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Subarea 1 Cod: Fisheries and Stock Composition, 1983

by

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1. INTRODUCTION

1.a) Description of the fishery

The fishery for cod in Subarea 1 is partly an offshore fishery mainly by large trawlers using bottom otter trawl, and partly a coastal and fiord fishery in which the major part of the catches is taken by pound-net. The pound-net season is generally from May-June to September. In 1983 about 80% of the catch by gears other than trawls were taken in the pound-net season (Table 4). As a rough guideline for a break-down of landings on gears it is estimated that about 3/4 of the non-trawled landings in May-September came from the fishery by pound-nets.

The remainder part of the catch taken by gears other than trawl is taken by hand lines, long lines and set gill nets (bottom). Of these gears hand line is supposed to be the most important, but no break-down of landings by this miscellaneous-gear group is made.

The trawlers accounted for 2/3 of the total SA1 cod nominal catch in 1983 and just above half the total catch in 1982 while in 1981 only 1/4 of the catch was made by trawlers (Table 1). The increase from 1981 to 1982 and 1983 is partly due to the fact that while during the period 1977-81 only Greenland vessels were allowed directed cod fishing, in 1982 and 1983 fishing was also allowed for some other EEC member countries, primarily the Federal Republic of Germany.

1.b) Nominal catches

The landings over the last ten years (1974-83) are shown in Table 1, specified on trawlers and gears other than trawl. In this period the landings were at their lowest in 1976 after a number of years with recruitment failure, then raised somewhat when the relatively good 1973 year class recruited in 1977. The high catch in 1979 was based nearly entirely on the 1973 year class and was especially good in Div. 1E-1F.

The total nominal catch for 1983 by division and gear is shown in Table 2, while total monthly catches for 1983 are listed in Table 3 for trawlers and in Table 4 for vessels other than trawlers. Table 5 lists the monthly catches for the Greenland trawlers only.

The nominal catch in 1983 (about 62600 tons) is about 15% higher than that in 1982. The increase is entirely due to the increase in trawlers' catch. To be judged from the data for Greenland trawlers the increase was due to an increase in fishing activity (effort) rather than to an increase in catch rate. On the contrary, the catch rate seems to have decreased considerably from 1982 to 1983, see Section 2.

2. DATA FOR STOCK ANALYSES

2.a) Trends in effort and catch per unit effort

In the years 1977-81 Greenland vessels were the only ones allowed direct cod fishery. Therefore, data for the Greenland trawlers are used to illustrate trends in catch rates. The basic material is a haul-by-haul logbook record adjusted to actual weight of landings as recorded on the factories, where catches are landed.

Such effort figures for Greenland vessels are available only for the nine trawlers operated by the Royal Greenland Trade Department. Six of these are in the 500-999 GRT tonnage class. Their nominal catches, effort and catch per unit effort for the years 1981-83 are listed in Table 6.

Looking upon the figures over the whole year the overall c.p.u.e. decreased sharply from 3259 kg/hour in 1981 through 2212 kg/hour in 1982 to 1364 kg/hour in 1983, a level slightly above that for 1980 (1238 kg/hour). As in 1982 the best catch rate was in Div. 1E, and 70% of the fishing time for cod by the trawlers regarded took place in this division, while for the years 1980-81 no single division had more than 45% of the total cod fishing effort by these trawlers.

In Table 7 the c.p.u.e.-figures for the six trawlers are given by quarter of the year for the years 1981-83. Except for Div. 1C, 1E and 1F in the third quarter there was a decrease from 1982 to 1983 for all comparable set of figures ranging from 32 to 88%. The increase in the third quarter for the three divisions just mentioned is based on only 10% and 13% of the total effort in 1983 and 1982, respectively, for the trawlers in question and may, therefore, be less indicative of changes in stock density than the other sets of figures.

If the Greenland trawlers' data could be extrapolated or raised to give a total effort for the overall Subarea 1 stock then the figures in Table 8 would suggest that the overall effort (in Greenland trawler unit) increased by as much as between 83 and 126%, i.e. round about doubled from 1982 to 1983. However, this exercise with the figures is allowed only on the assumption that catchability and fishing pattern were the same in the two years compared, including the assumption that the inshore density and catchability of fish

followed the same trends as in the offshore fishery illustrated by the six trawlers. These assumptions seem doubtful. However, recalling that the total catch by these trawlers accounted for about 39% of the total catch by trawlers (Table 3 and 8) and about 26% of the total SA1 catch of cod, and taking into account their considerable decrease in catch per unit effort it seems rather certain that the overall effort and fishing mortality must have increased. The difficulty in transforming effort in terms of number of hours fished to fishing mortality rate is, however, obvious since shoaling behaviour and catchability of fish varies between seasons and between years so that one trawling hour at any given place and time does not necessarily create the same fishing mortality as another trawling hour at another place and time (or at same place another time, or same time at another place).

It is, therefore, difficult to quantify the change in overall F-value on the basis of a fraction of the fishery, but the general conclusion does, nevertheless, seem to be that the overall instantaneous fishing mortality rate (F) increased from 1982 to 1983.

2.b) Mean length and weight of age groups in 1983

The mean length and weight by age in the Danish samples of cod from Subarea 1, 1983, is given in Tables 9 and 10 for the offshore and the inshore samples, respectively. Only those samples for which direct observations on individual fish weight were made are included (very few samples were excluded).

In order to get a weighted mean over the year of the quarterly mean weights the weighting factors given in Tables 11 and 12 were used for the offshore and the inshore samples, respectively. The results are shown in Table 13 in which also the mean weight by age found in 1981 and 1982 is shown.

The mean weights in Table 13 were not used to convert fractions of catches (represented by individual samples) to numbers caught. In these calculations the actual weight of each individual sample was used to convert the landings represented by the sample to numbers caught.

In order to achieve mean weights by age for forecasts of the 1984 and subsequent years' catches it has been assumed that the present quarterly catch distribution is maintained for the offshore as well as for the inshore component. Furthermore, it has been assumed that 2/3 of the total catch will be offshore, 1/3 inshore. This leads to the mean weight by age as given in Table 14. These figures were plotted (Fig. 1) and a smoothed curve was fitted. The smoothed figures are proposed as input for forecasts.

The sum-of-product (SOP) test of these figures on the numbers caught in 1983 (Table 15) gave a figure of 42230 tons for the offshore fishery (actual figure 41992 tons, Table 3) and of 20710 tons for the inshore fishery (actual figure 20596 tons, Table 4).

2.c) Numbers by age in 1982-83

The catch figure used last year to calculate numbers caught in 1982 was 55481 tons. The present information is that the catch was 55832 tons (NAFO,

MS 1984). It has, therefore, not been deemed necessary to revise the figures for numbers by age in the 1982 nominal catch. Reference is made to Table 14 in Horsted *et al.* (MS 1983).

The figures obtained for 1983 are presented in Table 15. Clearly, the 1977 year-class (age group 6) made up the major part of the catch by numbers as well as by weight. It occurred mainly in the offshore catches and mainly in Div. 1E-1F. In inshore catches the predominance was by the 1979 year-class, mainly in Div. 1B-1D, followed by the 1977 year-class. Year-class 1979 did also show up in the offshore catches of Div. 1B-1D and will presumably increase its relative importance in 1984-85. Reminders of the good 1973 year-class were found in Div. 1E-1F and may have been important for the small scale fishery by long-lines and gill nets.

2.d) Information on recruitment

No significant new information has become available through the Danish investigations as to the possible strength of the year-classes 1980-82. The strength for these year-classes proposed by the author last year was 75, 20 and 200 million fish at age 3 for year-classes 1980, 1981 and 1982, respectively.

It is noted that the winters 1982/83 and 1983/84 were extremely cold in the West Greenland area. It is (not yet) known whether this has had any adverse effect on the young fish. However, the surface water over the West Greenland banks was relatively cold during 1983, and as the plankton survey did not show any noteworthy occurrence of cod larvae, the 1983 cod year-class is predicted to be a relatively poor one. A tentative figure of 20 mio. fish at age 3 is proposed for its strength.

2.e) Preliminary information on the fisheries and the stock in the beginning of 1984

By the end of April 1984 the total catch of cod reported by vessels above 80 GRT to the Greenland authorities is about 6900 tons. The comparable figure for 1983 was 16500 tons. Drift ice and locally formed ice have been a great hindrance for the offshore fishery, and there has been only a negligible inshore fishery in the first quarter of the year.

Detailed catch and effort statistics for the Greenland trawlers for the first quarter of the year had not yet been worked up when this paper was received. However, from verbal reports by observers from the fisheries institute sampling on board on some trips, it occurs that catch rate was relatively low and that relatively much time was spent searching for fishable concentrations. The best catch rates were probably in the East Greenland area, for which area the catches reported by the end of April are 135 tons (of cod) for Greenland vessels and 4,879 tons for vessels of the Federal Republic of Germany.

Samples of the landings were taken in each month of the first quarter (Table 16), and based on these samples the catch composition of the first quarter of 1984 seems to be as presented in Table 17. The 1977 year-class still predominates catches in Div. 1F and at East Greenland while in Div. 1E the 1979 year-class seems to become by far the most predominant one in 1984. This is also likely to apply to more northern divisions, inshore as well as offshore.

Based upon this preliminary information a rough estimate of the age composition of the total catch for 1984 have been made for a supposed (but not necessarily recommendable or achievable) catch of 62,000 tons of which 21,000 tons are supposed to be taken inshore with 70% by numbers belonging to the 1979 year-class. Taking mean weight by age groups as given in Table 14 (column B). The catch in numbers by age for a total catch of 62,000 tonnes is hereby roughly estimated to be as follows:

Age	Nos. (thousands)
3	124
4	1,791
5	24,193
6	1,758
7	6,608
8	351
9	255
10	97
11	119
12+	83
Total	35,379
Tons	62,000
Mean weight of fish	1.75 kg.

As shown in Table 16, there is a remarkable difference in mean length and mean weight between the samples from Subarea 1, Jan-Mar 1984 and that from East Greenland, Feb 1984. The difference is not so much due to difference in age composition as to difference in mean weight inside the age groups. The un-weighted means by age for the samples are given below.

Age	Div. 1E(Jan-Mar)		Div. 1E(Apr)		East Greenland(Feb)	
	Mean length (cm)	Mean weight (cm)	Mean length (cm)	Mean weight (cm)	Mean length (cm)	Mean length (cm)
4	44.0	0.83	-	-	53.1	1.43
5	50.2	1.18	52.3	1.30	65.6	2.65
6	56.6	1.74	58.5	1.83	69.8	3.27
7	62.8	2.34	67.0	2.61	71.9	3.57
8	70.2	3.16	73.5	3.24	79.5	4.75
9	76.6	4.15	80.5	4.39	83.5	5.78
10	83.0	5.76	87.5	5.82	81.9	5.07
11	86.2	6.09	88.1	5.96	92.9	8.01
Overall	53.4	1.49	62.0	2.27	73.4	3.90

A possible explanation for this difference in mean length and weight by age between the two areas may be that the migration from West to East Greenland waters is initiated by the maturation of fish so that the faster growing individuals of each year-class are the first in that year-class to migrate from West to East Greenland (and possibly to Iceland).

REFERENCES

Horsted, Sv. Aa., J. Messtorff, and A. Schumacher. MS 1983. Status of Subarea 1 cod and estimates of Stock yield for 1983-85. NAFO SCR Doc., No. 60, Serial No. N719, 43 pages.

NAFO. MS 1984. Historical catches of selected species by stock, area and country for the period 1973-82. NAFO SCS Doc., No. 6, Serial No. N800, 38 pages.

Table 1. Landings of Subarea 1 cod for the years 1974-83 (000 tons).

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Trawlers	21	28	19	46 ⁴⁾	53 ⁴⁾	57 ⁴⁾	16	14	29 ⁵⁾	42 ⁵⁾
Other vessels	27	20	14	27	20	42	38	39	26 ⁵⁾	21 ⁵⁾
Total	48	48	33	73 ⁴⁾	73 ⁴⁾	99 ⁴⁾	54 ⁴⁾	53	55 ⁵⁾	63 ⁵⁾
TAC	90 ²⁾	51 ²⁾	45 ²⁾	31 ²⁾	-1 ¹⁾	-1 ¹⁾	20 ¹⁺²⁾	50 ¹⁺³⁾	62	62

1) Catches limited to Greenlander's fishery and to by-catches in 1978-81

2) Quota for offshore fishery only

3) Quota for offshore plus inshore Greenland fishery

4) Estimates used for stock assessments

5) Provisional data

Table 2. Nominal catch (tonnes) of cod in Subarea 1, 1983 (provisional figures). Pound-net catches are estimated as being 3/4 of total miscellaneous-gear catches in June-September (incl.) for Divisions 1B-1F. Besides catches presented in Tables 3 and 4 the table also includes 11 tons taken by a Faroese vessel.

Division	Otter trawl (offshore)	Pound net (inshore)	Miscellaneous gear (mainly inshore)	Total
1A	-	-	122	122
1B	691	1856	848	3395
1C	1194	1906	1732	4832
1D	10825	4082	2597	17504
1E	25043	3227	1894	30164
1F	4239	993	1350	6582
Total SA 1	41992	12064	8543	62599

Table 3. Total nominal catch (tonnes) of cod in SA 1, 1983, taken by trawlers. The figures include 30802 tonnes taken by Greenland Trawlers (see Table 5), 10.050 for trawlers of the Federal Republic of Germany (provisional figures supplied by A. Schumacher) and 1140 tonnes for United Kingdom trawlers (vessels' catch reports to the Greenland authorities). The monthly catch for the UK trawlers has been allocated on divisions in the same proportion as reported for the Greenland and the Fed. Rep. of Germany trawlers combined. - indicates no catch reported (Provisional figures).

Division	Month												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
1A	-	-	-	-	-	-	-	-	-	-	-	-	-
1B	-	-	-	-	-	-	46	24	156	458	7	-	691
1C	14	2	-	-	-	25	470	171	497	-	15	-	1194
1D	778	821	45	396	763	786	818	826	297	544	3945	806	10825
1E	4270	1268	2165	3634	1975	1572	1290	2674	154	2	2413	3626	25043
1F	986	574	352	72	1189	173	4	326	65	17	25	456	4239
SA 1	6048	2665	2562	4102	3927	2556	2628	4021	1169	1021	6405	4888	41992

Table 4. Nominal catch (tonnes) of cod by Greenland vessels below 80 GRT. - indicates no catch reported (Provisional figures).

Division	Month												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
1A	-	1	1	2	1	1	7	21	22	51	13	2	122
1B	9	13	1	11	-	810	1144	360	160	88	102	6	2704
1C	18	18	1	7	30	860	438	574	669	709	299	15	3638
1D	2	4	-	97	65	394	1209	2527	1313	725	322	16	6674
1E	18	-	74	113	66	39	216	1787	2261	327	195	19	5115
1F	-	1	-	4	1	183	245	187	709	737	245	31	2343
SA 1	47	37	77	234	163	2287	3259	5456	5134	2637	1176	89	20596
East Gr1.	23	4	-	-	-	1	-	5	16	4	2	5	60
Total	70	41	77	234	163	2288	3259	5461	5150	2641	1178	94	20656

Table 5. Nominal catch (tonnes) of cod by Greenland trawlers, 1983. 16328 tons were reported for SA 1 by trawlers of the Royal Greenland Trade Department (KGH) and this catch was reported by month and division. For the remainder catch in SA 1 (14474 tons) only the monthly distribution was reported. These monthly catches have been allocated on divisions in the same proportion as those of the KGH-trawlers. - indicates no catch reported (Provisional figures).

Division	Month												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
1A	-	-	-	-	-	-	-	-	-	-	-	-	-
1B	-	-	-	-	-	-	46	24	156	458	7	-	691
1C	14	2	-	-	-	11	404	167	291	-	15	-	904
1D	597	812	45	396	763	572	658	806	169	523	3945	595	9881
1E	2186	631	2112	3634	1685	1170	1085	2472	33	2	2271	1816	19097
1F	-	-	2	-	-	-	-	227	-	-	-	-	229
SA 1	2797	1445	2159	4030	2448	1753	2193	3696	649	983	6238	2411	30802
East Gr1.	-	-	-	-	25	233	131	1	-	1	-	-	391
Total	2797	1445	2159	4030	2473	1986	2324	3697	649	984	6238	2411	31193

Table 6. Effort (hours fished), catch of cod, and catch per unit effort for the Greenland trawlers (500-999 GRT class) in 1981-83. Only figures for directed cod fishing are included.

Division	1981			1982			1983		
	tonnes	hours	kg/hour	tonnes	hours	kg/hour	tonnes	hours	kg/hour
1B	0	0	-	133	100	1330	292	927	315
1C	4254	1279	3326	4023	1937	2077	562	593	948
1D	4701	1856	2533	7189	4084	1760	3974	4039	984
1E	4381	952	4602	9350	3221	2903	11382	6295	1808
1F	0	5	0	11	17	647	112	114	982
Total SA 1	13336	4092	3259	20706	9359	2212	16322	11968	1364
East Greenland	8	16	500	5	8	625	8	2	250

Table 7. Effort (hours fished) and catch per unit effort (kg/hour) by quarter of the year for the Greenland trawlers (500-999 GRT tonnage class) in 1981-1983. Only figures for direct cod fishing are included.

Division	1981							
	I		II		III		IV	
	hours	c.p.u.e.	hours	c.p.u.e.	hours	c.p.u.e.	hours	c.p.u.e.
1C	1011	3430	26	3846	-	-	242	2835
1D	358	2835	165	3400	119	824	1214	2493
1E	118	5500	662	4734	38	737	134	4254
1F	-	-	-	-	-	-	5	0
Total SA 1	1487	3451	853	4449	157	803	1595	2685
East Greenland	-	-	-	-	-	-	16	500

Division	1982							
	I		II		III		IV	
	hours	c.p.u.e.	hours	c.p.u.e.	hours	c.p.u.e.	hours	c.p.u.e.
1C	1009	2528	277	2498	101	713	550	1287
1D	1050	2095	334	3793	886	1428	1814	1354
1E	1168	2541	1286	3650	181	1591	586	2391
1F	-	-	-	-	17	647	-	-
Total SA 1	3227	2392	1897	3507	1185	1381	2950	1548
East Greenland	-	-	-	-	8	625	-	-

Division	1983							
	I		II		III		IV	
	hours	c.p.u.e.	hours	c.p.u.e.	hours	c.p.u.e.	hours	c.p.u.e.
1B	-	-	-	-	586	218	341	481
1C	33	364	15	667	532	1011	13	154
1D	811	1125	634	2065	1199	817	1395	555
1E	2214	1735	2267	2212	996	2049	818	593
1F	2	1000	-	-	112	982	-	-
Total SA 1	3060	1558	2916	2172	3425	1108	2567	555
East Greenland	-	-	-	-	2	500	6	167

Table 8. Effort (hours fished), catch of cod by weight as well as by numbers, and catch per unit effort for the Greenland trawlers (500-999 GRT class), and their effort raised to total effort for Subarea 1, 1980-83.

Catch by weight					
Year	Grl. trawlers' effort (hours)	Grl. trawlers' catch of cod (tonnes and nos. x 10 ⁻³)	Grl. trawlers' c.p.u.e. (kg/hour and nos./hour)	Total SA 1 nominal catch	Total effort in Grl. trawler units (hours)
1980	5346	6617	1238	54803	44276
1981	4092	13336	3259	53456	16402
1982	9359	20706	2212	55481	25077
1983	11968	16322	1364	62599	45894

Catch by numbers of fish					
Year	Grl. trawlers' effort (hours)	Grl. trawlers' catch of cod (tonnes and nos. x 10 ⁻³)	Grl. trawlers' c.p.u.e. (kg/hour and nos./hour)	Total SA 1 nominal catch	Total effort in Grl. trawler units (hours)
1980	5346	2419	452	22315	49316
1981	4092	7663	1873	30195	16123
1982	9359	10226	1093	26994	24705
1983	11968	7491	626	34981	55887

Table 9. Mean length (total, cm below) and mean weight (kg, rough fresh) by age groups of cod in samples of offshore landings from Subarea 1 by Greenland trawlers, 1983. Figures are given only for age groups represented by five fish or more in the sample. OTB = bottom otter trawl.

Age group	Div. Month Gear	1D Jan. OTB	1E Jan. OTB	1D Feb. OTB	1E Feb. OTB	1E March OTB	1D April OTB	1E April OTB	1D May OTB	1B July OTB
III	l w	- -	- -	- -	- -	- -	- -	- -	- -	- -
IV	l w	47.9 0.99	46.2 0.87	46.8 0.95	50.0 1.18	45.1 1.01	46.1 0.90	47.0 0.89	46.0 0.73	45.6 0.57
V	l w	53.3 1.41	51.9 1.25	51.0 1.22	54.4 1.32	51.4 1.45	50.9 1.16	51.7 1.19	49.6 0.92	53.5 1.17
VI	l w	57.2 1.81	59.1 1.88	57.0 1.68	60.4 1.92	60.9 2.56	53.9 1.32	59.7 1.84	58.0 1.40	63.8 2.09
VII	l w	63.6 2.44	68.9 3.12	62.3 2.24	69.5 2.81	70.8 3.95	- -	68.9 2.73	68.0 2.10	73.0 3.01
VIII	l w	- -	74.3 4.01	63.4 2.30	71.0 3.19	74.9 4.63	- -	76.4 3.62	74.6 2.75	81.6 3.97
IX	l w	- -	78.1 4.97	- -	- -	79.7 9.42	- -	76.3 3.80	78.5 3.16	80.1 4.17
X	l w	- -	80.1 5.84	- -	74.6 3.32	86.7 6.39	- -	78.6 3.96	73.0 2.74	- -
Overall	l	56.2	59.8	54.1	61.5	63.4	49.3	58.2	53.5	68.0
Overall	w	1.71	2.01	1.48	2.05	2.98	1.07	1.75	1.17	2.54

Table 9. Continued

Age group	Div. Month Gear	1C July OTB	1D July OTB	1E Aug. OTB	1E Aug. OTB	1F Aug. OTB	1B Oct. OTB	1D Nov. OTB	1D Dec. OTB	1984
III	l	-	-	-	-	-	-	43.4	43.8	
	w	-	-	-	-	-	-	0.76	0.76	
IV	l	46.2	46.1	46.0	48.7	-	52.0	50.7	49.0	
	w	0.63	0.63	0.66	1.19	-	1.54	1.34	1.04	
V	l	53.7	53.7	55.2	55.2	55.6	54.1	57.6	56.7	
	w	1.18	1.19	1.41	1.53	1.54	1.82	1.93	1.49	
VI	l	63.2	63.2	63.1	63.0	64.9	68.8	66.1	62.3	
	w	2.02	2.02	2.02	2.24	2.43	3.47	3.08	2.04	
VII	l	73.0	73.0	70.7	71.2	72.0	74.7	76.1	-	
	w	3.00	3.00	2.83	2.99	3.09	4.40	4.90	-	
VIII	l	81.1	80.7	76.1	73.5	76.9	81.5	80.0	77.9	
	w	3.90	3.89	3.46	3.47	3.66	5.78	5.45	3.71	
IX	l	79.5	79.4	78.6	76.7	75.7	89.6	88.0	-	
	w	3.87	3.89	3.71	3.61	3.11	5.98	7.07	-	
X	l	79.1	78.7	83.8	75.2	76.0	98.7	-	-	
	w	3.57	3.42	4.91	4.58	4.34	10.09	-	-	
Overall	l	66.1	66.1	64.4	63.5	66.7	67.8	57.9	51.5	
Overall	w	2.34	2.34	2.18	2.30	2.57	3.59	2.18	1.24	

Table 10. Mean length (total, cm below) and mean weight (kg, round fresh) by age groups of cod in samples of landings from Subarea 1 by Greenland vessels below 80 GRT, 1983. Figures are given only for age groups represented by five fish or more in the sample. FPN = Pound net, LHP = hand line.

Age group	Div. Month Gear	1D May FPN	1D July FPN	1F July FPN	1D Aug. FPN	1E Aug. FPN	1F Aug. FPN	1D Sept. FPN	1D Sept. FPN
III	l	-	39.4	-	35.4	41.0	-	39.0	-
	w	-	0.63	-	0.63	0.73	-	0.58	-
IV	l	52.6	46.1	44.6	44.1	45.5	45.7	44.9	45.3
	w	1.55	1.00	1.06	0.89	0.98	0.87	0.91	0.77
V	l	54.2	50.7	48.5	51.4	54.0	48.3	47.3	51.0
	w	1.69	1.32	1.36	1.41	1.44	1.20	1.09	1.13
VI	l	62.5	60.8	49.0	59.6	62.3	54.5	61.3	60.4
	w	2.54	2.07	1.51	2.04	2.22	1.56	2.21	1.91
VII	l	67.5	70.0	-	69.2	69.9	-	62.7	68.0
	w	3.53	2.99	-	2.95	3.00	-	2.28	2.74
VIII	l	-	77.3	-	-	76.6	-	-	-
	w	-	4.01	-	-	3.86	-	-	-
IX	l	81.8	80.3	-	-	79.0	-	-	-
	w	6.00	4.12	-	-	4.44	-	-	-
X	l	-	77.4	-	-	77.5	-	-	-
	w	-	4.03	-	-	7.51	-	-	-
Overall	l	59.7	48.2	45.0	48.0	54.8	46.0	46.7	48.8
Overall	w	2.48	1.17	1.10	1.17	1.70	1.02	1.05	1.03

Table 10. Continued.

Age group	Div. Month Gear	1E Sept. FPN	1D Aug. LHP	1D Sept. LHP
III	1 w	- -	- -	- -
IV	1 w	49.5 1.03	49.5 1.11	49.6 1.25
V	1 w	55.2 1.40	55.4 1.46	- -
VI	1 w	62.8 2.13	62.7 2.16	61.6 2.20
VII	1 w	69.4 2.90	72.9 3.26	- -
VIII	1 w	71.9 3.25	72.4 3.19	- -
IX	1 w	75.9 3.71	78.6 4.59	- -
X	1 w	80.1 4.34	82.1 4.50	- -
Overall	1	60.8	64.8	54.3
Overall	w	2.01	2.43	1.63

Table 11. Number of cod per age group and quarter of the year in nominal catch from Subarea 1 by trawlers. The figures are used as weighting factors to obtain weighted annual mean weight of fish in each age group (see Table 13).

Age group	Quarter				Total
	1	2	3	4	
III	-	-	-	33	33
IV	345	1132	122	1749	3348
V	198	545	245	286	1274
VI	4254	3285	3002	2846	13387
VII	225	273	435	264	1197
VIII	239	96	295	170	800
IX	73	56	89	44	262
X	47	51	91	72	261
Total	5381	5438	4279	5464	20562

Table 12. Nominal catch of cod in Subarea 1, 1983 by quarter of the year.

Quarter		1	2	3	4
Offshore (trawlers)	tonnes	11275	10585	7818	12314
	%	26.9	25.2	18.6	29.3
Vessels below 80 GRT (mainly inshore)	tonnes	161	2684	13849	3902
	%	0.8	13.0	67.2	19.0

Table 13. Mean weight (kg, round fresh) of Subarea 1 cod, 1983, as obtained from samples listed in Tables 9 and 10. Weighting factors to obtain weighted annual mean are the catches listed in Table 11 for offshore samples and Table 12 for inshore samples. For comparison the figures obtained in 1981 and 1982 are listed together with those used for forecasts in the assessments carried out in June 1983.

	Age group	Unweighted mean by quarter 1983				Weighted annual mean			Forecasts weights	
		1	2	3	4	1981	1982	1983	1983	
Offshore samples	III	-	-	-	0.76	-	0.90	0.76	0.83	
	IV	1.00	0.76	0.74	1.31	1.23	1.22	1.07	1.11	
	V	1.33	1.01	1.34	1.75	1.94	1.84	1.29	1.70	
	VI	1.97	1.52	2.13	2.86	2.72	2.63	2.08	2.35	
	VII	2.91	2.42	2.99	4.65	3.75	3.59	3.21	3.20	
	VIII	3.53	3.19	3.63	4.98	4.68	4.75	3.83	4.30	
	IX	6.57	3.48	3.73	6.53	-	5.69	4.94	6.50	
	X	5.18	3.35	4.16	10.09	-	9.60	5.82	9.02	XI+ 9.32
	III	-	-	0.64	-	-	0.86	0.64		
	IV	-	1.55	0.99	-	1.20	1.14	1.07		
Small-boat samples (mainly inshore)	V	-	1.69	1.31	-	1.75	1.78	1.36		
	VI	-	2.54	1.99	-	2.61	2.36	2.07		as above
	VII	-	3.53	2.87	-	2.83	3.97	2.96		
	VIII	-	-	3.58	-	4.05	4.40	3.58		
	IX	-	6.00	4.22	-	4.21	5.65	4.47		
	X	-	-	5.10	-	-	-	5.10		

Table 14. Mean weight by age (kg, round, fresh) of Subarea 1 cod, 1983. As offshore figures in Table 13 weighted by factor 2, inshore figures by factor 1. B: Figures obtained from smoothed curve fitted to figures in A. (See Fig. 1)

Age group	A	B (smoothed)
3	0.72	0.78
4	1.07	0.98
5	1.31	1.38
6	2.08	2.08
7	3.13	2.95
8	3.75	3.85
9	4.78	4.78
10	5.58	5.58
11+		6.00

Table 15. Number of cod (in thousands) per age group in nominal catches in Subarea 1, 1983, grouped by divisions and in offshore and inshore (coast and fiords) catches, the latter being a maximum figure in which some offshore catches taken by gears other than otter trawl may occur.

Age group	Division			Offshore catch by trawlers			Inshore catch mainly pound net			Total		
	1A-1D	1E-1F	SA 1	1A-1D	1E-1F	SA 1	1A-1D	1E-1F	SA 1	1A-1D	1E-1F	SA 1
III	33	-	33	39	5	44	72	5	77			
IV	2504	844	3348	6406	2602	9008	8910	3446	12356			
V	403	871	1274	380	357	737	783	1228	2011			
VI	3253	10134	13387	2280	1561	3841	5533	11695	17228			
VII	224	973	1197	166	218	384	390	1191	1581			
VIII	287	513	800	122	73	195	409	586	995			
IX	77	185	262	57	25	82	134	210	344			
X	51	210	261	47	35	82	98	245	343			
XI	2	-	2	-	1	1	2	1	3			
XII	2	13	15	-	7	7	2	20	22			
XIII	-	-	-	-	-	-	-	-	-			
XIV	-	2	2	-	-	-	-	2	2			
XV+	2	7	9	3	7	10	5	14	19			
Total	6838	13752	20590	9500	4891	14391	16338	18643	34981			

TABLE 16. Age frequencies (°/oo) in samples of cod landings by Greenland trawlers, Jan-Mar 1984 and of a long-line catch in April.

Div. Month Gear	1E Jan OTB	1E Feb OTB	1E Mar OTB	1F Feb OTB	East Grl. Feb OTB	1E Apr LL
Age-group						
4	26	37	16	-	25	3
5	784	694	638	332	94	437
6	45	70	42	103	94	62
7	136	177	274	529	540	357
8	2	3	8	22	135	14
9	5	9	11	4	49	90
10	-	4	4	2	21	24
11	1	4	8	8	40	12
12	-	-	-	-	1	-
13	-	1	-	-	-	1
Nos. in sample						
Mean length (cm)	51.9	52.5	55.7	-	73.4	62.0
Mean weight (kg)	1.34	1.41	1.73	-	3.90	2.27

TABLE 17. Estimated catch-by-age of Subarea 1 cod in the first quarter of 1984. The figures are based upon samples presented in Table 16 and upon catch statistics supplied by fishing vessels to the Greenland authorities. Catches by Greenland trawlers (3,159 tons) are supposed to have been distributed 80% in Div. 1E, 20% in Div. 1F, while catches by the Federal Republic of Germany (3,110 tons) are supposed to be 50% Div. 1E, 50% Div. 1F. Three tons were reported by a longliner in Div. 1E.

Age	Nos. $\times 10^{-3}$
4	74
5	2301
6	226
7	996
8	31
9	29
10	10
11	21
12	-
13	1
Total	3689
Catch weight	6272 tons
Mean weight of fish	1.700 kg

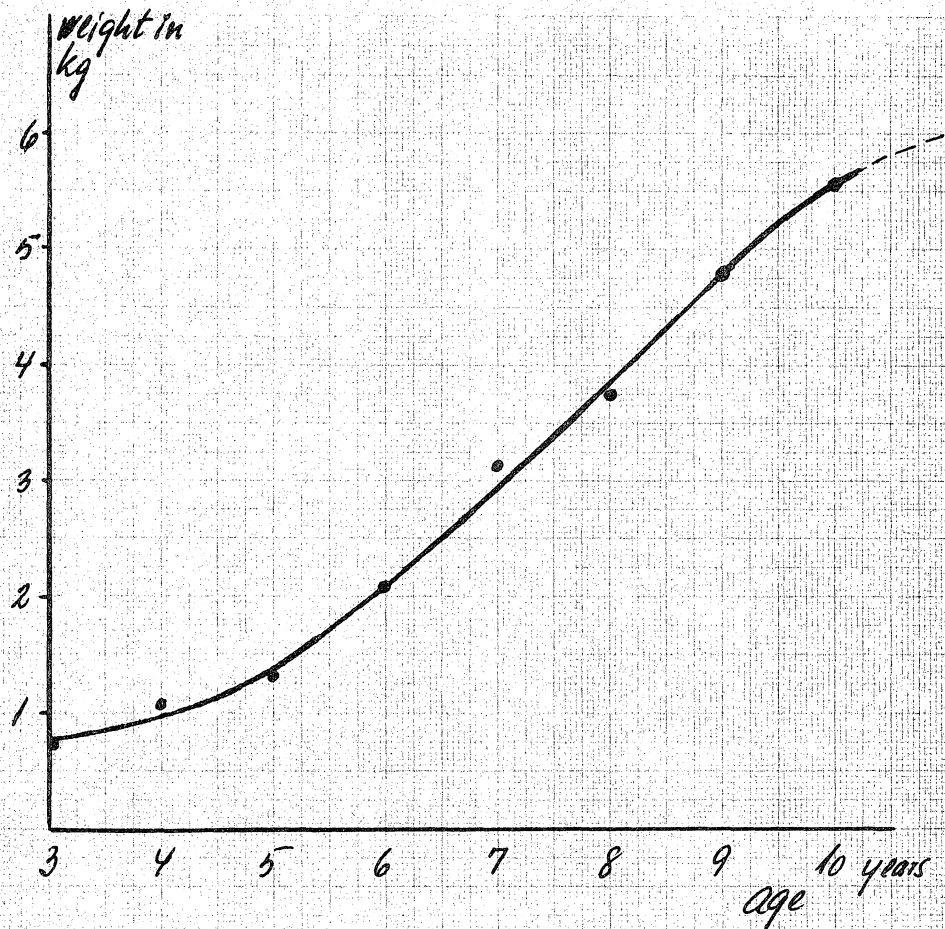


Figure 1. Mean weight by age of Subarea 1 cod, 1983.
See Table 14 for further details.