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Denmark (Greenland) Research Report for 1982

edited by

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This report contains information on the fisheries by Greenland vessels and on research carried out by Greenland Fisheries Investigations (Grønlands Fiskeriundersøgelser) in the NAFO Area and at East Greenland (ICES Subarea XIV) in 1982. Such work which is of minor direct importance to NAFO (e.g. much of the land-based environmental work) will only be very briefly mentioned although this kind of work is a major and increasing part of the institute's work.

Various colleagues in the institute have contributed to the report. To be mentioned especially is the section on hydrography supplied by Mr. Erik Buch.

SUBAREA 0

Greenland vessels did not report any fishing in this Subarea in 1982.
Two of the stations operated in the photographic shrimp survey by the R/V ADOLF JENSEN in August fall just on the borderline between SA 0 and Div. 1B while one station is in SA 0 adjacent to Div. 1B. This survey was reported by P. Kanneworff to the Special Meeting of the Scientific Council in January (NAFO SCR Doc. 83/I/1). The R/V DANA's trawl survey did not cover any of the planned stations in SA 0 due to ice.

Aerial observations on occurrence of marine mammals were carried out in March in cooperation with Canadian scientists (See Section B. II. 6. under Subarea 1)

SUBAREA 1

A. STATUS OF THE FISHERIES

1. General trends

Final statistics for the fisheries in 1982 were not yet available when this report was written except for the eight (by 1983 nine) large trawlers operated by the Royal Greenland Trade Department (KGH). However, with the possible exceptance of the shrimp fishery (for which inshore fisheries are not under quota regulation) the provisional catches listed in Table 1 for 1982 are likely to be close to the final figures.

Table 1. Nominal catches by Greenland vessels in Subarea 1, 1982 (provisional figures), and the relative changes from 1981 to 1982.

Species	Nom. catch 1982 (provisional)	Percentage change from 1981
Cod	47.068	- 11
Greenland cod	3.921	+ 4
Redfish	343	- 29
Wolffishes	2.751	- 17
Grenadiers	38	- 3
Greenland halibut	5.300	- 8
Halibut	538	- 14
Capelin	279	+ 99
Atlantic salmon	1.077	- 15
Arctic char	109	- 40
Lumpsucker[x)]	1.349	- 28
Herring	26	+100
Industrial fish and fish not specified	231	+ 43
Shrimp	38.000	+ 6
Total (rounded)	101.000	- 5

x) converted from landings of roe by factor 3.31.

The total nominal catch was 5% below the 1981 catch. Most species were caught in less quantities in 1982 than in 1981. Most important was the decrease in cod catch (by 11%), and this decrease was only partly counterbalanced by the 6% increase in shrimp catch and a minor increase in landings of Greenland cod *(Gadus ogac)*. As in 1981 the two most important species, cod and shrimp, accounted for 85% of the total landings.

The major part of the offshore finfish catches were taken in Div. 1D and 1E. These two divisions were also the major ones for the inshore cod fishery. The shrimp catches were as usual taken mainly in Div. 1B and Div. 1A, the latter being the most important for the inshore shrimp fishery, but also more and more important for the offshore shrimp fishery. Div. 1A remained the most important for the fishery for Greenland halibut, partly fished from the ice in winter.

2. Cod

a) The fisheries

The nominal catch by Greenland vessels was about 11% below that in 1981. The larger trawlers' catch increased considerably from about 13.000 tons to about 21.000 tons. This increase was due to a relatively higher increase in trawlers' effort (from about 4.100 to about 9.400 hours fished), so that catch per hour decreased by about 1/3.

The inshore fishery decreased abruptly from about 40.000 tons to about

26.000 tons. The decrease was most pronounced in Div. 1F and 1E, less in Div. 1D and 1C while for Div. 1B and 1A catches were at the same (relatively low) level as in 1981.

b) Forecast for 1983-84

The previously very important 1973 year-class has now virtually disappeared from the stock and the landings although by long lines and gill net one may still catch some cod of this year class. As foreseen, the disappearance of the 1973 year class was felt as a considerable decrease in catches in Div. 1F and 1E.

Two year classes seem to become predominating in the 1983-84 catches, viz. year-class 1977 and year-class 1979. Both seem to have their main distribution round Div. 1D.

The fishery in 1983-85 is thus expected to be concentrated in Div. 1C - 1E. Catches will frequently show a bimodal length distribution, in 1983 with small fish and medium-sized fish, in 1984 with somewhat larger fish and increased mean weight of fish.

Further details on the cod stock and the fisheries will be presented in a research document to the June 1983 Meeting of the Scientific Council (NAFO SCR Doc.).

3. Shrimp

a) The fisheries

Preliminary statistics for 1982 indicate a catch of about 38.000 tons in Subarea 1, of which about 30.000 tons were taken on the offshore grounds. In total this is an increase from 1981 when the total catch of shrimp by Greenland vessels was about 35.800 tons.

The offshore fishery was severely hampered by ice conditions in the first 5 months of the year, during which the effort was concentrated in the southern part of Div. 1B and the northern part of Div. 1C. From June to November the Greenland vessels fished mainly west and north of Store Hellefiske Bank, mainly Div. 1B. There was a limited fishery in Div. 1A, and fishing north of 70°N, as in 1980 and 1981, did not take place except for a few hauls in October.

b) Forecast for 1983

The status of the stock on the offshore shrimp grounds was assessed by the NAFO Working Group on Shrimp in January 1983 (NAFO SCS Doc. 83/I/1). It was advised that the overall 1983 TAC for the offshore grounds in Subarea 1 and the adjacent parts of Subarea 0 should remain at the level advised for 1979-82 (29.500 tons).

4. Other fish

The Salmon fishery was opened 25 August but as in 1980 the quota was not fully achieved in the season (shortfall about 80 tons). This seems primarily due to problems in administering the quota in two general fractions, one for free competition, and a smaller allocated to the various districts' small boat fishery.

Landings of Greenland cod increased slightly (by 4%) while for Wolffishes and Greenland halibut a decrease by about 17% and 8%, respectively, was noted.

B. SPECIAL RESEARCH STUDIES

I. Environmental studies

1. Hydrography. The hydrographic research carried out by the Greenland Fisheries Investigations in Subarea 1 in 1982 has followed the standard programme formulated in 1980, with two major cruises along the westcoast of Greenland and in the Disko Bay area in July and November, supplemented with five small cruises covering the Fylla Bank section throughout the year.

a) Water temperature. An impression of the temperature conditions in SA 1 in 1982 can be obtained from Figs. 2-6.

A great inflow of East Greenland Polar water dominated the upper 100 - 200 m west of Fylla Bank up until October, with maximum inflow in May - June, when the polar water extended to the top of the bank revealing a mean temperature of 0.74°C of the water column there (40 m) in the middle of June, nearly 1°C below normal. By the middle of July the mean temperature on top of the Fylla Bank had increased by 2° as compared to June, but west of the bank the temperature was still extremely low, i.e. the influence of the polar water had moved westward due to a decrease in the intensity of the current.

In July the surface temperatures in the areas north of Fylla Bank were 1 - 2°C above those in the two previous years, except for the westmost station in the Disko Fjord section, which was influenced by the Westice. In November the surface tempeartures were 1 - 2°C below normal.

b) Salinity. Examples of the salinity measurements are shown in Figs 7-10. In 1982 the salinity of the surface layer in the whole area was the lowest observed over the last 5 - 10 years. This is probably due to the great amount of icebergs and driftice supplied to the Westgreenland waters and the Disko Bay area in 1982.

Also the deeper water layers were relatively less saline in 1982 than normally.

c) Other hydrographic observations.

In 1982 the Greenland Fisheries Investigations started a detailed mapping of the distribution of oxygen, phosfate and nitrate in SA 1 and the series of current and light measurements initiated in 1980 were continued.

Additionally the hydrography of the Buksefjord (Div. 1D) and the Tunugdliarfik fiord (Div. 1F) has been invistigated in detail as part of the preliminary investigation aiming at making it possible to predict the environmental effects of planned hydro-power plants.

2. Plankton

Since 1980 the plankton surveys, like the hydrographic surveys, have been expanded from the southern to the northern Davis Strait and the Disko Bugt area. The grid of stations is shown in Fig. 1.

Oblique hauls with 2 m stramin net (30 min., 225 - 0 m wire, speed about 2 n. miles/hour, max.fishing depth about 50 m, mesh size 1 mm) were made in July at the same stations where hydrographic observations were made. However, 3 stations failed at Section III in 1982. - Fresh and preserved total volume was measured, and animals were sorted and counted.

Oblique hauls with bongo net (30 min., 225 - 0 m wire, speed about 4½ n.miles/hour,max. fishing depth about 50 m, diameter 60 cm, mesh size 0.5 mm) were made at some stations in July 1981 and 1982, and in November 1982. The material has not yet been worked up.

For comparison, some main results of the stramin net surveys are shown in Table 2 , but, unfortunately, three stations failed at Section III in 1982. - Average preserved volume (ml) and average specimen numbers of copepods (mainly *Calanus*) and of larval gadoids (cod), Greenland halibut, sandeel, and of *Pandalus* are given. It is seen that the northern areas, especially Disko Bugt, are the most productive. Larvae of sandeel and shrimp are concentrated mostly in the northern areas, while cod and Greenland halibut larvae are limited almost to the southern Davis Strait.

Table 2. Zooplankton in 1980-82 in the areas Disko Bugt (incl. Vaigat), northern Davis Strait (N), and southern Davis Strait (S). The areas are shown in Figure 1. For each area are given average total preserved volume (ml) and specimen numbers of copepods and the most important larvae per 30 min. stramin net haul. r = less than one.

Area	Year	No. of samples	Volume ml	No. of copepods	No. of larvae			
					Gadoids	Greenl. halibut	Sand-eel	*Pandalus*
Disko	1980	10	250	5260	r	-	530	410
Bugt	1981	12	100	4880	r	-	770	570
	1982	16	2280	245560	-	r	1450	2960
Davis	1980	7	410	9060	r	-	190	480
Strait	1981	11	150	4030	r	-	325	90
N	1982	11	320	39410	r	r	350	460
Davis	1980	15	520	1400	3	18	1	40
Strait	1981	15	130	220	r	8	1	30
S	1982	12	520	3000	14	61	45	320

1982 was a very rich year with unusually high numbers of *Calanus* (the larvae important as food for fish larvae) and of fish and shrimp larvae, with the highest number of cod larvae since 1957. - Also other plankters (especially *Aglantha, Themisto, Limacina,* and chaetognaths) were very numerous in 1982.

3. Other environmental studies

The monitoring studies at a disposal site for tailings from a lead-zinc mine in Umanak Fjord (Div. 1A) continued. Furthermore, a study of the impact by heavy metals on the marine environment of a cryolite mine in South Greenland was carried out.

The mussel watch program initiated in 1980 terminated in 1982. The objective of this program is to improve the knowledge of the natural variation of the level of a number of chemical elements in *Mytilus edulis* and some species of seaweed.

Land-based studies, including mainly biological studies of a number of streams, were made at locations where future development of hydropower plants may take place.

II. BIOLOGICAL STUDIES

1. Cod

a) Eggs and larvae

The average number of gadoid larvae found in the plankton samples in 1982 was as high as 14.4 per half-hour stramin-net haul on the three standard sections from Fylla Bank to off Holsteinsborg. This is the highest since 1957. The larvae are presumably cod larvae, but attention is drawn to the fact that the larvae of *Gadus ogac* are not known.

Whether this will lead to a really good cod year class remains to be seen. The June temperature on Fylla Bank, normally used as reference temperature for environmental conditions for cod larvae was not more than 0.74°C, but the July temperatures were rather favourable.

b) Occurrence of pre-recruit cod

No specific research effort to observe cod of age-groups 1 and 2 (year-class 1981 and 1980, respectively) was made, and they did not occur in the commercial fishery.

Cod of age-group 3 (year-class 1979), on the other hand, were observed frequently both in the commercial fisheries, especially that by pound net, and in research vessels' catches. The year class is expected to be a major contribution to the fishery in 1983-85.
Further details on pre-recruitment cod is found in NAFO SCR Doc. 83/VI/ .

c) Cod in commercial landings

The offshore fishery was fairly well sampled and showed strong predominance of the 1977 year-class. The inshore fisheries were not well sampled, but also for the inshore fishery the 1977 year-class seems to have been the most productive in 1982.

Further analyses of the age and length composition of the 1982 landings and catches are found in NAFO SCR Doc. 83/VI/ .

d) Tagging experiments

129 cod were tagged in the Godthåb Fiord, Div. 1D.

2. Salmon

Samples were taken from commercial catches at the fishing plant in Godthåb and from experimental net fishing (Div. 1D) in cooperation with Canadian scientists.

3. Other fish species

Samples of wolffish (by species) and of redfish were taken from trawlers' catches. Capelin was sampled by hand seine in May. Samples of all by-catch species in research hauls during the shrimp survey were taken (mainly redfish, Greenland halibut, and American plaice).

4. Shrimp *(Pandalus borealis)*

As in previous years offshore shrimp surveys were mainly made around Store Hellefiske Bank and west of Disko, while inshore investigations were limited. Biomass was estimated by bottom-photography (NAFO SCR Doc. 83/I/1). Information on the distribution of the shrimp fishery and the catch rates were obtained from logbooks of Greenland trawlers together with reported catches of all nations fishing in Subarea 1 (NAFO SCR Doc. 83/I/8). A trawl survey with R/V DANA was carried out in July - August on the offshore grounds in Div. 1B (NAFO SCR Doc. 83/I/7).

5. Crab *(Chionoecetes opilio)*

Experimental crab fishing and collecting of samples on crab (Queen crab) was continued in inshore localities in Div. 1D.

6. Marine mammals

In co-operation with Canadian scientists an aerial survey was carried out in March over Davis Strait and southern part of Baffin Bay, as in 1981, to collect information of the distribution of marine mammals. A supplementary survey by aircraft and by ship and interviews of the hunters were made in March - May in the region between Godhavn and Holsteinsborg, especially on walrus.

Material for age determination of harp seal and hooded seal was sampled. Supplementary information on the food and state of nutrition of the seals was collected in Umanak district.

Sampling of minke whale and observation of this and other species of whales were obtained in June - August on a Norwegian whaling vessel in the Davis Strait. Observation on whales were also made from the American sailing ship REGINA MARIS.

EAST GREENLAND

A. STATUS OF THE FISHERIES

Provisional figures for the Greenland fisheries in this area (ICES Subarea XIV) show a total of about 1450 tons, a decrease of about 25% from 1981. The decrease is due to a decrease of cod catches in the local fishery at Angmagssalik (from about 880 in 1981 to about 320 tons in 1982), whereas the shrimp fishery by Greenland trawlers increased from about 1000 tons to about 1100 tons (provisionally 1115 tons). Landings of species other than cod and shrimp were negligible.

The shrimp fishery was regulated by a TAC of 4500 tons set by the EEC for the fishing zone off East Greenland.

The Scientific advise for regulation of the shrimp fishery was a TAC of 4200 tons for 1981, and the same figure was advised for 1982.

B. SPECIAL RESEARCH STUDIES

The local pound-net fishery in the Angmagssalik area was sampled, and 1164 cod were tagged.

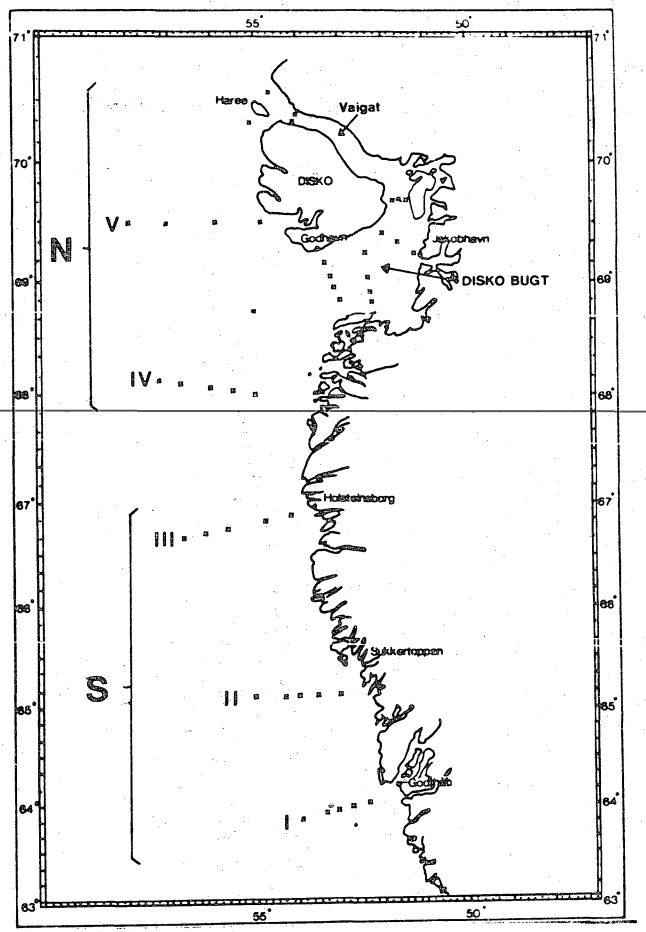

Fig. 1. Oceanographic sections and stations for hydrography and plankton sampling in 1980-82. N and S indicate northern and southern Davis Strait.

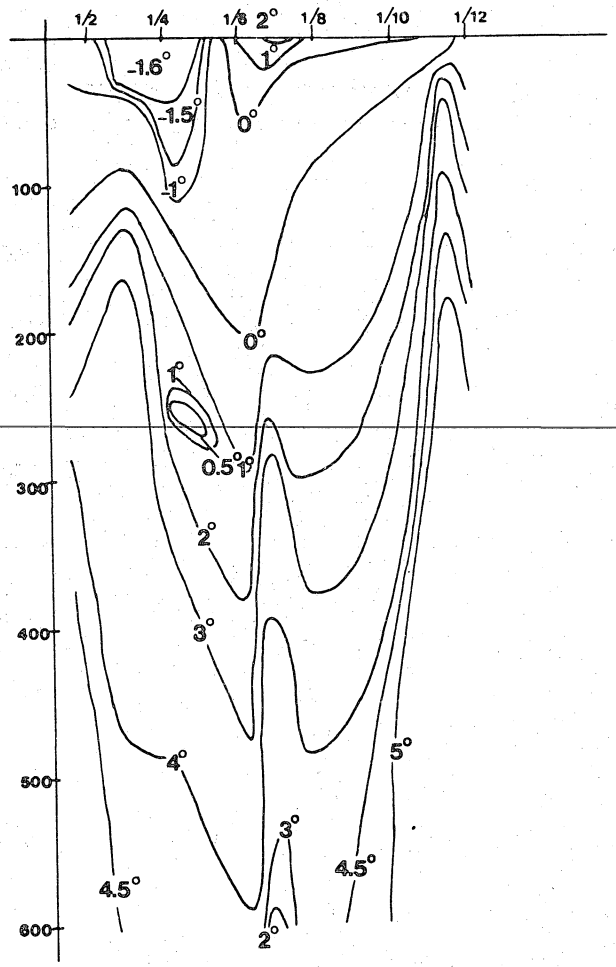

Fig. 2. Temperature at Fylla Bank, St. 4, 1982.

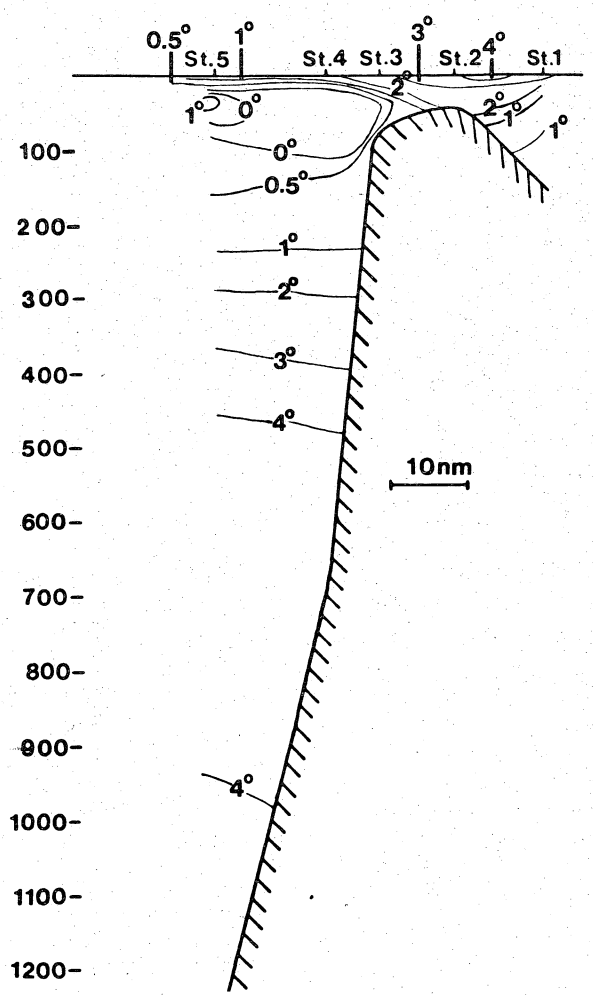

Fig. 3. Vertical temperature distribution across the Fylla Bank in July, 1982.

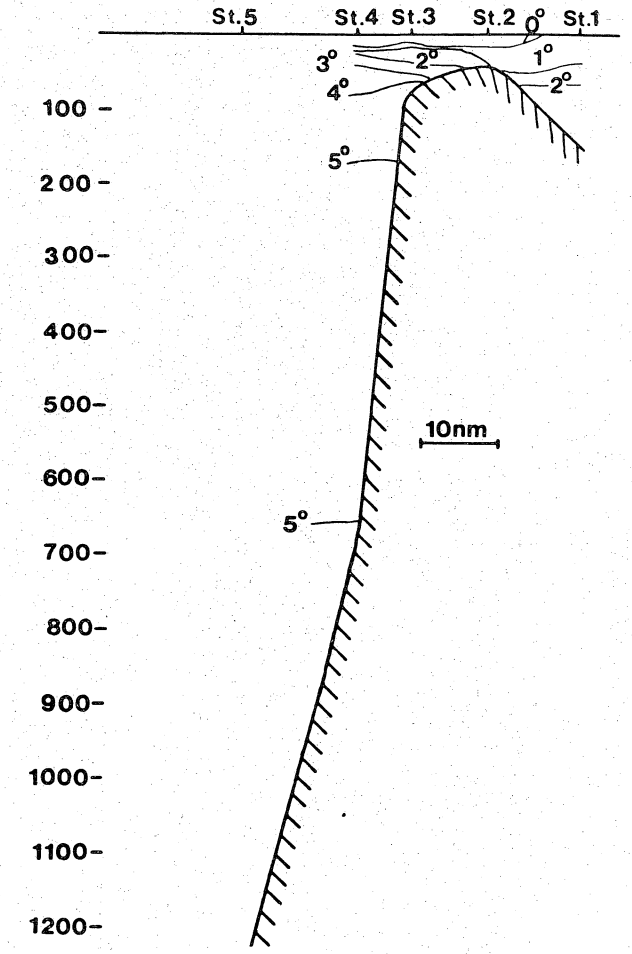

Fig. 4. Vertical temperature distribution across the Fylla Bank in November, 1982.

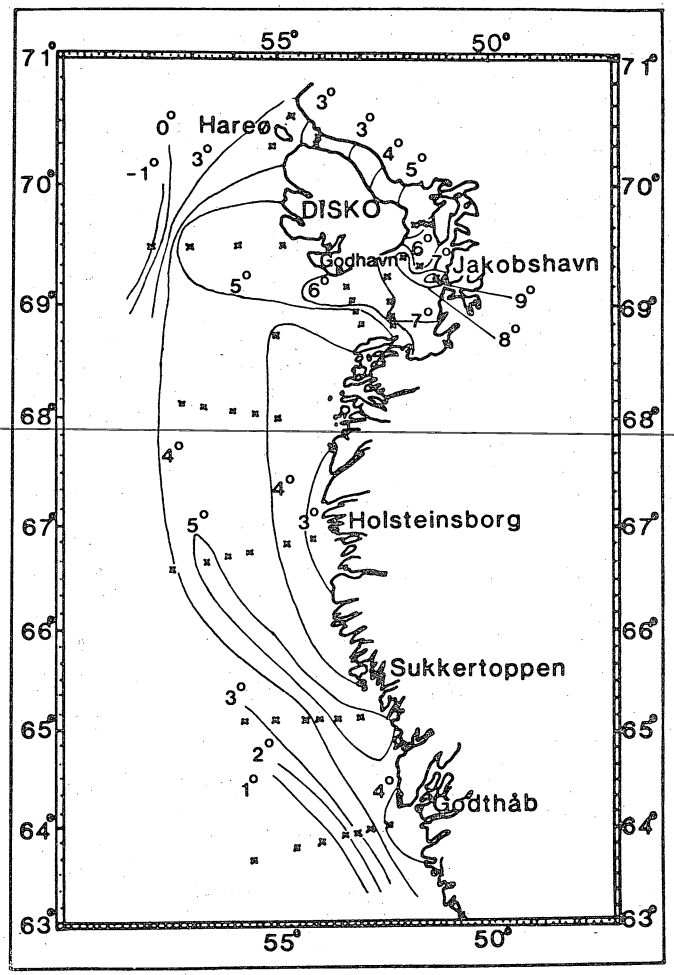

Fig. 5. Surface temperature in July, 1982.

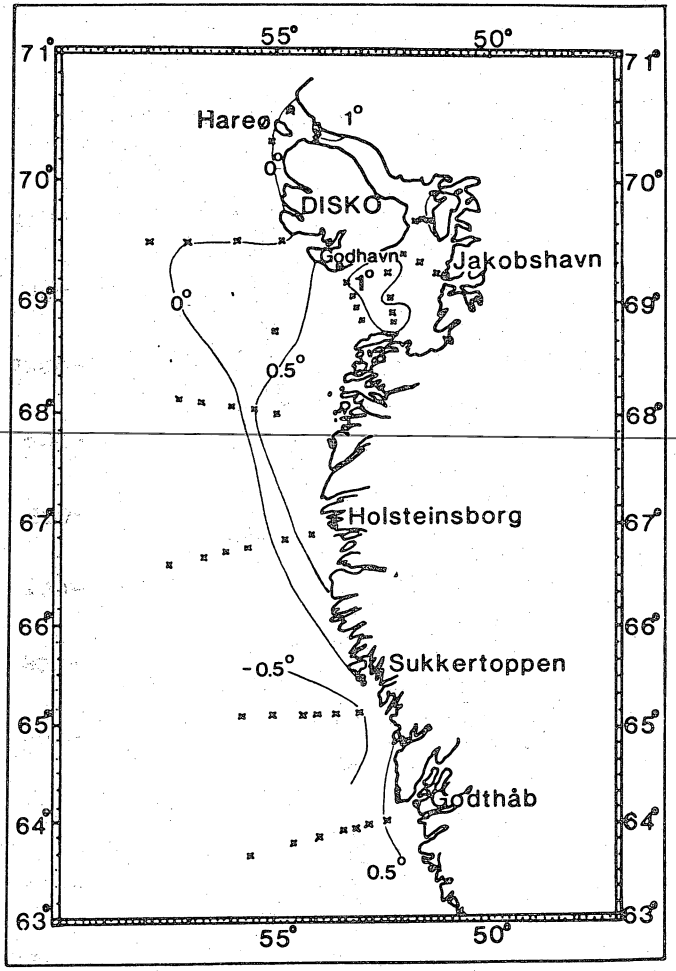

Fig. 6. Surface temperature in November, 1982.

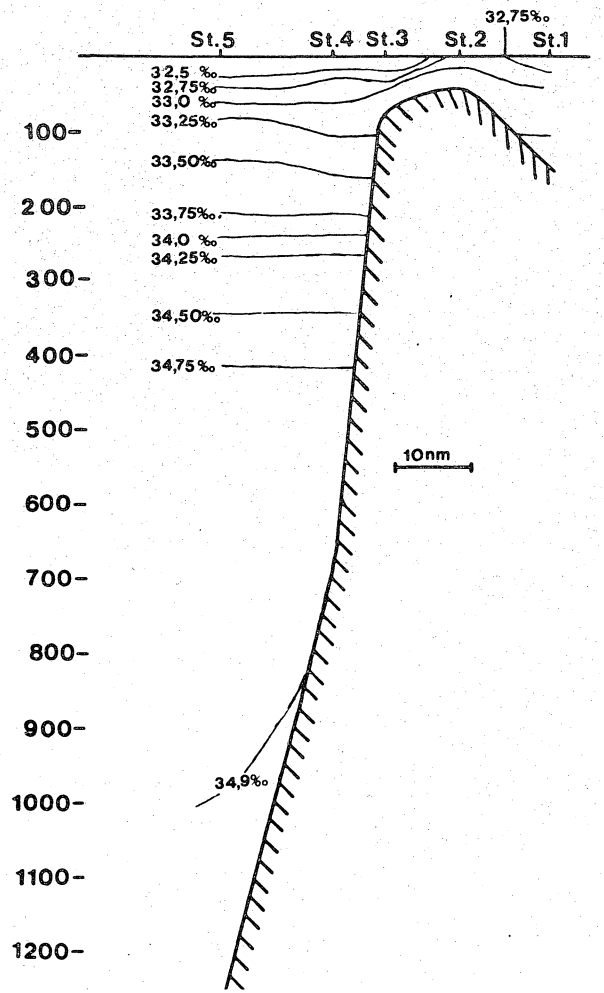

Fig. 7. Vertical salinity distribution across the Fylla Bank in July, 1982.

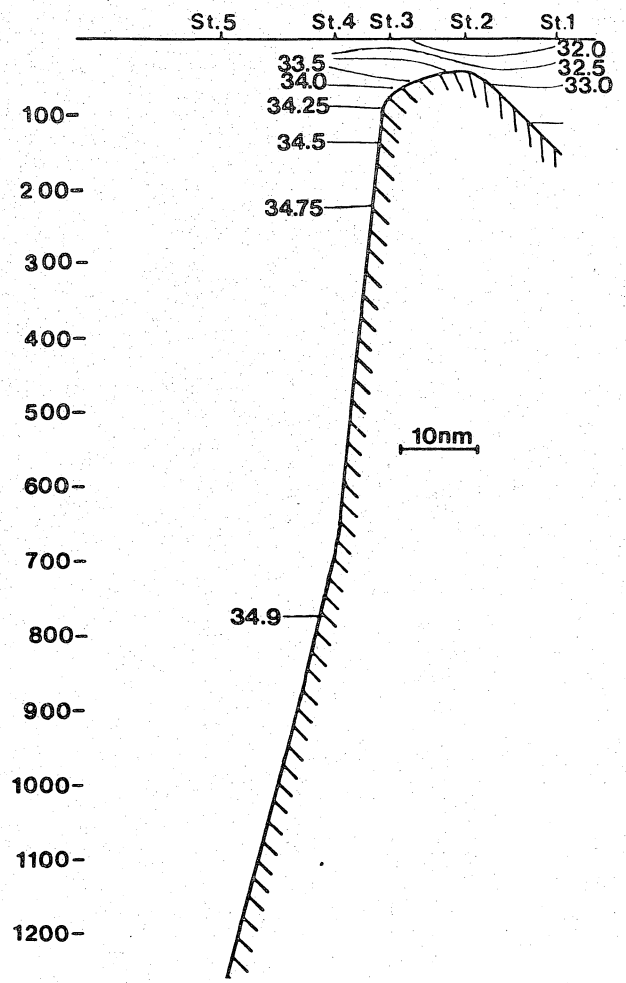

Fig. 8. Vertical salinity distribution across the Fylla Bank in November, 1982.

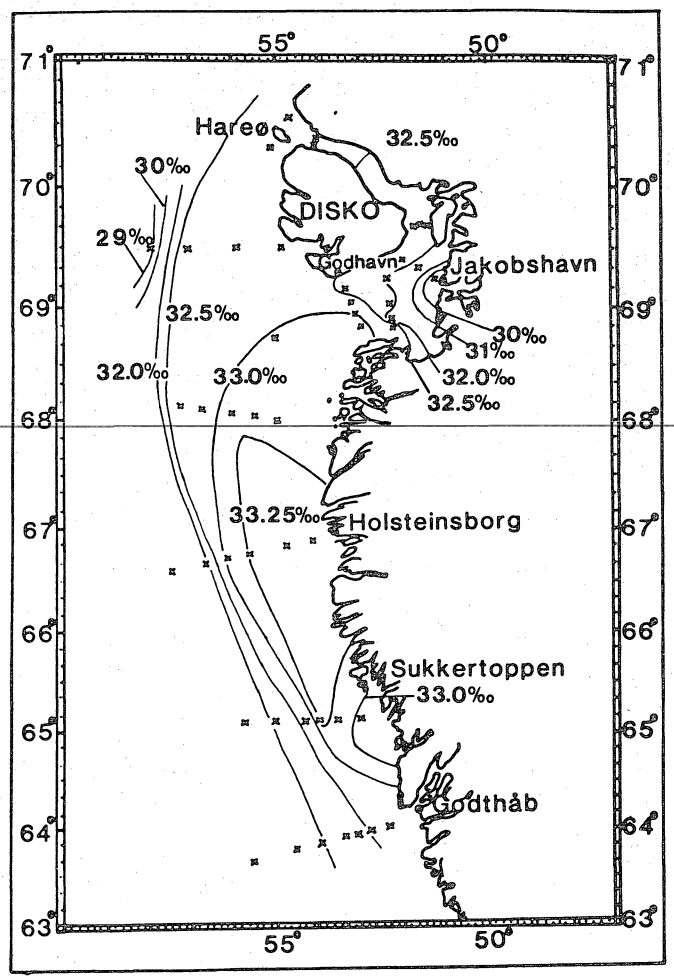

Fig. 9. Surface salinity in July, 1982.

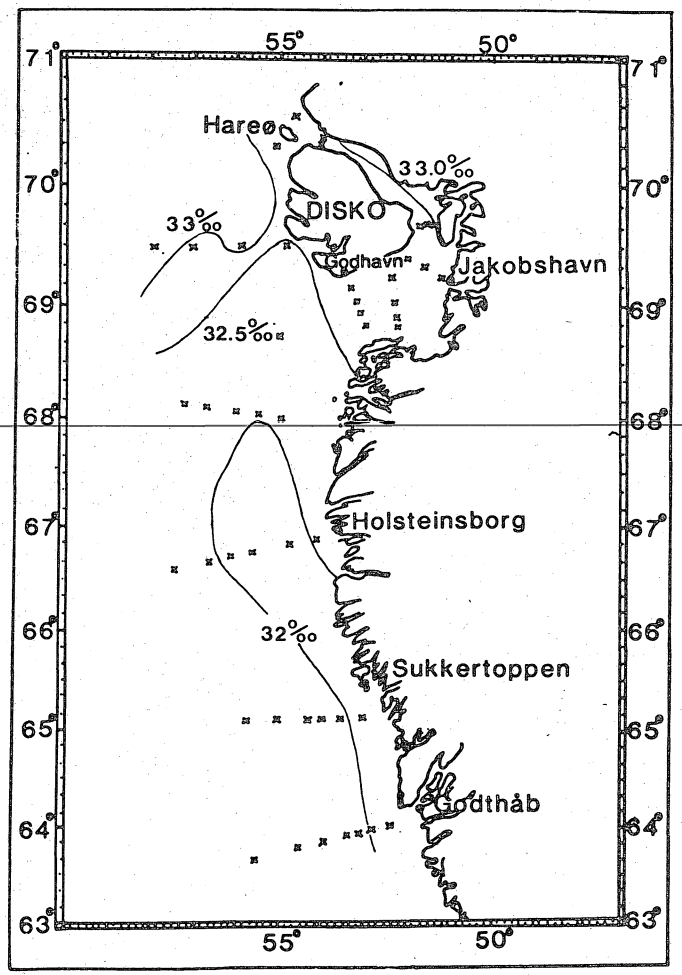

Fig. 10. Surface salinity in November, 1982.