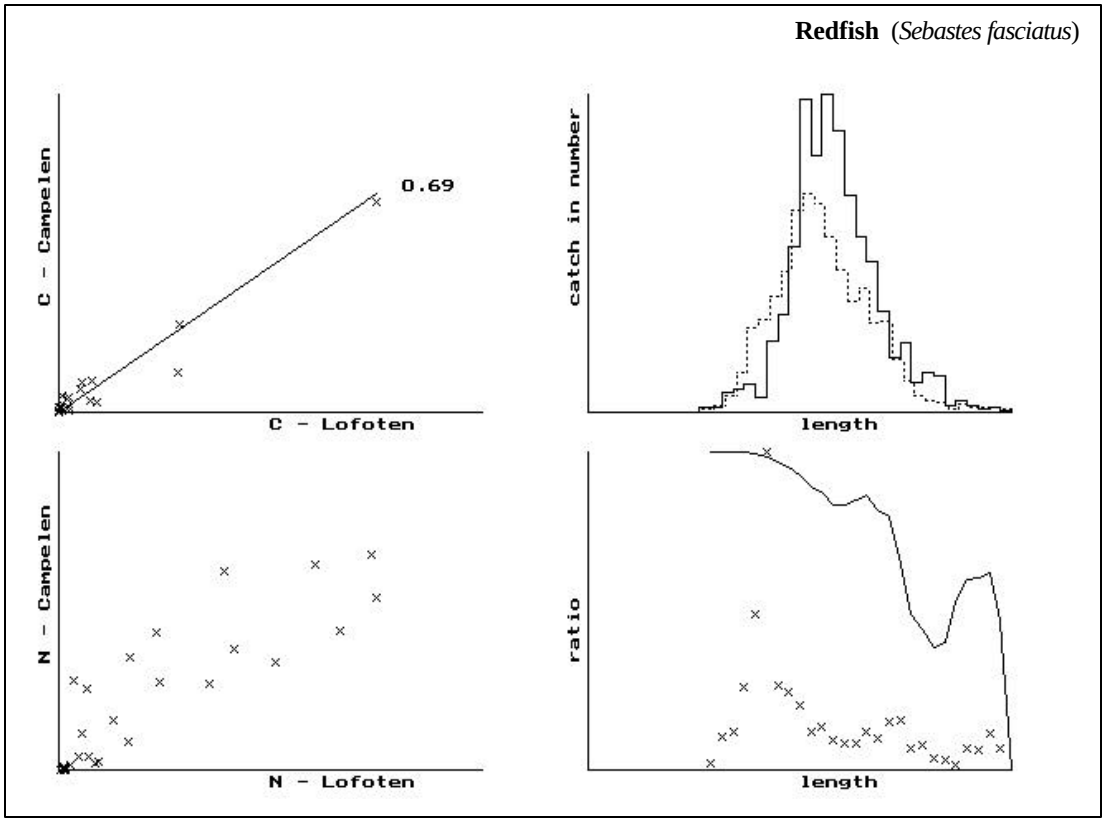


Figure 9 – (continued)



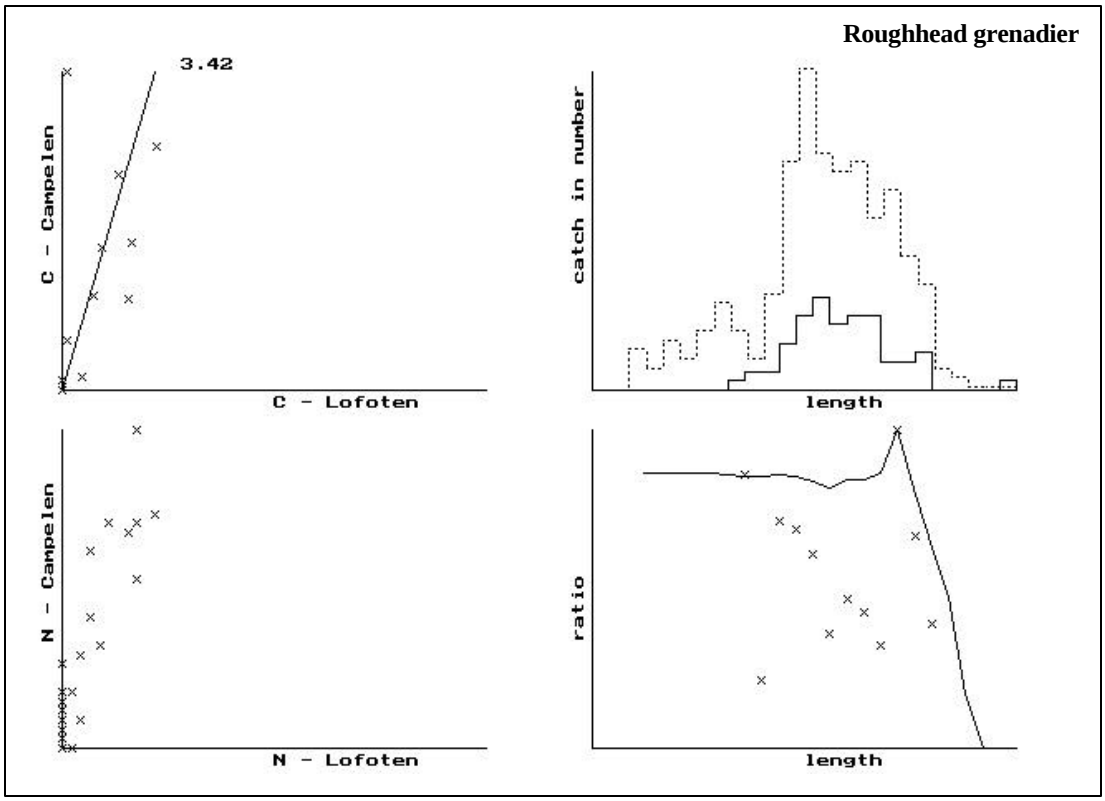


Figure 9 – (continued)

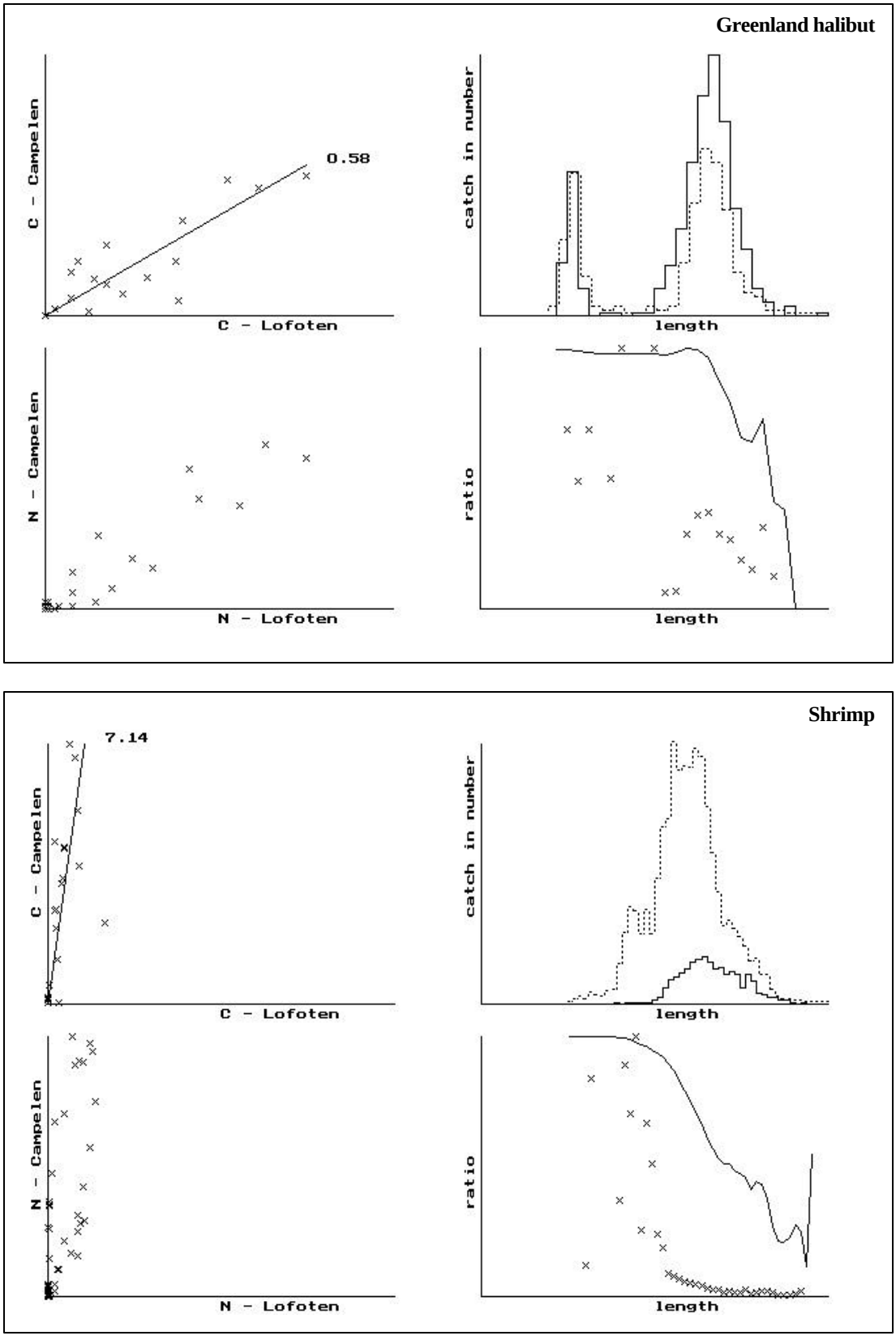


Figure 9 – (continued)