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Young Cod Distribution and Abundance in
West Greenland Inshore Areas, 1990

by

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1. Introduction

A survey using links of gill-nets with different mesh-sizes has been developed and used since 1985 (Hansen and Lehmann 1986, Hovgård 1987, Hovgård and Nygaard 1988, Nygaard et al. 1989, Hovgård and Nygaard 1990). The objective of this programme is dual: a) to gain knowledge on the geographical distribution of young cod and b) to assess the relative year-class size of 1- and 2-year old cod.

2. Materials and methods

The young-cod survey was carried out in June-July, 1990 in three inshore areas off West Greenland: Qaqortoq (NAFO Div. 1F), Nuuk (Div. 1D) and Sisimiut (Div. 1B) (Fig. 1).

The links of gillnets contained separate sections with mesh-sizes of 16.5, 18, 24, 28 and 33mm (bar length) arranged in random order. The catching capacity of each mesh-size is bimodal as the cod is attached either behind the gill-cover or at the jaw (mandibulars). Catch efficiency at both catching sites are simply related to fish size, but the gill catching is 4 to 5 times as efficient as the jaw-catching (Hovgård 1988). With the mesh-sizes used fish from 15cm are caught, but large fish are caught with lower efficiency.

A total of 171 net settings were made (Table 1). Nets were set at the bottom at depths ranging from 2 to 35 m. Average fishing time was 7.6 hours, range 4.5 to 14.4 hours, and catch rate (number caught per hour) for each age group is used as an index of abundance.

3. Results

Distribution pattern of young cod

Length frequency distribution of the catch for each mesh-size is shown in figure 2, and age and length composition of the catch by Division in figure 3.

During the survey a total of 1375 cod were caught. In the northern part (Div. 1B) catches were dominated by 2- and 3-year olds, but also cod 4 years and older were caught in substantial amounts. In Division 1D catches were dominated by 2- and 3-year olds with smaller amounts of older fish, whereas in the southern part (Div. 1F) the older cod (4+) dominated, though in small numbers only (Fig. 3).

No 1-year old cod were caught, which indicates a poor recruitment of this year-class, as 1-year olds are caught efficiently by the smaller mesh-sizes when abundant (Hansen and Lehmann 1986).

Catch rates of 2-year olds, by area and depth are shown in table 2. Highest catch rates were found in Div.1B, whereas the catchrate was substantially lower in Div.1D, and almost zero in Div.1F.

Year-class indices

Year-class indices are calculated as the mean of the CPUE given in table 2, excluding settings below 20m, where effort has been scarce and density is low.

In 1985 and 86 only three mesh-sizes (16.5, 24 and 33mm) were used, whereas in the 1987-90 surveys five mesh-sizes (18.5 and 28mm added) were used. For comparison indices using both three and five mesh-sizes have been computed (table 3).

By comparing the abundance indices for 2-year old cod, the 1988 year-class is estimated to number between 39% (three mesh-sizes) and 35% (five mesh-sizes) of the 1985 year-class. The index of the 1 year-olds (1989 year-class) is set as zero.

4. Discussion

The 1987 year-class and older fish show a northern distribution, as found in the last two years survey. This corresponds with the distribution from Div.1D and farther north found in the offshore trawl survey in the autumn of 1989 (Anon. 1990), where according to survey abundance estimates 75% of the 1987-yearclass is found in Div. 1BC which accounts for only 38% of the surveyarea (depth stratum 0-100m). The northern distribution indicates a local West Greenland origin of this stock component.

The 1988 year-class also has a northerly distribution in the gill-net survey, and again this corresponds with the findings from the offshore trawlsurvey in 1990 (Anon. 1991) where 71% is taken in Div. 1BC. The abundance index in the gill-net survey is 9% of the index for the 1984 year-class as 2-year olds, and hence the 1988 year-class could account for some 40-50 mill. fish at age three, using the index as face value and figures for the abundance of the 1984 year-class (Anon., 1989). However the index value is far from values found in the trawl survey (1988 year class only 1% of the 1984 year class), using abundance estimates for the 2-year olds in 1989 and 1986.

The 1989 year-class does not seem to be abundant compared to the 1984 and -85 year-classes, as one-year olds were absent in this years survey. However, as only a small fraction of age 1 cod attains sizes above 15 cm this year-class is poorly selected by the gear and it is hence to early to evaluate the year-class size.

As stated, there are some discrepancies between the findings from the trawl- and the gill-net surveys. Naturally the two surveys are operating in two separate areas, and gear selection is quite different, but it has formerly been assumed that the offshore and inshore situation in some way should reflect each other. This might be true in some years, i.e. in years with good recruitment, but need not be valid in all years.

If the abundance estimate for 2 year olds from the trawlsurveys (Anon. 1990) is used as an index, it can be compared with the gill net index (three mesh-sizes) as follows:

Index of 2-year old: 1984 year-class set to 100.

year	1986	1987	1988	1989	1990
trawl (offshore)	100	35	3	2	1
gill net (inshore)	100	22	6	17	9

Up to 1988 this index correlated well with the abundance estimate of age 2 cod found in the ground fish survey. However, the correspondence between the two indexes was poor in 1989 and 1990.

The inshore catch rates is quite different in the three areas over the years (table 3.4). In 1986 the catch rate was high in all areas. In later years it has generally been high in Div. 1B whereas the catch rates in Div. 1D and 1F has varied considerable with the trend in Div. 1F closely resembling the offshore abundance as seen in the ground fish survey (fig. 4).

It therefore seems misleading to use the overall gill-net index as a measure of year-class strength. The high catch rates taken inshore since 1988 in Div. 1B and in 1989 in 1D probably merely reflects good year-classes from the local fiord populations.

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Table 1 : Number of gill-net settings by area and depth (hours fished in brackets), 1990.

Area Div.	Qaqortoq 1F	Nuuk 1D	Sisimiut 1B	Total
Depth (m)				
0 - 5	5 (32)	6 (44)	7 (49)	18 (124)
5 - 10	19 (145)	22 (186)	18 (135)	59 (466)
10 - 15	10 (72)	14 (115)	10 (69)	34 (257)
15 - 20	14 (109)	14 (110)	13 (97)	41 (316)
20 - 30	3 (29)	6 (42)	6 (34)	15 (104)
30 - 40	3 (24)	1 (8)	0 (-)	4 (31)
total	54 (411)	63 (505)	54 (383)	171 (1299)

Table 2 : CPUE (Nos. per hour) of two year old cod (1988 year-class) by area and depth.

Area Div.	Qaqortoq 1F	Nuuk 1D	Sisimiut 1B
Depth (m)			
0 - 5	0.00	0.16	0.76
5 - 10	0.01	0.17	1.31
10 - 15	0.01	0.21	0.78
15 - 20	0.00	0.07	0.49
20 - 30	0.00	0.06	0.18
30 - 40	0.00	0.00	-

Table 3: Indices of year-class strength.

Meshsizes 16.5, 24 and 33mm.

Survey	Age 1	Age 2
1985	0.74	+
1986	0.09	1.61
1987	+	0.36
1988	+	0.09
1989	+	0.27
1990	+	0.14

Meshsizes 16.5, 18, 24, 28 and 33mm.

Survey	Age 1	Age 2
1987	+	0.93
1988	+	0.25
1989	+	0.61
1990	+	0.33

Table 4: Indices of year-class strength by division and year based on CPUE from three mesh sizes.

Year-class	NAFO division			Total
	1B	1D	1F	
1984	3.19	0.74	0.92	1.61
1985	0.58	0.11	0.49	0.36
1986	0.19	0.07	0.005	0.09
1987	0.37	0.42	0.02	0.27
1988	0.36	0.07	0.002	0.14

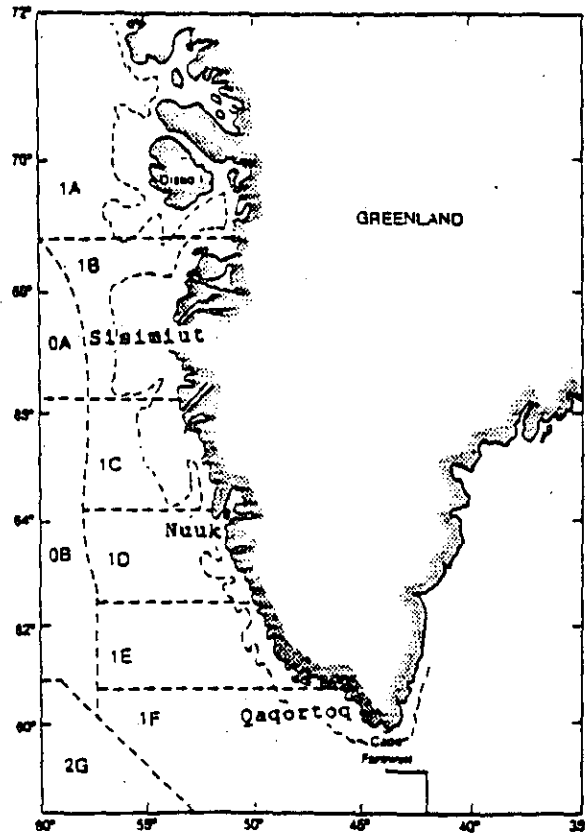


Fig. 1 Map of West Greenland.

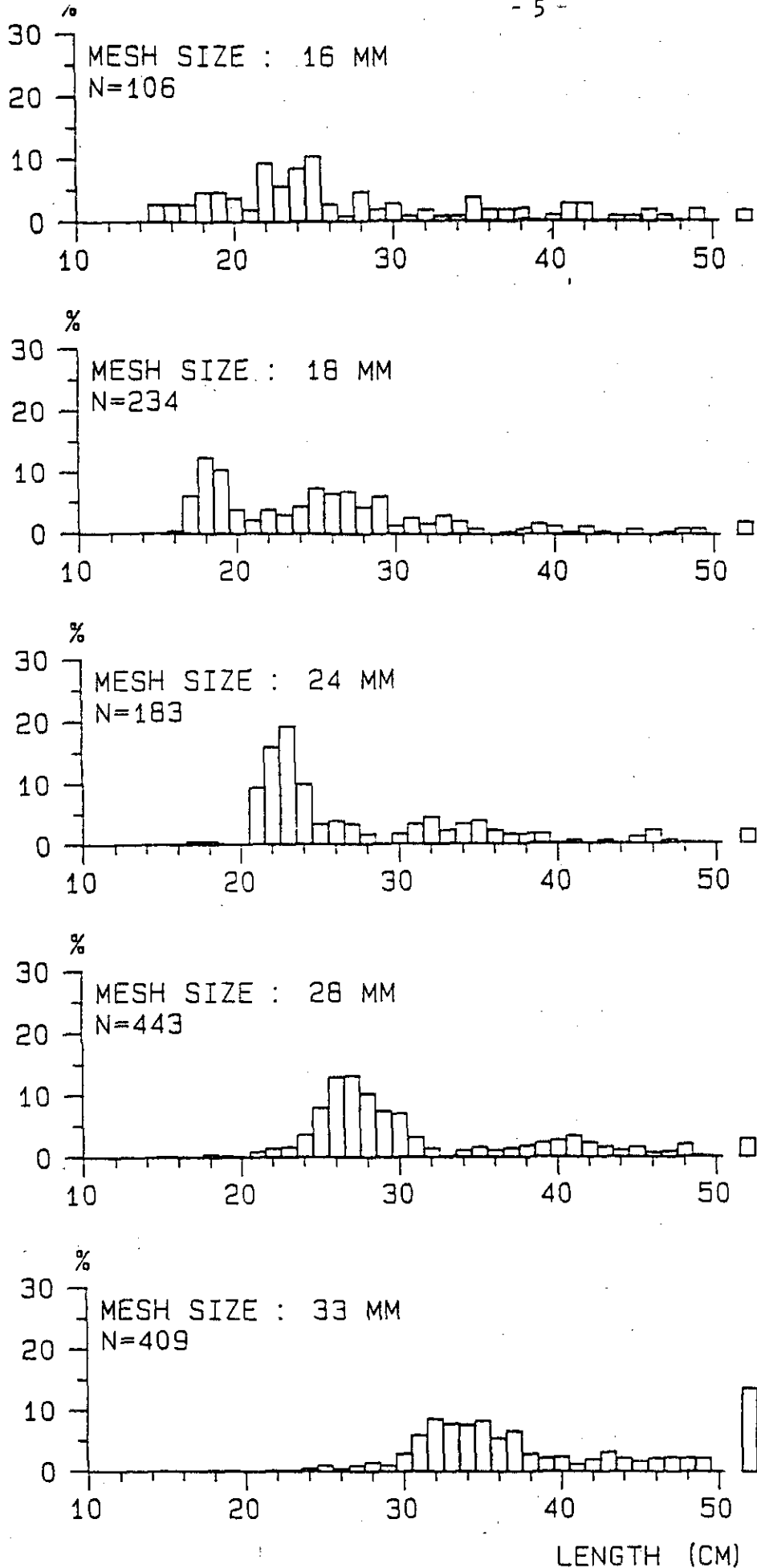


Fig. 2 Length-frequency distribution for the different mesh-sizes.

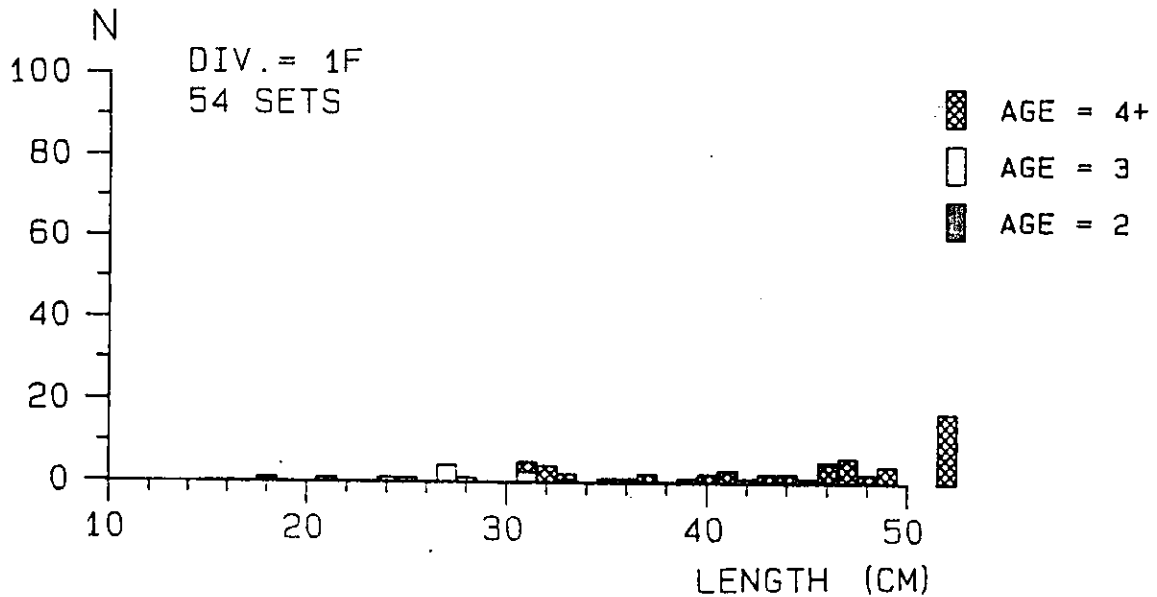
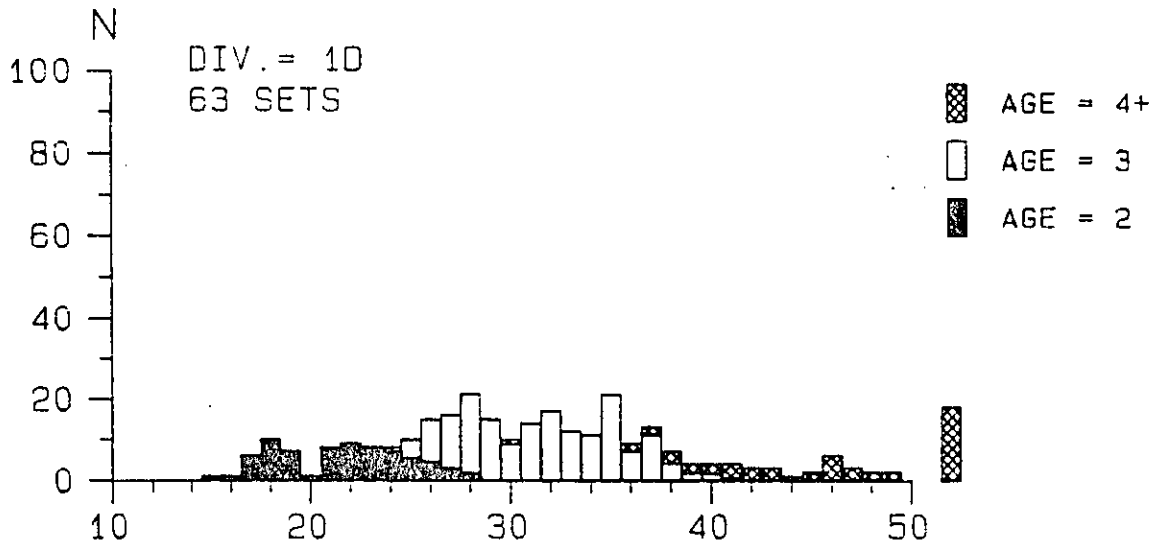
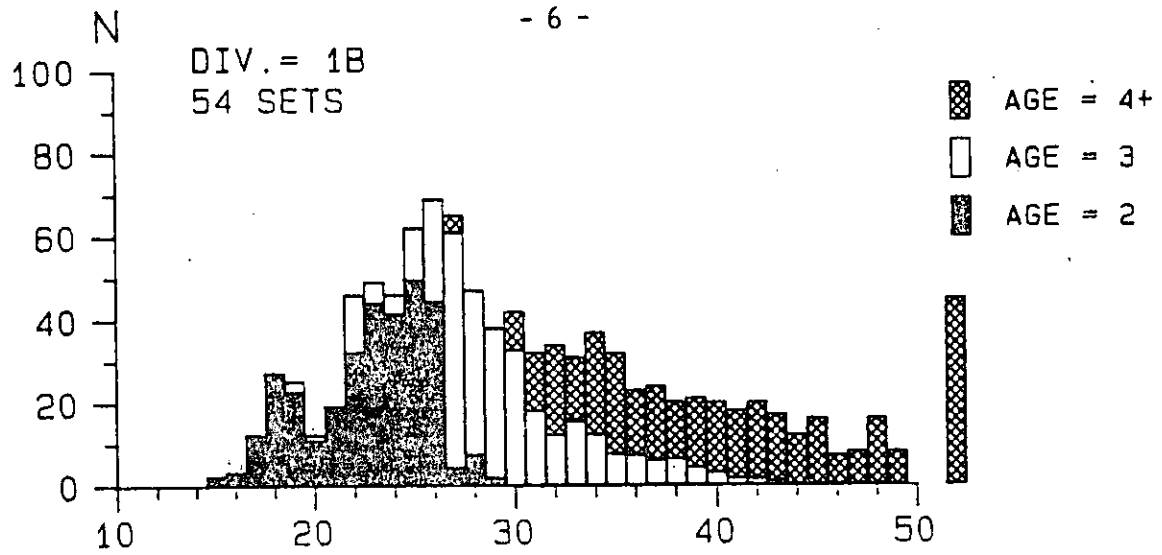


Fig. 3 Length-frequency distribution by Division.

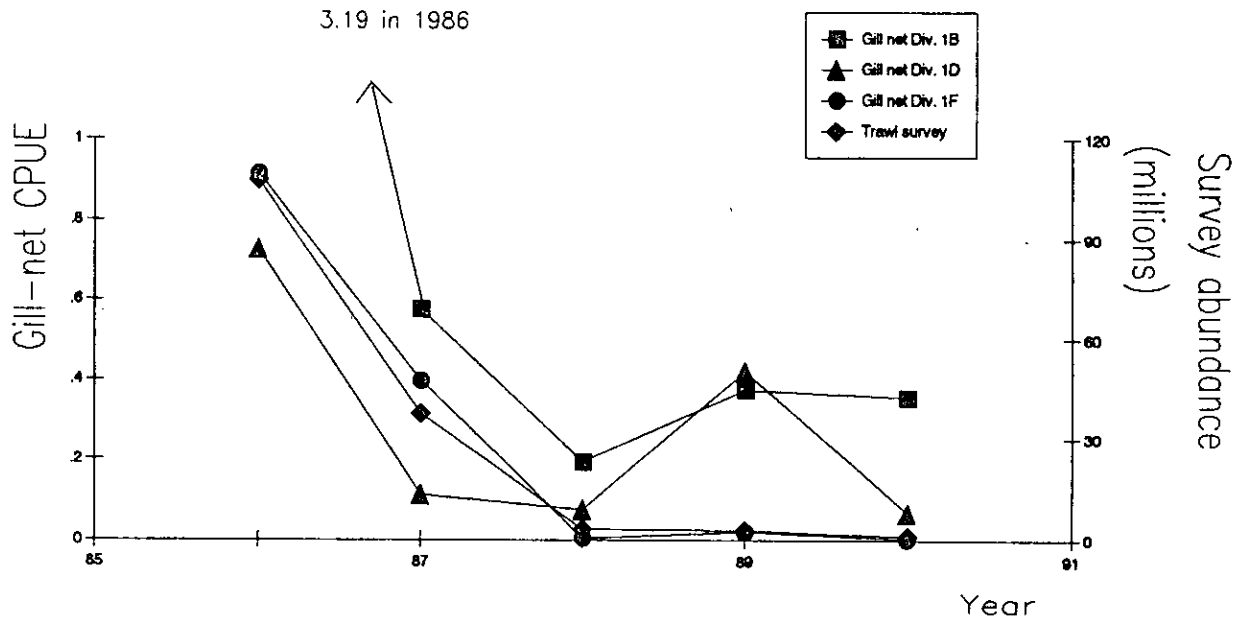


Fig. 4 : Gillnet indices of year-class size by area and year. Abundance of age 2 cod as found in the German ground fish survey is given as reference.