International Commission for the Northwest Atlantic Fisheries

Serial No. 3589
(D.a.74)

ICNAF Summ.Doc. 75/31

ANNUAL MEETING - JUNE 1975

Danish (Greenland) Research Report, 1974[1]

Part I

Denmark (Greenland) Statistical Area 0, Subarea 1 and East Greenland, and Subarea 2

by

Sv.Aa. Horsted and Erik Smidt
Grønlands Fiskeriundersøgelser
Charlottenlund, Denmark

Statistical Area 0

A. STATUS OF THE FISHERIES

Whereas in 1973 the Greenland trawlers had several trips to the Baffin Island waters with a nominal catch of 912 tons of Greenland halibut and 40 tons of other species the nominal catch in 1974 is reported to be only 9 tons of Greenland halibut obtained in November by an effort of 30 hours trawled.

The decrease cannot be taken as any indication of the fishing conditions in this area. Fishing in Stat.Area 0 is normally conducted only when fishing in Subarea 1 is extremely bad.

B. SPECIAL RESEARCH STUDIES

Biological studies. A groundfish survey was conducted in July by the R/V DANA to the deeper waters between Baffin Island and Greenland, mainly in order to obtain material of roundnose grenadier. Some of the stations operated are located in Stat.Area 0. However, for fish stocks in the deeper part of the Davis Strait the border line between Stat.Area 0 and Subarea 1 does not seem a natural one. The report of the survey is, therefore, not broken down by areas but reported in its entirety under Subarea 1.

Samples of roundnose grenadier and of Greenland halibut were taken on this survey. (Fig. 4)

Subarea 1

A. STATUS OF THE FISHERIES

1. General trends

The nominal catches by Denmark (G) in 1974 are given in Table 1. (provisional figures).

[1] The Danish Research Report, 1974 consists of three parts. Part I contains report of fisheries and biological research by Subareas, Part II hydrographic conditions, and Part III ice observations.

Table 1.

Species	Nominal catch (metric tons)	Increase or decrease from 1973 (%)
Cod	18 389	+ 4
Greenland cod	3 391	+243
Redfish	2 891	+160
Wolffishes	5 995	+ 43
Roundnose grenadier	1	- 91
Greenland halibut	4 136	+ 13
Halibut	92	+ 64
American plaice	67	+ 24
Capelin	3 470	+ 8
Atlantic salmon	1 198	- 24
Arctic char	92	- 21
Lumpsucker (roe only, not converted to round, fresh fish)	11	- 39
Herring	28	- 65
Industrial fish and fish not specified	181	- 51
Shrimp	10 323	+ 27
Total (excl. lumpsucker roe)	50 254	+ 22

Total nominal catch of Denmark (G) has increased by about 22% from 1973 to 1974 primarily due to increased effort by the large Greenland trawlers. 1974 was the first year in which all of the planned seven trawlers were in operation throughout the year. Furthermore, nearly all their effort was spent in Subarea 1 whereas in 1973 several trips were made to other areas.

The programme for building large trawlers to supply the Greenland industry has now been fulfilled and no new large groundfish trawlers are planned at present.

The overall (all species) increase in catch by the trawlers was about 20% from 1973 to 1974. The fishery by the traditional Greenland fleet of small vessels was at the same level as in 1973. However, only the considerable increase in shrimp catches and the inclusion of Greenland cod (Gadus ogac) in the exploited species counterbalancing a further decrease in cod catches has made it possible for this fleet to maintain its total catch.

The three most important species in terms of income for the Greenland fishermen have been shrimp by 35%, cod by 33% and salmon by 15%. The landings by the seven trawlers account for about 25% of the total landed value.

Further details of the major fisheries are given below.

2. Cod

a) The fisheries. Nominal catch was slightly (4%) above that of 1973. However, a further decrease from 1973 by about 1100 tons (about 12%) occurred for the coastal and inshore small boat fishery.

For those trawlers for which a comparison can be made between 1973 and 1974 there seems to be some decrease in cod catches. The increase in total nominal catch of cod has, therefore, been possible only by increasing the number of trawlers to the present seven.

As will be seen in a later section the catch has to a very great extent been based on the 1968 year-class.

b) Forecast for 1975-76. The 1968 year-class, which formed a major part of the catch in 1974, is now recruited to the spawning stock and has its maximum biomass. It is, thereby, possible that some concentrations of fish can be found to give relatively good catch per effort, especially in the first half of the year 1975. In fact, the Greenland trawlers did, by the end of March 1975, have a catch double that by the same time of 1974 (about 7100 tons against about 3500 tons).

It is, therefore, likely that the Greenlanders' cod catches will be relatively high in 1975.

The prospects for cod fishing in 1976 are to some extent dependent upon the total international catch in 1975 but the quota regulation should ensure that the 1968 year-class will be of importance also in 1976. The fishery will, however, to a great extent also be dependent on the new year-classes 1969-71, all of which are pre-judged to be poor ones. For details regarding recruitment prospects, stock/recruitment relationship and advice on TAC see the Report by the Assessment Subcommittee, 1975 and Res.Doc.75/31.

3. Atlantic salmon

The decrease in catch is due simply to efficient administration of the quota regulation as compared to 1974 when the quota was exceeded.

The fishery itself showed catch rates higher than in previous years, and the fishery of the Greenlanders was stopped in the last days of August after a period of only four weeks.

Fishery by Danish drifters and by research vessels showed salmon to be present in the area in the usual period (late July to late October). The impression by fishermen themselves was that salmon occurred in greater quantities than in any previous year. Logbook records received from some Danish drifters actually indicate catch per net shot to be 0.91 while the figures from the earlier years were as follows:
1970: 0.35, 1971: 0.76, 1972: 0.42 and 1973: 0.34 salmon per net.

The very high catch rate figure for 1974 could indicate an increased stock compared to earlier years and/or a higher availability of salmon to fishing. Unfortunately, the stop due to the quota being fulfilled prevents more firm conclusions on stock size to be drawn.

4. Other fish

The Greenland trawlers have to a greater extent than in previous years conducted a mixed groundfish fishery resulting in increased catches of redfish, wolffish, Greenland halibut and halibut. Also for American plaice there is some increase, but due to its relatively small size compared to the size in other subareas the species is frequently discarded.

The trawlers' fishery of the species mentioned above is not expected to change much in 1975.

The considerable increase in catches of Greenland cod (Gadus ogac) occurs mainly in the inshore small boat fishery. The species seems to occur more frequently in pound net catches than in previous years, although a comparison is difficult since the species was formerly normally discarded.

The species has now to some extent substituted cod in the inshore fisheries. It is expected to increase further.

The direct fishery for roundnose grenadier, which started in 1973, has not been continued in 1974. Like the fishery for Greenland halibut in Stat. Area 0 a fishery for roundnose grenadier can be expected only when the fishery for cod (and mixed groundfish) in Subarea 1 is extremely bad or restricted due to regulations.

5. Shrimp

The species fished is Pandalus borealis. 1974 showed the highest fishery so far, exceeding for the first time the 10 000 tons (Greenlanders' catch). About 85% of the catch was taken in the Disko Bay. The good catches were obtained with an increased effort, partly due to good weather conditions permitting more fishing days and partly due to increased use of more efficient trawls.

Also the fishery by non-Greenland vessels is likely to have increased considerably in 1974. Analyses of the stock complex and assessment of the individual stocks and their long-term yield now seems to be a matter of urgency.

B. SPECIAL RESEARCH STUDIES

1. Environmental studies

a) Hydrography. Work has been carried out on the standard hydrographic sections off West Greenland. For further information see Part II by Frede Hermann.

It should be noted that temperature conditions in June-July over the shallow part of the banks improved rather much compared to 1973. However, it still remains to be seen whether this has resulted in a relatively good 1974 year-class of cod.

b) Plankton. Oblique hauls with 2 m stramin net (each haul half an hour, 225-0 m wire) were taken at some of the standard hydrographic sections in July and at a standard station at Godthåb from January to July.

On the Fylla Bank section the mean volume of plankton per half hour was 265 ml which is 110 ml more than in 1973 and somewhat above the mean of 209 ml for the cold years 1969-74 but still considerably below the mean of 895 ml for the warmer years in the 1960ies (1961, 63, 64, 66, and 68).

c) Benthic studies (see Item e)

d) Observation on ice. Regular aerial observations on the ice round Greenland is carried out by the Danish Meteorological Institute. Part III by Hans Valeur contains a summary of the ice conditions in 1974.

e) Other environmental studies. The lead and zinc mine in the Umanak Fjord, northern Greenland, started production in the autumn 1973. As reported last year environmental background investigations were carried out before the mining started. These were followed up with surveys in February 1974, when the fjord was covered with ice and the water circulation at a minimum, and in September 1974. Water and sediment samples were taken at the established control stations, and some fish, mussels and seaweed were sampled for later analysis of content of heavy metals.

The tailing is led out in a natural basin partly separated by a natural treshold from the fjord. This should prevent pollution to be more than local. The investigations in 1974 showed that the very stringent restrictions to prevent more than local pollution are followed. The situation will be kept under current control both in winter and summer.

2. Biological studies

a) Cod: Eggs and larvae. As in the years 1969-73 very few cod larvae were found in the plankton (Fig.1). Although water temperatures point to the possibility of a relatively good survival of eggs and larvae in 1974 the number of larvae found in the plankton does not give support to the hope of an improvement in future recruitment of cod, probably due to the small spawning stock in 1974 when presumably only part of the 1968 year-class had matured.

Table 2 compares the number of cod larvae per half hour haul on the stations between Godthåb and Holsteinsborg (lat. 64°N to 67°N) for some of the years when good year classes of cod were produced with the years 1969-74.

Table 2. Mean number of cod larvae per half hour haul with 2 m stramin net in July on stations between Godthåb and Holsteinsborg.

Resulting year-class strength	Year	No.of cod larvae
Good year classes	1950	12.5
	1953	7.7
	1957	39.3
Moderate good	1968	7.1
Poor year classes (pre-judgment)	1969	2.0
	1970	0.8
	1971	1.0
	1972	1.0
	1973	1.5
	1974	0.8

Occurrence of pre-recruit cod. Small cod of age-groups I-III have occurred only in small numbers in catches with fine meshed trawl (Table 3) and have not been seen in any noteworthy quantities by visual observations on shallow water in summer time, nor were small cod reported in great quantities in pound net catches, whereas shoals of Gadus ogac seem to occur more frequently than previously, especially in inshore waters.

Table 3. Number of cod per hour trawled on the standard station GODTHÅB DYBET. Details and figures for the years 1968-73 were given in last year's report, ICNAF Summ.Doc. 74/30, Table 2.

Year	Date	Ref.No.	No.of hauls	Total time trawled, minutes	No.of cod per hour and age gr. II	III	IV	V	VI	VII	VIII+
1974	8+21 Jan	4876/7	3	180	0	35	15	2	5	0	1
"	10 Jun	4913	3	180	0	1	2	1	4	1	2

Age and size distribution of cod in landings. The most important material has been samples from the trawlers' landings (Fig.2). As in 1973 and as expected the 1968 year-class was by far the most important one in the commercial catches. Its main occurrence seems now to be in Divs. 1D-1E, where for some samples close to 90% by numbers belonged to this year class. Further north (Divs. 1B-1C) there was greater inflow of other, especially younger, year classes and in one of the samples the 1969 year-class was the most frequent one. It is likely that the 1968 year-class by its maturation has moved somewhat southwards so that its occurrence in 1975-76 will be mainly in Divs. 1D-1F whereas in Divs. 1B-1C the 1969 year-class may become the most important one in 1975-76.

Tagging experiments. A total of 770 cod were tagged in 1974.

b) Atlantic salmon. Off West Greenland about 500 salmon were caught in August by the R/V ADOLF JENSEN. Blood and scales were sampled for further studies on the stock separation (European and North American components) by Canadian scientists who participated in this cruise.

c) Roundnose grenadier and Greenland halibut. Groundfish survey.

A groundfish survey was conducted by the R/V DANA in the deeper part of the Davis Strait in July. The stations with successful hauls are shown on Fig.3 together with the number of roundnose grenadier per hour trawled as given in Table 4.

Table 4. Number of roundnose grenadier caught by the R/V DANA, 1974 in Subarea 1 and Stat.Area 0 between 62°N and 66°N, and 55°W and 62°W. Stations arranged according to depth.

Ref.no.	Duration of haul minutes	No.of r.grenadier caught	Number per hour	Depth m	Bottom temperature °C
16443	60	333	333	650	3.0
16429	30	579	1158	725	3.9
16440	60	878	878	730	4.0
16442	50	1526	1830	740	3.0
16436	15	268	1072	760	4.5
16435	60	796	796	810	4.0
16428	30	781	1462	900	3.7
16439	60	96	96	980	3.7
16431	60	125	125	1060	3.8
16432	60	124	124	1060	3.8
16438	60	169	169	1080	3.8

Grenadiers were not found on the stations north of the Greenland-Canada ridge. South of the ridge the preferred depth seems to be 650-900 m with a rapid decline on depths more than 900 m.

Otoliths, length and weight were sampled. The otoliths have not yet been read. Length measurement is frequently impossible for this fish since the tail is damaged. Some length samples were, however, obtained both for Subarea 1 and Stat.Area 0. The length frequencies are shown in Fig.4. It will be seen that small specimens were much more frequent in the sample from Div. 1C than in that from Stat.Area 0. However, further material seems necessary before any conclusions as to possible stock separation can be drawn.

Of important fish other than roundnose grenadier especially Greenland halibut occurred in the hauls of the survey. Table 5 shows that on most stations the Greenland halibut accounted for less than 10% of the total number of roundnose grenadier and Greenland halibut. Besides these two species the only other species of commercial interest were redfish and roughhead grenadier (Macrurus berglax), but both these fish occurred only in small numbers.

Ref.no.	Depth m	Number of fish per hour r.grenadier	G.halibut	Ratio G.h./r.gr.
16443	650	333	12	0.036
16429	725	1158	66	0.056
16440	730	878	129	0.147
16442	740	1830	56	0.031
16436	760	1072	68	0.063
16435	810	796	20	0.025
16428	900	1462	112	0.077
16439	980	96	1	0.010
16431	1060	125	45	0.36
16432	1060	124	0	-
16438	1080	169	2	0.012

Table 5. Number of roundnose grenadier and Greenland halibut on the same stations as given in Table 4.

The size of the Greenland halibut generally ranged from 35 to 95 cm with the greatest abundance of fish of a size about 50 cm on all stations.

Besides in the above mentioned survey Greenland halibut has also been sampled as part of the routine sampling programme of commercial landings.

d) Capelin. Samples have been obtained from a number of locations by pelagic trawling and further experience has been gained on the distribution and density of shoals.

A Danish scientist participated in part of the Norwegian cruise with the vessel HAVDRØN to West Greenland inshore and offshore waters. For further information see the Norwegian Research Report, Summ.Doc. 75/27.

e) Other fish. Length samples of exploited species other than those already mentioned above have been taken from research vessels' catches. Especially samples of American plaice and redfish are of a considerable size.

f) Crustaceans. A sampling and survey programme on shrimp (Pandalus borealis) has been initiated aimed at supplying data for a stock by stock assessment of this important species. The basic data will be commercial catch and effort figures by small areas (units of 15 min. long. by 7½ min. lat.) and frequent sampling and trawling by research vessel. Underwater photography of the shrimp grounds will probably be initiated in 1975.

Investigations on occurrence of snow crab (Chionoecetes opilio) has been continued in the Godthåb area (Div. 1D, inshore) and extended to the Sukkertoppen area (Div. 1C, inshore) and to the waters round Disko (Div. 1A). Most experiments have been conducted with traps, but a commercial fisherman made some experiments with trawl. However, no commercial fishery has yet been established, and no great resource on which to base a commercial fishery of greater importance has been found.

g) Seals. Sampling of material for age analysis of harp seals was continued in Northwest Greenland in 1974. Results are not yet available, but preliminary estimates seem to confirm the findings from previous years, that youngs of the year account for more than 50% of the catches in that area.

Unfortunately, attempts to get samples of harp seals from other parts of Greenland were unsuccessful.

New data on age composition of catches of hooded seals from South Greenland were presented at the Annual Meeting (res.Doc. 74/85). A sample of 208 jaws of hooded seals from 1974 confirms that catches are dominated by age-groups 2-4.

In 1974 a sample of about 150 jaws of hooded seals was obtained from Northwest Greenland. 80% of these were males. 9-10% were youngs of the year, and 2-6 year old animals dominated the sample (altogether 45%).

Studies of ringed seals were continued in 1974, and plans for an enlargement of this activity in the future have been set up.

3. Gear and selectivity studies.

Fishing experiments with bottom gill nets for Greenland halibut were carried out in the fjords near Godthåb (Div. 1D) by the small cutter TORNAQ. However, due to some technical difficulties the experiments will have to be continued before any conclusions can be drawn as to the advantages and disadvantages of this method of fishing.

EAST GREENLAND

A. STATUS OF THE FISHERIES

The only commercial fishing conducted by Denmark (G) at East Greenland in 1974 has been the local cod fishery in the Angmagssalik area. Nominal catch in 1974 was 172 tons, somewhat more than in 1973, when nominal catch was 140 tons.

B. SPECIAL RESEARCH STUDIES

Salmon. In the Irminger Sea the R/V DANA carried out some drift net fishing for Atlantic salmon. The purpose of this was mainly to show distribution and density of salmon in the area, since this is of great importance for the assessment of the effect of the fishery off West Greenland.

The survey in 1974 took place 9-13 July and 9-15 August. Catches were 26 and 6 salmon in the two periods respectively, corresponding to figures per 100 commercial nets of 8 and 2 salmon, respectively. For the 1974 season off West Greenland the catch per 100 nets is about 90 salmon. This together with the results of previous years points to a widely distributed "stock" in the Irminger Sea, but probably not with concentrations as those found at West Greenland.

Subarea 2

A. STATUS OF THE FISHERIES

In 1974 only 3 of the Greenland vessels have been fishing in Subarea 2J. In January 187 tons of cod were taken together with 5 tons of Greenland halibut.

B. SPECIAL RESEARCH STUDIES

No work by Danish research vessels has been carried out in Subarea 2, but one sample of cod from the commercial fishery has been analysed (Fig. 2 Sample No. 5).

Subareas 3-5

No fishing and no research in these areas by Denmark(G).

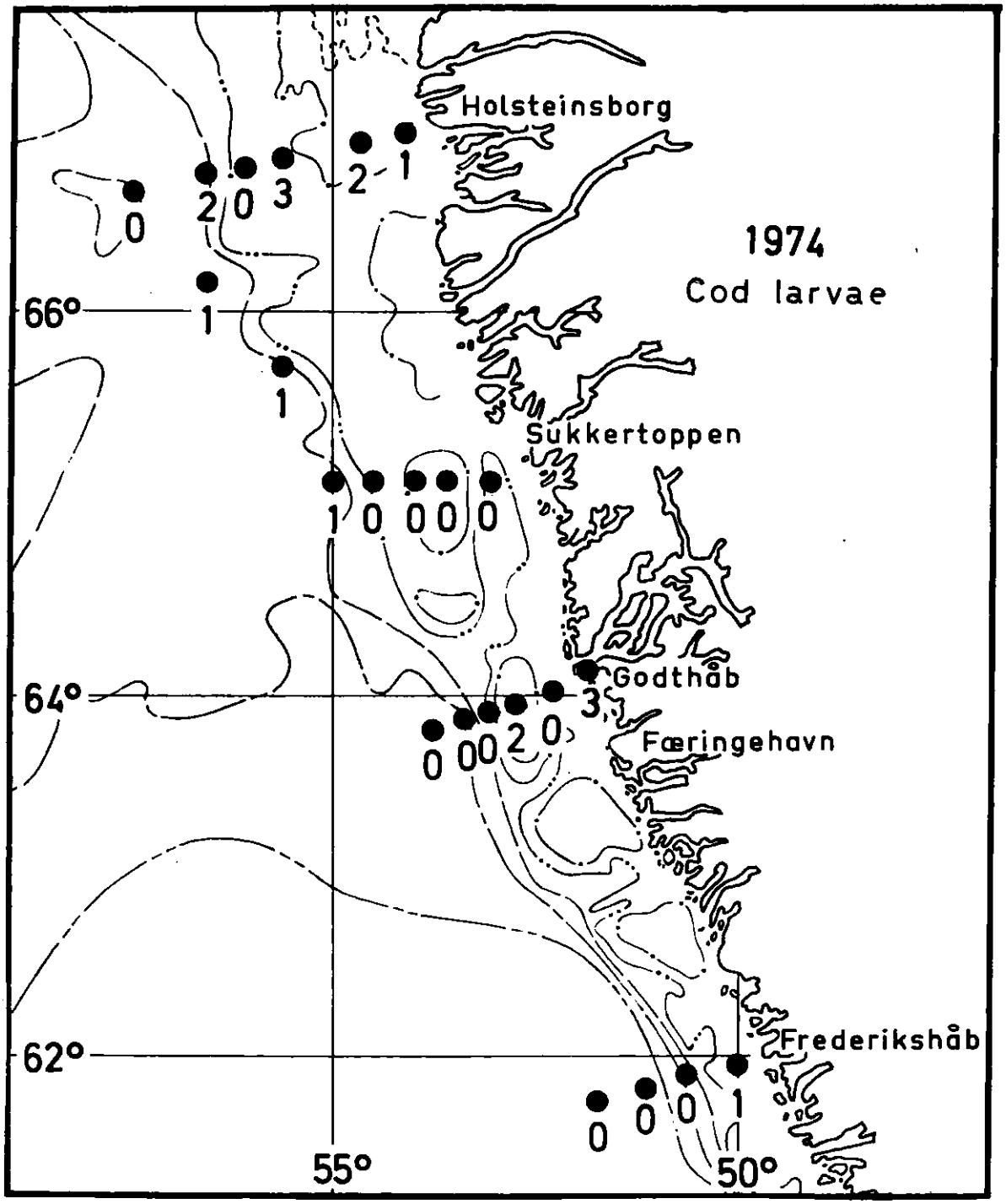

Fig. 1. Cod larvae (number per 30 min) taken by 2-m stramin net in the upper water layers (max. depth 50 m) in July 1974.

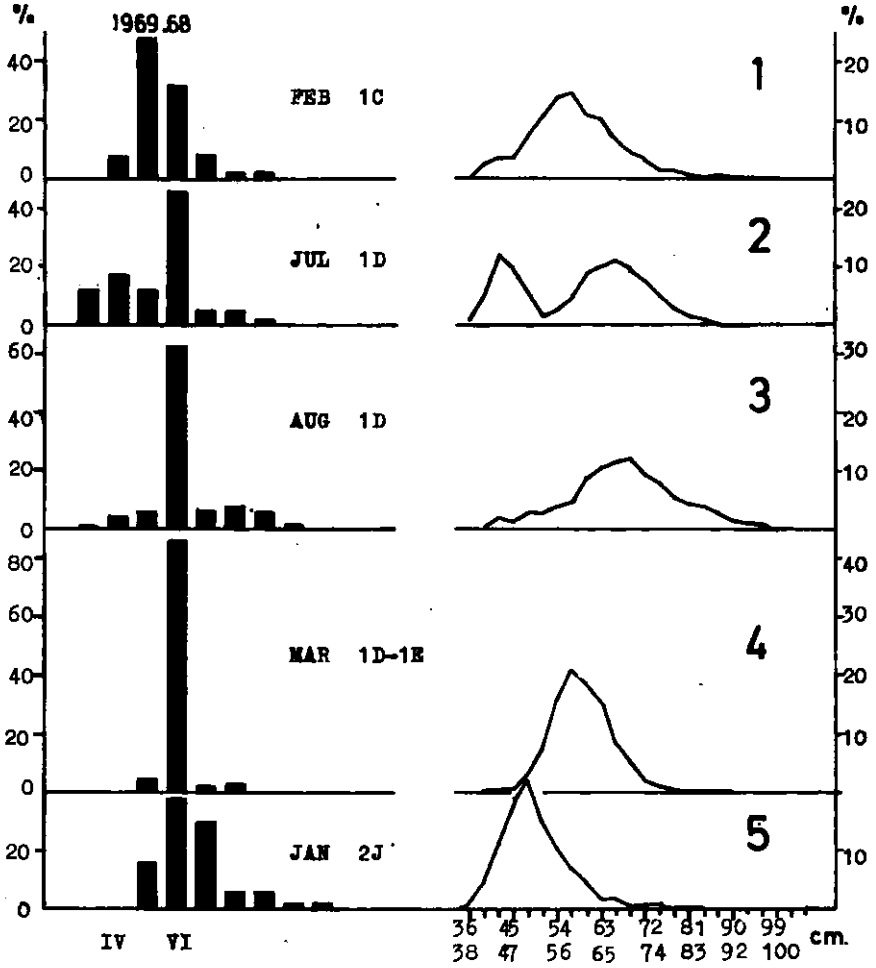

Fig. 2. Age and length composition of commercial landings by Greenland otter trawlers. Sample No. 1 from Banana Bank, No. 2 from Fyllas Bank, No. 3 from Fyllas and Fiskenæs Bank, No. 4 from Danas and Frederikshåb Bank, No. 5 off Labrador.

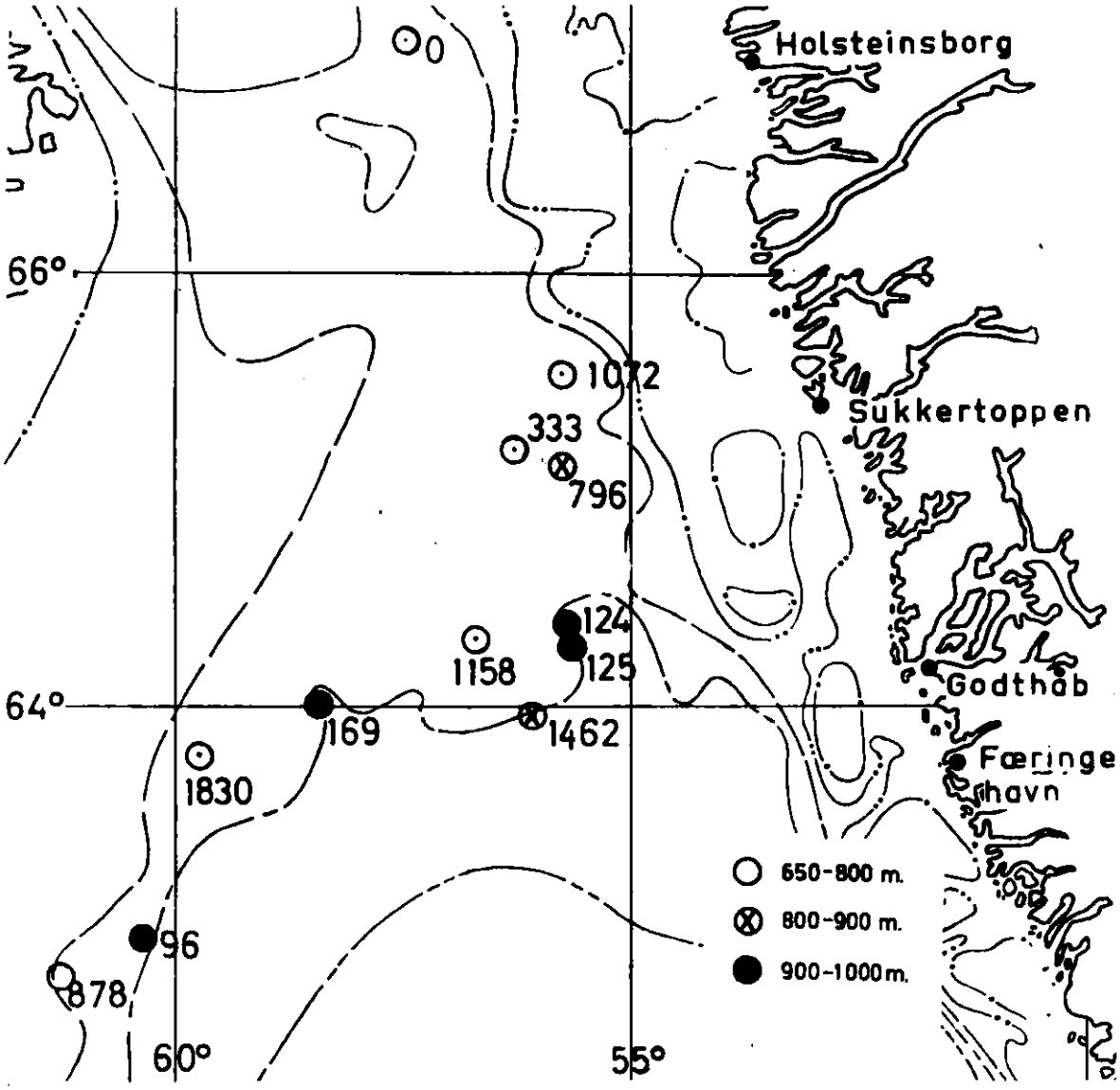

Fig. 3. Trawl stations of the R/V Dana in the Davis Strait, 1974. Figures indicate number of roundnose grenadier per hour trawled. Symbols indicate depth intervals as shown on the figure.

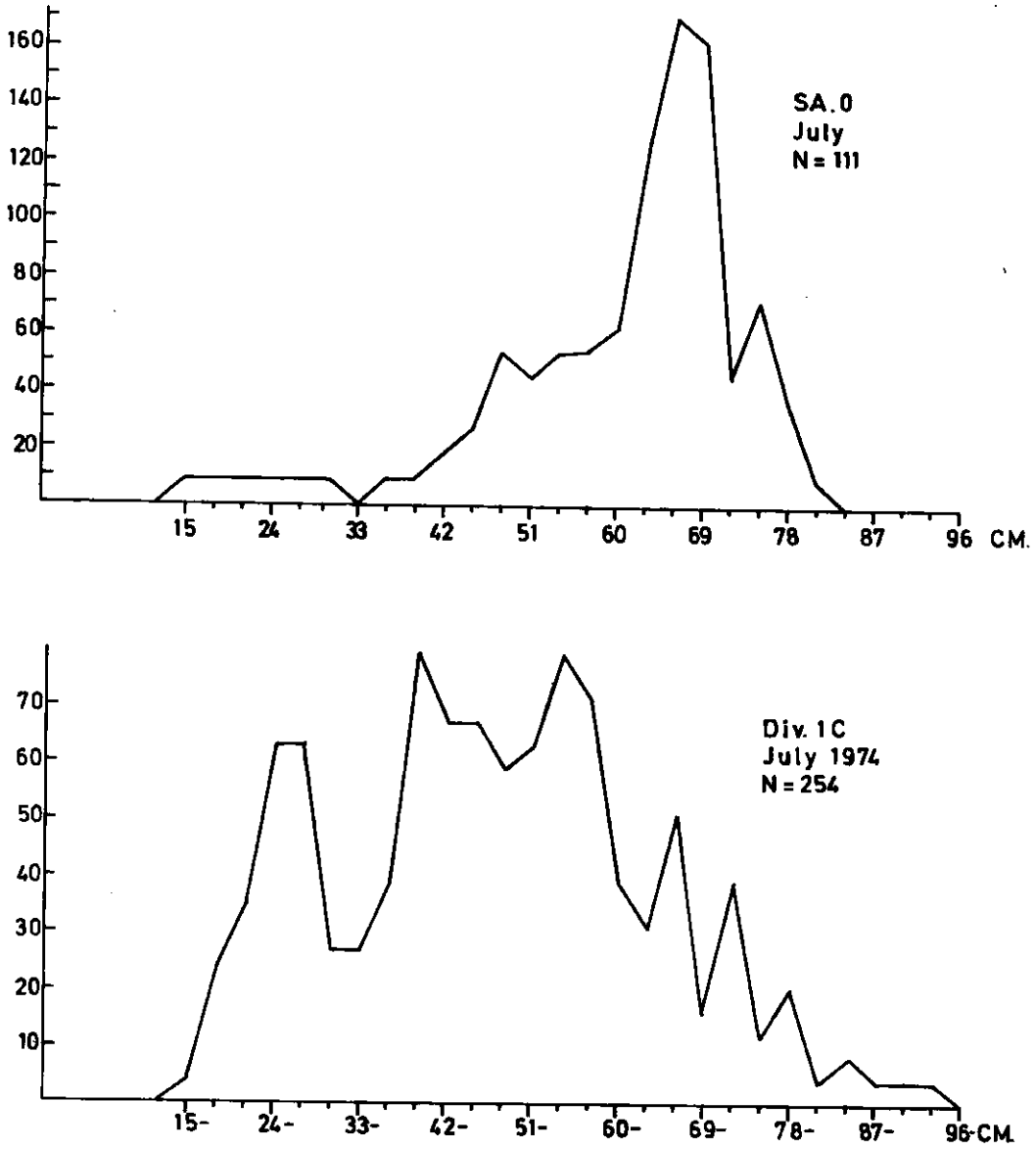

Fig. 4. Length frequencies of samples of roundnose grenadier from research vessel catches in Div. 1C and in Stat. Area 0, July 1974.

Part III

Ice conditions off the Greenland west coast, 1974 season

by

Hans H. Valeur
The Danish Meteorological Institute
Charlottenlund, Denmark

General The ice conditions were close to normal.

Polar ice

The areal extent and the concentration of polar ice was about normal. The ice appeared around New Year and covered during January and most of February the greater part of Julianehåb Bugt (JHB). At the end of February the ice had receded and through March and part of April the southernmost part, only, of JHB was covered. During April the icebelt readvanced forming a tongue, which at the end of the month reached 61°N and 51°W, yet as commonly with a well marked shore-lead down to Nanortalik (about 60°05'N). The icetongue culminated at the end of May and beginning of June reaching a latitude of 61°40'N and covered the whole of JHB in a belt about 60 nm wide. During June the ice receded again and at the end of the month the southernmost part, only, of JHB was ice covered. Apart from a shortlasting advance in the middle of the month, the ice receded during July and at the end of that month it had gone not to reappear until towards the end of December.

West ice

The west ice conditions, too, were close to normal, yet in December somewhat more favourable than usually.

In January the west ice reached the westcoast at 67°N and blocked the whole coast to the north of that latitude. In February the iceedge reached the coast at 66°30'N; however, several polynyas were present along the coast up to 68°N. In March the icebelt had receded from the coast not reaching the coast south of latitude 68°N, yet the distance from coast to iceedge being only about 10 nm down to 66°N.

From the beginning of April the coast was icefree including Disko Bugt apart from a few days around April 10 when the ice blocked the coast between 66°30'N and 67°30'N. The iceedge followed roughly 55°W between 68°N and 65°N from where it curved towards west and southwest.

During May the iceedge receded further and towards the end of the month it did not reach the coast south of 72°30'N. Towards the end of June the coast was ice-free up to 74°N, and the iceedge followed roughly 58°W and 59°W down to 65°N and from there SW. The Northwater had gained its full width from Ellesmere Island to Greenland.

During the first week of July the Northwater integrated with the open water of Baffin Bay and at the end of the month scattered occurrences along the Canadian coast, only, were present.

The ice of the new season began to form in the northern part of Baffin Bay towards the end of October and at the end of November the ice edge was running from coastline at 73° west and southwards following 59°W and 60°W between 72°N and 66°N.

At the end of December the iceedge reached the coast at 67°N, while several polynyas or nilascovered areas were present north of 68°N.

International Commission for the Northwest Atlantic Fisheries

Serial No. 3589
(D.a. 74)

ICNAF Summ.Doc. 75/31
Addendum

ANNUAL MEETING - JUNE 1975

Danish Research Report, 1974[1]

Part II

Hydrographic Conditions off West Greenland in 1974

by
F. Hermann
Danish Institute of Fisheries and Marine Researches
Charlottenlund Slot, Denmark

The location of the hydrographic sections worked by M/K "Adolf Jensen is shown in fig 1. The section II across Fylla Bank was worked in January, April, May, July and November. The section I, III and IV were worked in July.

The observations from January and April indicate a strong wintercooling which, however, mainly was restricted to the upper 75 m. In the deeper layers of the Fylla Bank relatively high temperatures were found in January with maximum temperature above 5°.

In July the temperature in the surface layer was higher than found in recent years, but in the deeper layers the temperatures are still low.

Deviations of temperature and salinity from the mean values for the years 1950-66 (Hermann 1967) for the station at 63°53'N - 53°22'W, west of the slope of Fylla Bank in July are shown below.

Depth interval m	Mean temp. (°C) 1950-66.	Mean salinity ‰ 1950-66	Δ T July 1974	Δ S July 1974
0- 50	2.07	33.29	-0.10	-0.01
50-100	1.33	33.65	-0.46	-0.19
100-200	1.85	34.00	-1.19	-0.40
200-300	2.88	34.39	-1.37	-0.36
300-400	3.79	34.67	-0.97	-0.12
400-500	4.22	34.81	-0.53	+0.03
0-500	2.39	34.27	-0.87	-0.19

[1] The Danish Research Report, 1974 consists of three parts. Part I contains report of fisheries and biological research by Subareas, Part II hydrographic conditions, and Part III ice observations.

Negative temperature and salinity anomalies are still found down to a depth of 400 m indicating great inflow of polar water. It is, however, remarkable that both temperature and salinity in the upper 50 metres' now are very near the mean values.

Fig. 3 shows the 5-years running mean of surface temperature anomalies in the West Greenland area (A_1) and the South Greenland area (B) based on the surface anomalies up to 1972 (Smed, up to 1972). The temperatures are now about 0.4°C lower than the mean value for the cold period 1876-1915.

References:

Hermann, F. 1967: Temperature variations in the West Greenland area since 1950. ICNAF Redbook 1967, Part IV, p. 76-85.

Smed, J. up to 1972: Monthly anomalies of the surface temperature of areas of the North Atlantic. Ann.Biol. Copenhagen.

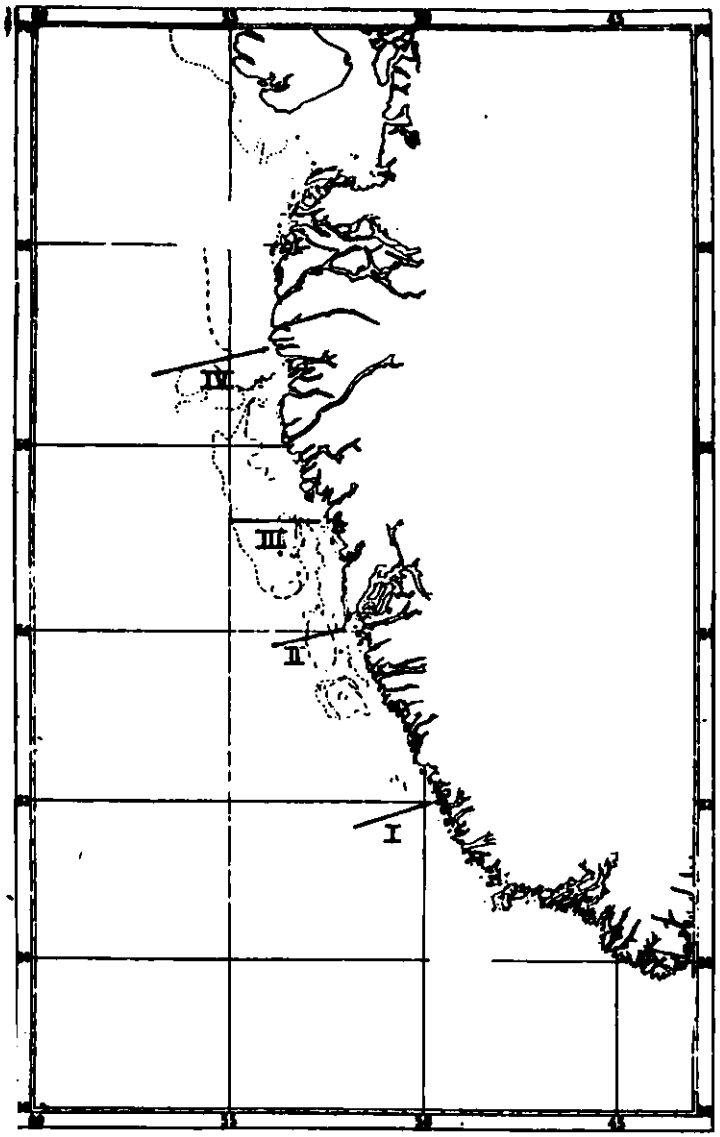

Fig. 1. Location of sections.

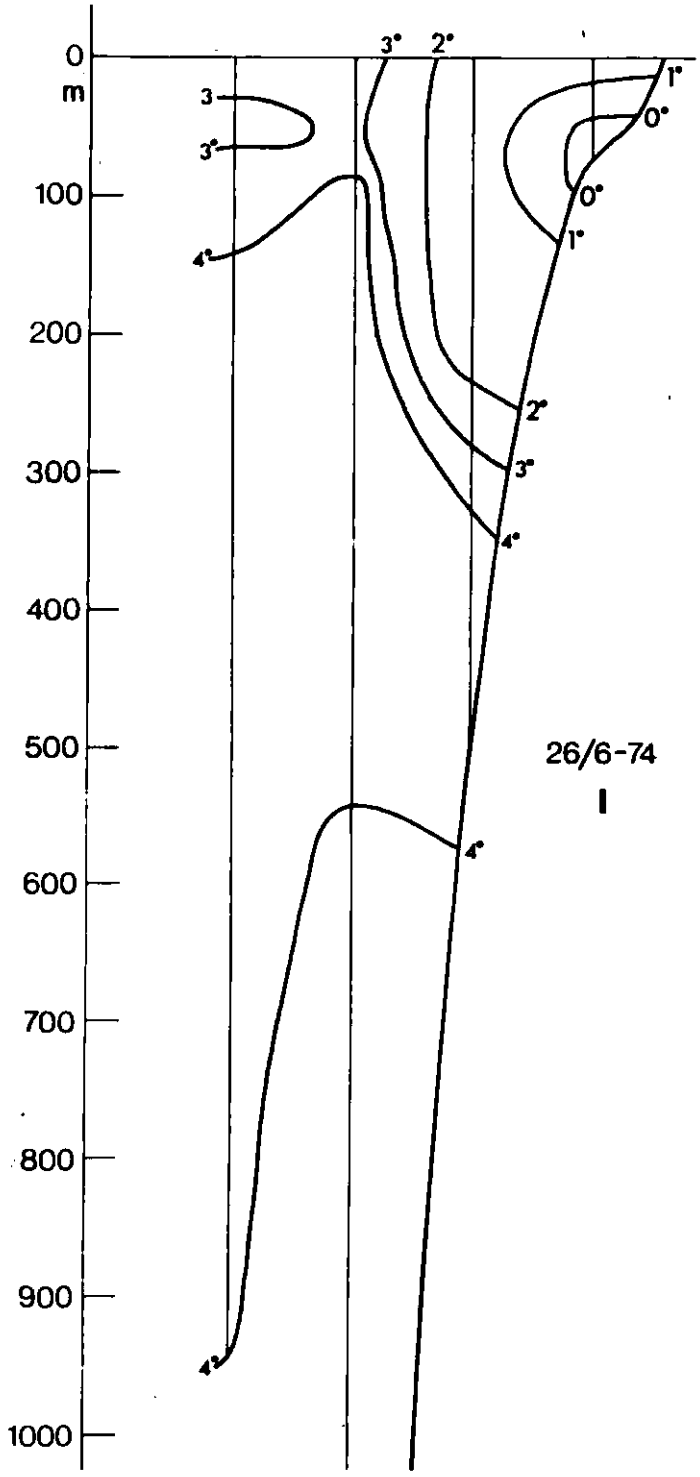

Fig.2. Temperature section off Frederikshåb in June.

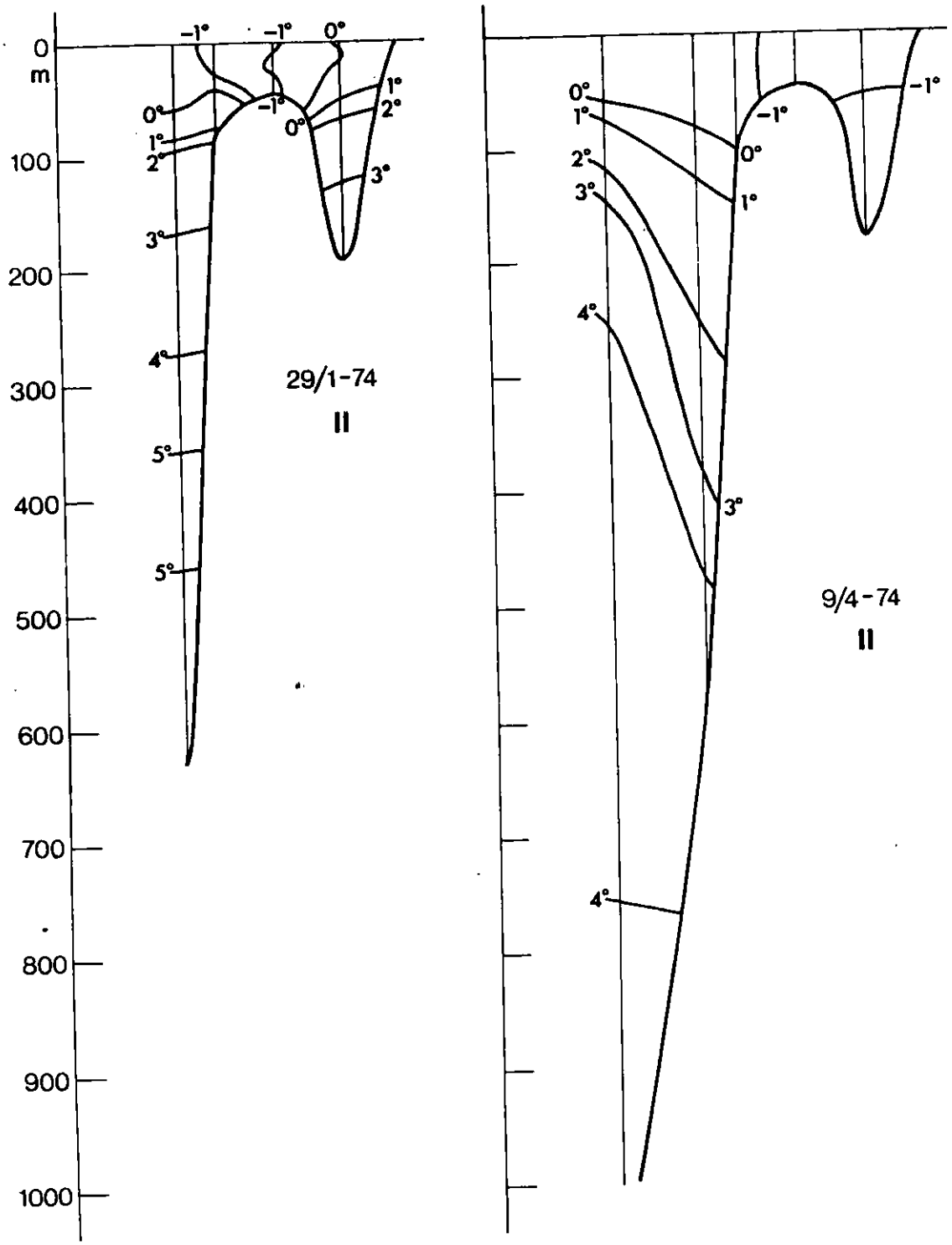

Fig. 3. Temperature sections across Fylla Bank in January and April.

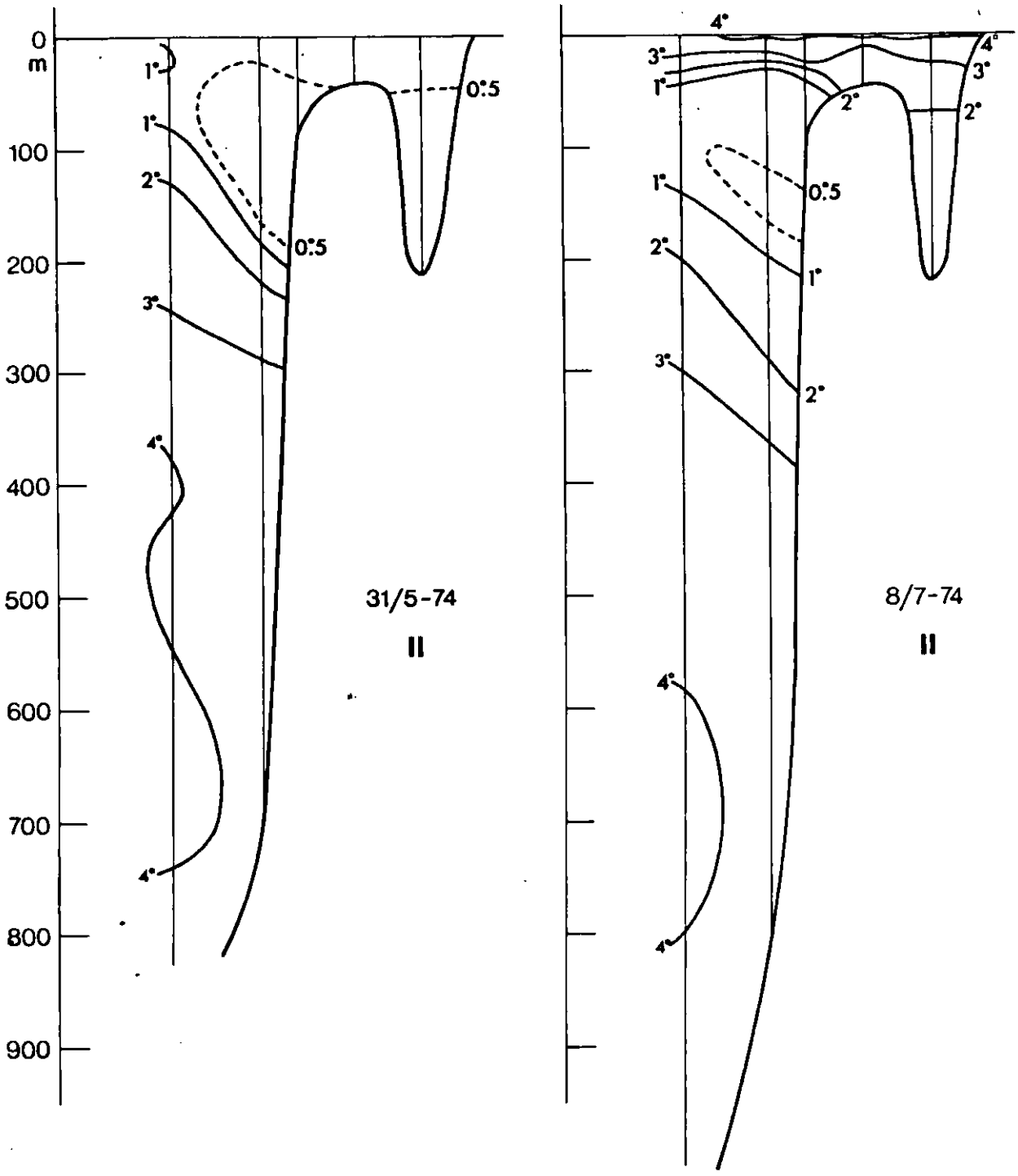

Fig. 4. Temperature sections across Fylla Bank in May and July.

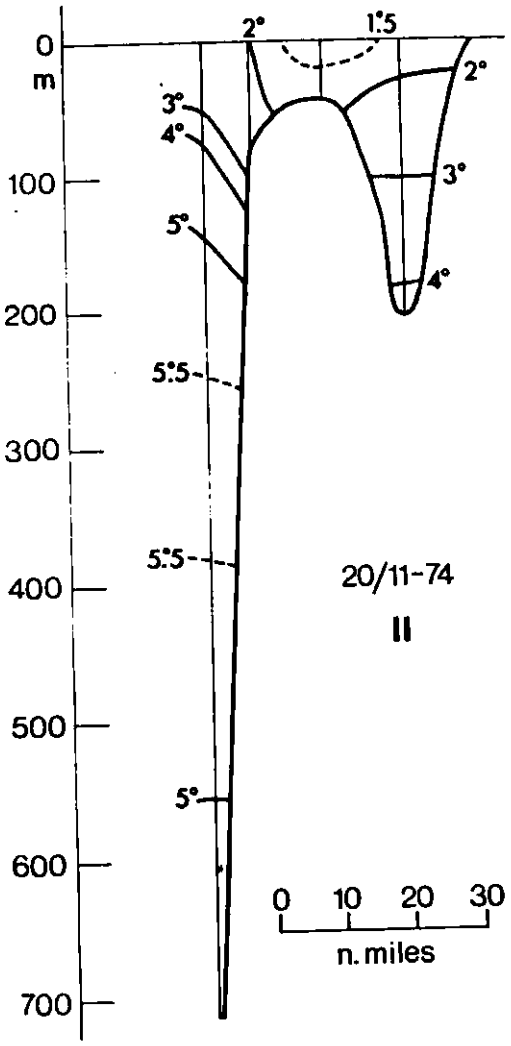

Fig. 5. Temperatur section across Fylla Bank in November.

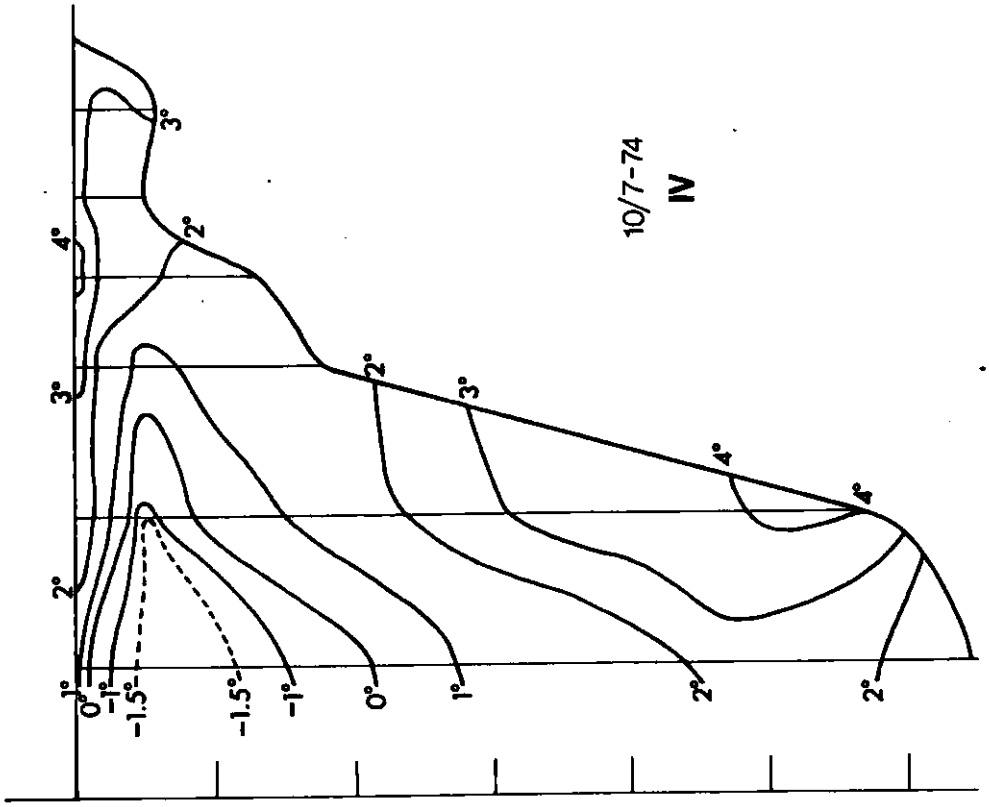

Fig. 7. Temperature section across Great Hellefiske Bank in July.

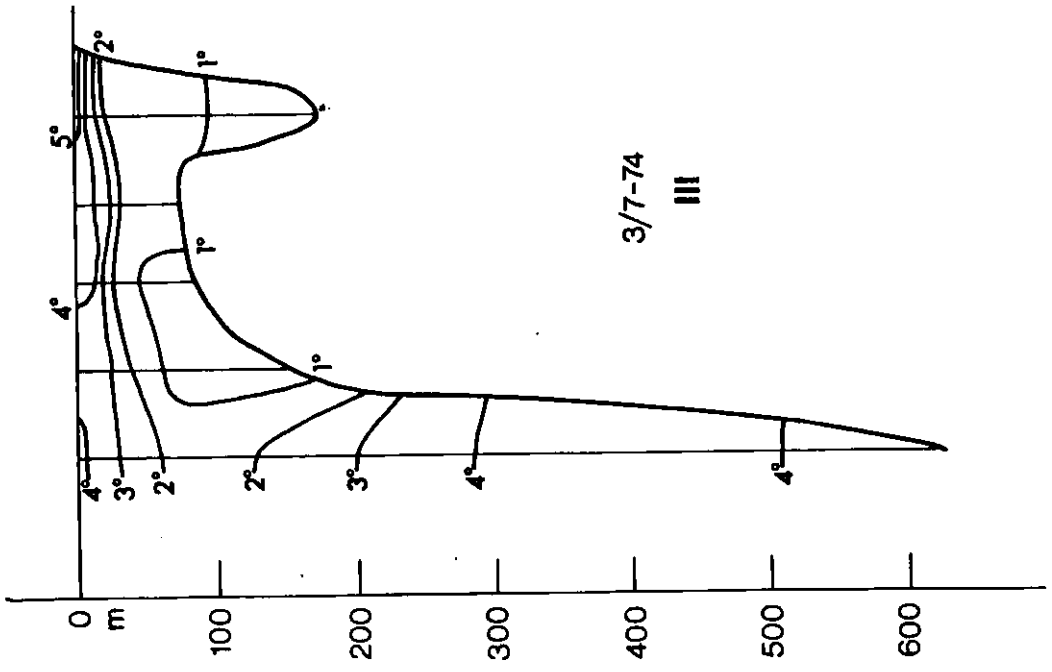

Fig. 6. Temperature section across Little Hellefiske Bank in July.

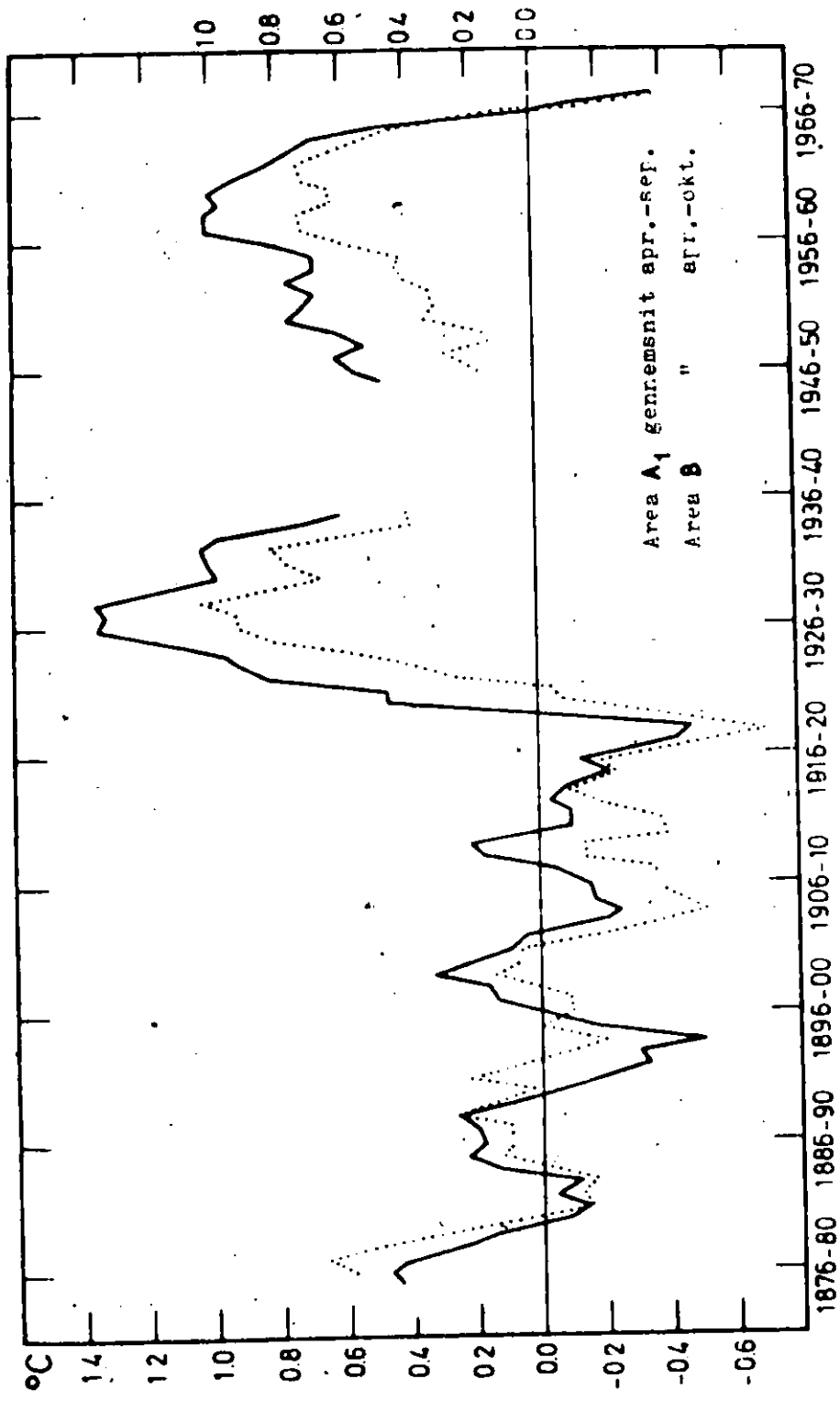

Fig. 8. Sea surface temperature anomalies, 5 years running means.

A_1 (solid line) West Greenland Area, April-September.

B (dotted line) South Greenland Area, April-November.

Base period 1876-1915.