

ANNUAL MEETING - JUNE 1965German Research Report, 1964SUBAREA 1 AND EAST GREENLAND

by Arno Meyer

A. Status of the FisheriesI. Cod and Redfish

In 1964 the German trawlers again fished off West and East Greenland over the whole year. Since the beginning of the German fishery off Greenland in 1952, the nominal catch has increased steadily to 232,000 tons in 1963. In 1964 the catch dropped for the first time by 17.2% to 192,000 tons. The proportion of cod increased to 67.1% of the total catch, that of redfish decreased to 31.5%, the lowest value to date.

Table 1. German nominal catches (in tons) off Greenland, 1962-1964.
Average annual catch per fishing day in brackets.

		Cod	Redfish	Total
West Greenland (Subarea 1)	1962	126,640 (19.2)	54,900 (8.3)	185,386 (28.2)
	1963	139,283 (19.4)	42,292 (5.9)	185,492 (25.9)
	1964	99,614 (17.7)	20,662 (3.7)	122,754 (21.8)
East Greenland	1962	14,246 (8.6)	24,720 (14.9)	40,495 (24.4)
	1963	13,614 (6.2)	30,916 (14.2)	46,646 (21.4)
	1964	29,352 (8.9)	37,294 (11.3)	69,575 (21.2)
Total Greenland	1962	140,886 (17.1)	79,619 (9.7)	225,881 (27.4)
	1963	152,898 (16.3)	73,203 (7.8)	232,146 (24.8)
	1964	128,966 (14.4)	57,956 (6.5)	192,329 (21.5)

Table 1 shows that the decrease in catch in 1964 was caused by a considerable drop of 63,000 tons or 33.9% in the output of the fishery off West Greenland. Never did fishing in Subarea 1 give such poor results as in 1964. Therefore the fishing activity off East Greenland increased. Several factory ships worked off East Greenland for the first time and the catches there increased by 49.2% to nearly 70,000 tons. This increase of 23,000 tons in total catch was caused by a big increase in the catch of cod during the spawning time by 116% to 29,350 tons. This is the highest output to date from the cod fishery off East Greenland.

Table 1 and Fig. 1 also show that the poor catches off West Greenland were the result of a further drop in the annual catch of redfish per fishing day. During the last 6 years the catch per fishing day steadily decreased from 12.5 tons to 3.7 tons. From 1959 to 1964, the proportion of redfish taken in the total catch dropped from 55% to 16%. The stock of redfish off West Greenland has become so reduced that this fish which, up to 1960, was of the greatest commercial importance for the German fishery off West Greenland now is only a by-catch.

The broken line in Fig. 1 shows that, generally, in each year the curve of the monthly catch per fishing day shows two maxima, the first in February to April and the second in June to July. However, in the winter of 1963/64, the

monthly catch per fishing day had reached its first maximum in January and then it dropped steadily. The expected increase in catch during the spawning time failed to appear. Instead the cod spawning season off Southeast and East Greenland from March to May gave the biggest output of the hitherto existing fishery off East Greenland. The cod fishery off Southeast Greenland has never been so highly productive.

In spite of the increased yield of cod the redfish was the most important fish in the East Greenland fishery. But the proportion of redfish has dropped from 89% of the total catch from the beginning of the fishery in 1955 to 54% in 1964. Because, since 1962, the last possible redfish grounds off Cape Discord and Cape Walloe have been fished, we must assume that in future the redfish catches off East Greenland will continue to decrease. Already the annual catch per fishing day has decreased from 14.9 to 11.3 tons from 1962 to 1964. The decrease was, of course, most pronounced on the banks off Southeast Greenland where the catch per fishing day diminished from 23.1 tons in 1962 to 15.0 tons in 1964.

Results of age determinations of fish from commercial catches (Fig. 2) and from research catches made during three trips of the WALTHER HERWIG and ANTON DOHRN (Fig. 3) throw some light on the special fishery conditions in 1964. In 1964, as in the two preceding years, the two strong year-classes 1957 (of West Greenland origin) and 1956 (of East Greenland origin) were of essential importance for the output of the cod fishery on both sides of Greenland. All older rich year-classes have become very weak. Among the younger year-classes, the 1958 one reached growing importance especially in Divisions 1E and 1F. From the southern distribution of this year-class we must assume that these cod were born off East Greenland. This is also true for the rich 1961 year-class (Fig. 3). Since the second half of 1964 the young rich West Greenland 1960 year-class has entered the fishery. Because of the poor fishing conditions in autumn, this year-class was heavily fished. In November, 46% (by numbers) of the landings from Holsteinsborg Deep consisted of cod of 4 years of age and younger. This does not include all those small cod which were discarded or turned into fishmeal. In the last quarter of 1964, 17% (by weight) of the gross catch of cod in the mentioned area were, according to reports from sea, discards or industrial fish! This intensive fishery on grounds where the young cod are living (fostered by the installation of additional filleting machines for the utilization of small cod on board of factory ships and by the equipping of nearly all modern trawlers with fishmeal plants) must have big consequences for the future fishery. This is neither a specific problem of the fishery off West Greenland nor a problem of the German fishery with factory ships but holds good for the whole international fleet of factory ships and trawlers with fishmeal plants in the whole ICNAF area, especially when, in the second half of the year, this international fleet works those areas where the young immature cod are growing up.

It is interesting to trace the spawning migration of the 1957 and 1956 year-classes. We expected that the 1957 year-class would again spawn off Southwest Greenland and that the 1956 year-class, grown up off Southwest Greenland (and as an East Greenland year-class spawning for the first time mostly at 8 years of age) would migrate from Southwest to Southeast and East Greenland to spawn. As seen from the decreasing percentage of the 1956 year-class in the commercial catches off South Greenland from November 1963 to March 1964 (Table 2) the 8-year-old cod left South Greenland for Southeast Greenland. Later they also left Southeast Greenland (Table 3, drop from 55% in January to 12% in April) and their proportion in the catches reached 76% in February off Angmagssalik (35°W) and 54 to 65% on Dohrn Bank (30°W) from the end of February to the beginning of May. While the 8-year-old cod passed the Southeast Greenland area on their way to Angmagssalik, Dohrn Bank and probably Iceland, they were followed by an increasing number of 7-year-old cod (Table 3). When in April on the banks of Southeast Greenland, mainly on Bille and Fylkir Bank, spawning reached its maximum and the monthly catch of cod per fishing day increased to 18.0 tons (the ice and the bad bottom conditions only allow fishing during the short daylight) the 1957 year-class made up more than 60% in these catches.

Table 2. Variation in the percentage of the 1957 and 1956 year-classes in the commercial catches off South Greenland to show emigration of the 1956 year-class and return after spawning.

Date Year-class	6 November 1963	15 January 1964	26 February 1964	20 March 1964	15 April 1964	21 June 1964
1957	12	34	55	55	42	40
1956	64	34	13	6	16	28

Table 3. Variation in the percentage of the 1957 and 1956 year-classes in the commercial catches off Southeast Greenland to show immigration of the 1957 year-class from South Greenland and emigration of the 1956 year-class to Dohrn Bank and Iceland

Date Year-class	23 September 1963	11 October 1963	11 January 1964	5 March 1964	20 March 1964	8 April 1964
1957	16	13	20	38	52	60
1956	40	43	55	31	24	12

From these findings we must conclude that, in 1964, not only the East Greenland 1956 year-class left the Southwest Greenland area but a substantial part of the West Greenland 1957 year-class left also. We may further assume that this emigration of mature cod caused:

1. The low first maximum in the 1964 West Greenland yield curve (Fig. 1);
2. The unusual decrease in the monthly catch per fishing day of cod from February to April in Subarea 1;
3. The strong increase in the output of the fishery for spawning cod on the banks of East Greenland and
4. Probably a considerable strengthening of the Icelandic stock of spawning cod.

Return of 12 cod tagged off West Greenland and recaptured mainly during the 1964 spawning season off Southeast Greenland (2 cod, born in 1956 and 1957), East Greenland (2 cod, 1 with otolith = 1957 year-class) and Iceland (8 cod, 3 with otoliths = 1956 year-class) endorse these findings.

B. Special Research Studies

I. Environmental Studies

1. Hydrography. The German research ship WALTHER HERWIG worked off West, South and Southeast Greenland in June-July and November. The warm Atlantic component of the West Greenland current was very well developed and was lying close to the slope (Fig. 4-7). The temperatures were very high, higher than in the warm year of 1960 and thus probably the highest found to date off West Greenland. On 27 June temperatures over 5°C were found on the western slope of Fyllas Bank from 180 to 340 m with a maximum of 5.2°C in 200 m. On Noname Bank water of more than 5°C covered the slope from 130 to 470 m. Off

Holsteinsborg on 23 June temperatures higher than 4°C were found below 320 m with a maximum of 4.66°C in 490 m.

During the first half of November, the temperature close to the slope was more than 7°C! At the slope, temperatures of more than 6°C were found in 170-370 m. The western part and the slope of the southern Great Halibut Bank was covered with water of nearly 6°C. Water of 6°C nearly reached 67°N. Concentrations of mature cod were found on the eastern side of the Sukkertoppen Bank in 250 m in 6.2°C bottom temperature, whilst the young cod concentrated off Holsteinsborg in water of about 3°C.

The cold Arctic component of the West Greenland current was very weak and was found in June-July only over the banks and not on the slope. Negative temperatures down to -0.99°C in 50 m were met only off Cape Farewell. On Noname Bank lowest temperatures were +0.59°C in 24 m. On the bottom of the West Greenland banks temperatures ranged mostly between 1 and 2°C. The surface temperatures over the banks were relatively low at the end of June.

Concentrations of cod were only found off Sermersok (South Greenland) in the temperature range of 2° to 4°C. On the northern banks, cod were scattered and feeding pelagically, mostly on krill, Mallotus and Ammodytes in temperatures of 1.1° to 1.5°C. On the southwestern banks, pelagic traces were found in 3° to 4°C consisting of Mallotus, Ammodytes and squids with some cod and wolffishes among them.

In November, the sections over Noname Bank and Nanortalik Bank were worked twice (Fig. 7). At the end of November very cold waters with temperatures down to -0.48°C was advancing northward.

II. Biological Studies

1. Cod. In 1964 765 cod were tagged off West and East Greenland. From a total of 2932 taggings from 1959 to 1964 200 recoveries (6.8%) were reported to March 1965. The recaptures off East Greenland and Iceland were more numerous in 1964 than in the preceding years. To the present, 49 cod were recaptured off East Greenland and Iceland mostly off Iceland. A special paper of the results of German cod tagging in the Greenland area was prepared for assessment, at the 15th Annual Meeting, of the magnitude of interchange of cod stocks between Sub-area 1 and East Greenland and Iceland (1965 Research Document No. 23).

Subarea 2-5

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SUBAREA 2

A. Status of the FisheriesI. Cod and Redfish

In comparison to the preceding year (1963) an increase in fishing activity and landings of German trawlers was recorded in Subarea 2 in 1964. This was apparently due to the unstable fishing conditions in Greenland waters. But nevertheless, the total landings from Labrador reached only about 6% of those from Greenland. The landings in metric tons are given below:

Month	Apr.	Jul.		Aug.		Sep.		Oct.		Nov.			Dec.	1963
Division	2J	2J	2H	2J	2J	2J	2H	2J	2H	2G	2J	2J	total	
Cod	709	74	81	127	187	1090	64	55	31	2	39		2459	
Redfish	28	40	44	676	873	898	714	281	356	19	320		4249	
Other fish	83	14	16	143	214	503	142	66	89	6	102		1378	
Total	820	128	141	946	1274	2491	920	402	476	27	461		8086	
Trips	1	*	1	2	2	3	2	1	1	*	1		14	
Fishing days	39	8	8	57	69	136	62	34	30	6	46		495	

* part of one trip to another Subarea or Division.

Whilst the quantities of cod and redfish landed in 1963 were almost the same, the increase of the 1964 landings was not equal for both species. Redfish catches amounted to 53% and cod catches to only 30% of the total landings. Most catches were taken from Div. 2J (93% of cod and 73% of redfish landings). Most fishing days (64%) were recorded during August, September and October and also 69% of the total catch was made during this period. The mean catch per fishing day decreased for cod from 10 tons (1963) to about 5 tons (1964) and for redfish from 10 tons to 8.6 tons.

B. Special Research Studies

The entire landings were processed and deep-frozen at sea. Accordingly, no market samples could be taken. Special field work was not carried out in the Subarea.

SUBAREA 3

A. Status of the FisheriesI. Cod and Redfish

On account of a somewhat higher fishing activity in 1964 the total landings from this Subarea increased to exactly double the quantity taken in 1963. The landings in metric tons are given below:

Month	May		Jul.		Aug.		Sep.		Oct.		Nov.	Dec.	1963
Division	3K	3L	3K	3L	3K	3M	3K	3M	3K	3L	3K	3K	Total
Cod	266	242	23	195	164	240	580	50	60	34	30	6	1890
Redfish	137	-	42	4	352	89	1027	15	213	24	349	80	2330
Other fish	47	28	5	38	64	35	238	9	39	21	68	20	610
Total	450	270	70	237	580	364	1845	74	312	79	447	106	4830
Trips	1	*	*	1	1	1	3	*	1	*	1	*	
Fishing days	20	7	7	9	39	14	106	3	27	4	36	10	280

* part of one trip to another Subarea or Division.

On the whole, however, fishing of German trawlers was comparatively unimportant. Only 9 trips which were distributed over 7 months have been made to Subarea 3. The trawlers fished mostly in Div. 3K, where they spent 87% of the fishing days and caught 79% of the total landings of the Subarea (60% of cod - and 95% of redfish landings). The composition of the total German landings from Subarea 3 was 39% cod and 48% redfish in 1964 against 59% cod and 27% redfish in the preceding year (1963). The mean catch per fishing day decreased for cod from 13 tons (1963) to 7 tons (1964) and increased for redfish from 6 tons to 8 tons.

B. Special Research Studies

None were carried out for the same reasons mentioned for Subarea 2.

SUBAREAS 4 and 5

A. Status of the Fisheries

I. Haddock

Fishing, mainly for haddock, was carried out off Nova Scotia during 4 trips.

The landings in metric tons are given below:

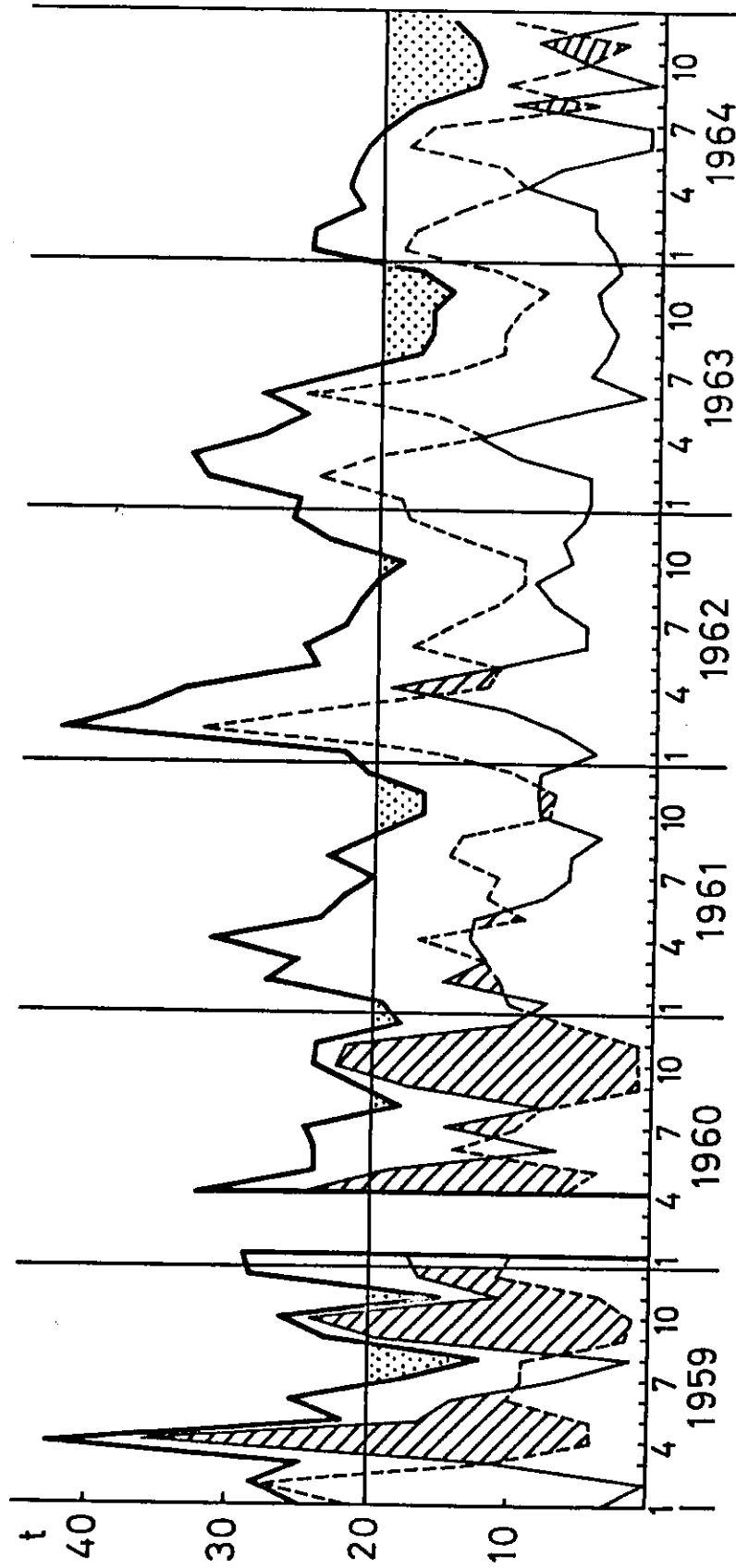
Month Division	Apr. 4W (+ 4V, 4X, 5Z)	May 4W	Oct. 4X (+ 4W, 4V)	1964 Total
Haddock	607	953	110	1670
Cod	230	278	241	749
Pollack	55	229	70	354
Redfish	-	-	52	52
Other fish	99	160	70	329
Total	991	1620	543	3154
Trips	1	2	1	4
Fishing days	53	94	31	178

On the first trip in April fishing operations were extended over several Divisions (including northeastern edge of Georges Bank, 5Z) but the main catches were taken from 4W. The proportion of haddock in the landing was 62% (cod 22%, pollack 6%). The haddock catch per fishing day was 11.5 tons against 16 tons in April 1963.

Two trips in May were restricted to Division 4W and the landings consisted of 69% haddock, 17% cod and 14% pollack. The haddock catch per fishing day amounted to 10 tons which was the same as in May 1963. On the last trip in October 1964 fishing conditions were unsatisfactory for haddock. The catch per fishing day was only 3.5 tons and only 22% of the total catch consisted of haddock (cod 44%, pollack 13%, redfish 10%).

B. Special Research Studies

None was carried out for the same reasons mentioned for Subarea



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Fig. 1 Average monthly catch per fishing day of German trawlers in Subarea 1 in tons from 1959 to 1964. Thick solid line: total catch, broken line: cod, thin solid line: redfish, hatched section: redfish catches exceeding cod catches, dotted area: monthly catch per fishing day less than 20 tons.

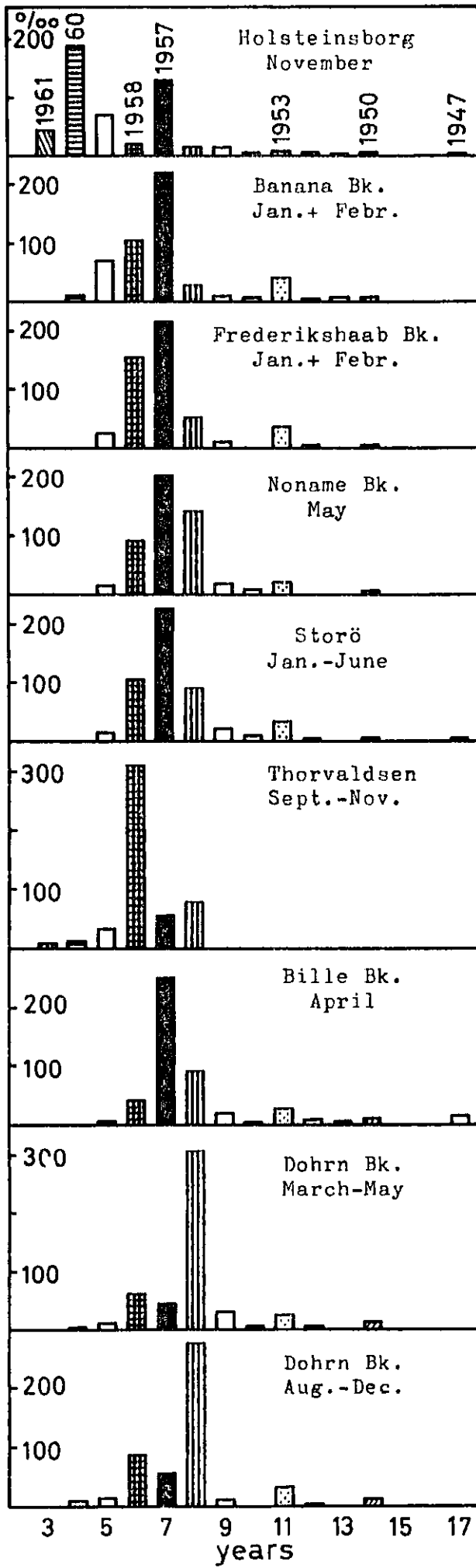


Fig.2 Cod. Age composition of commercial catches in 1964

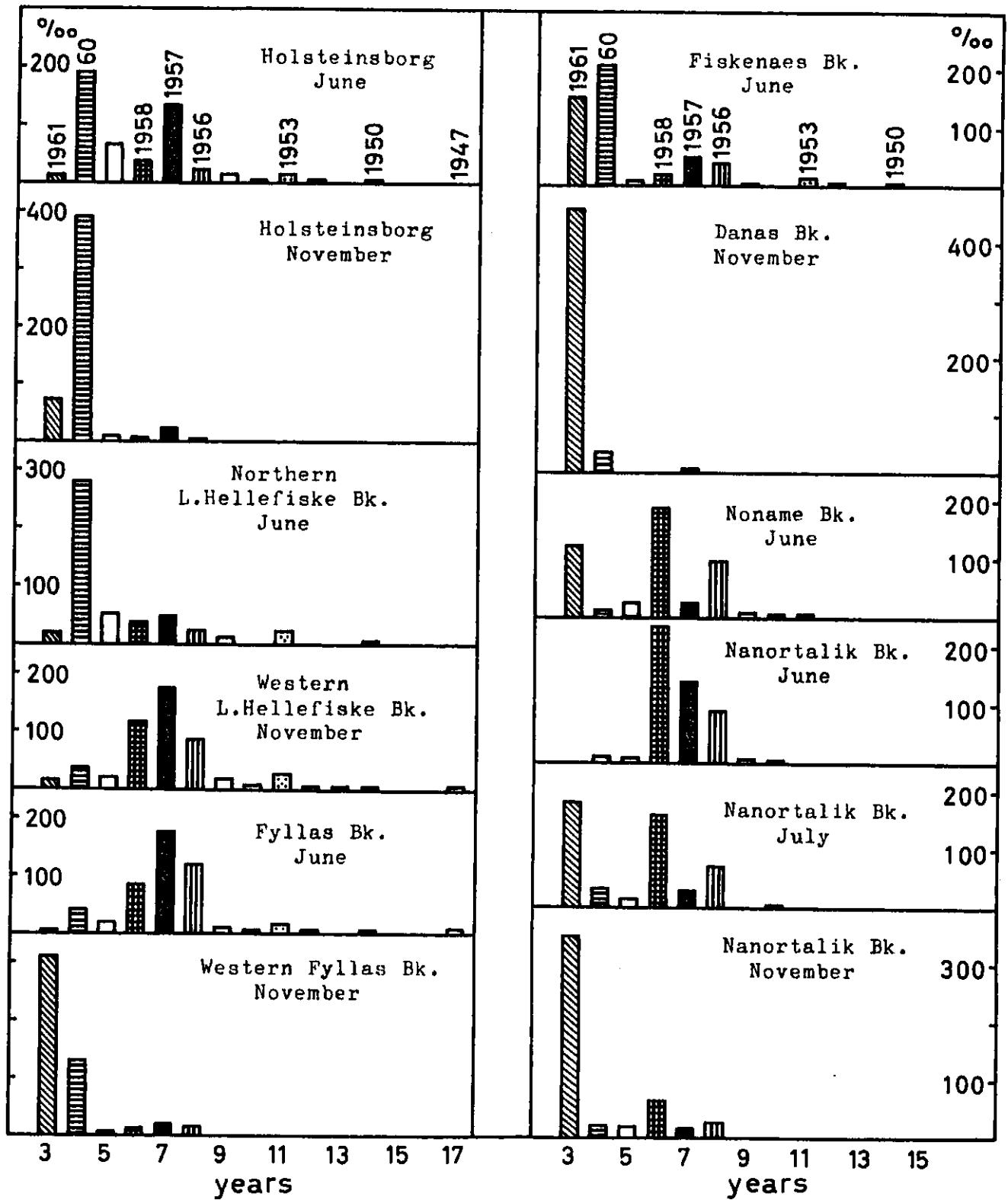


Fig.3 Cod. Age composition of research catches in 1964

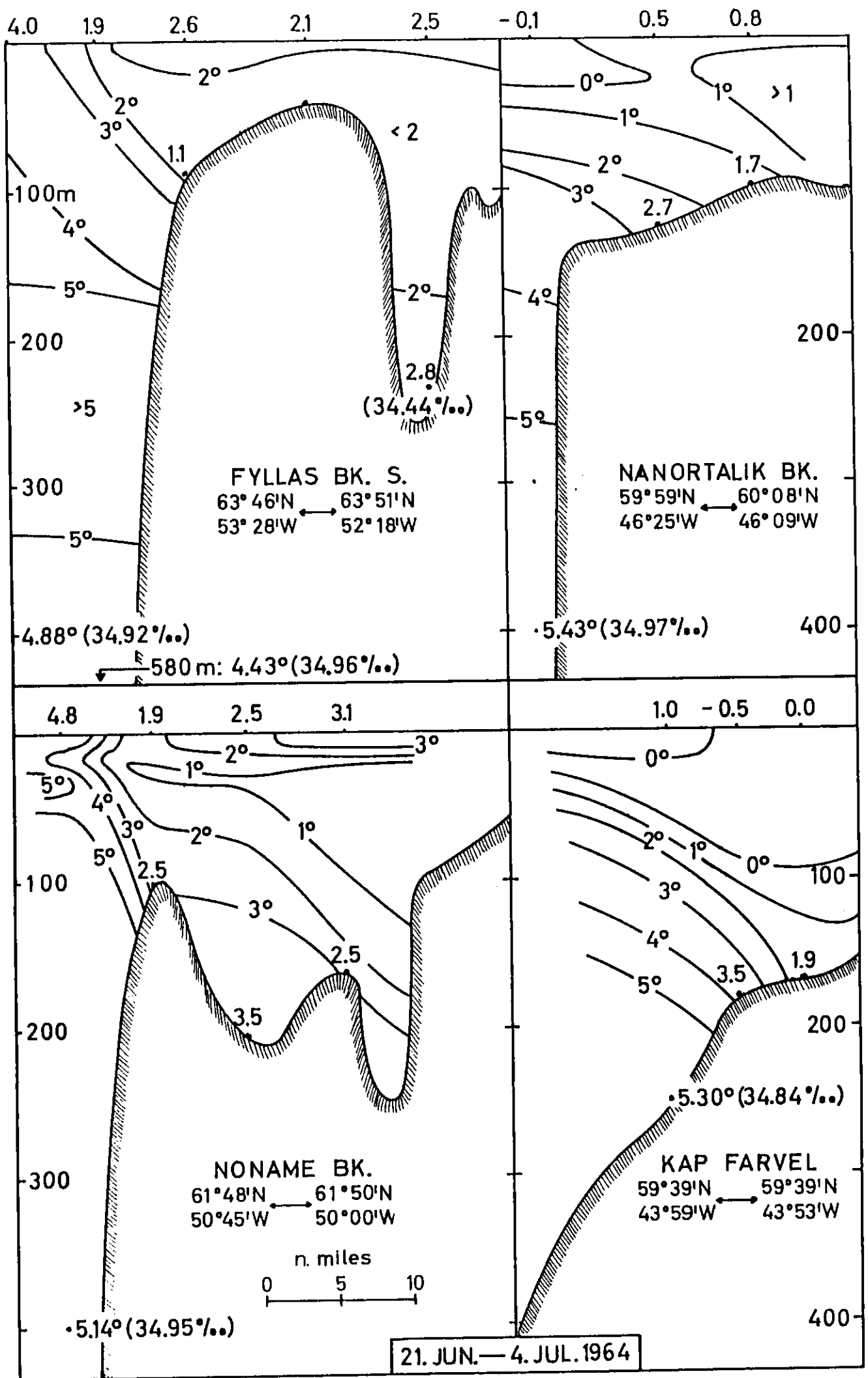


Fig. 4 Hydrographic sections off West Greenland, June-July 1964

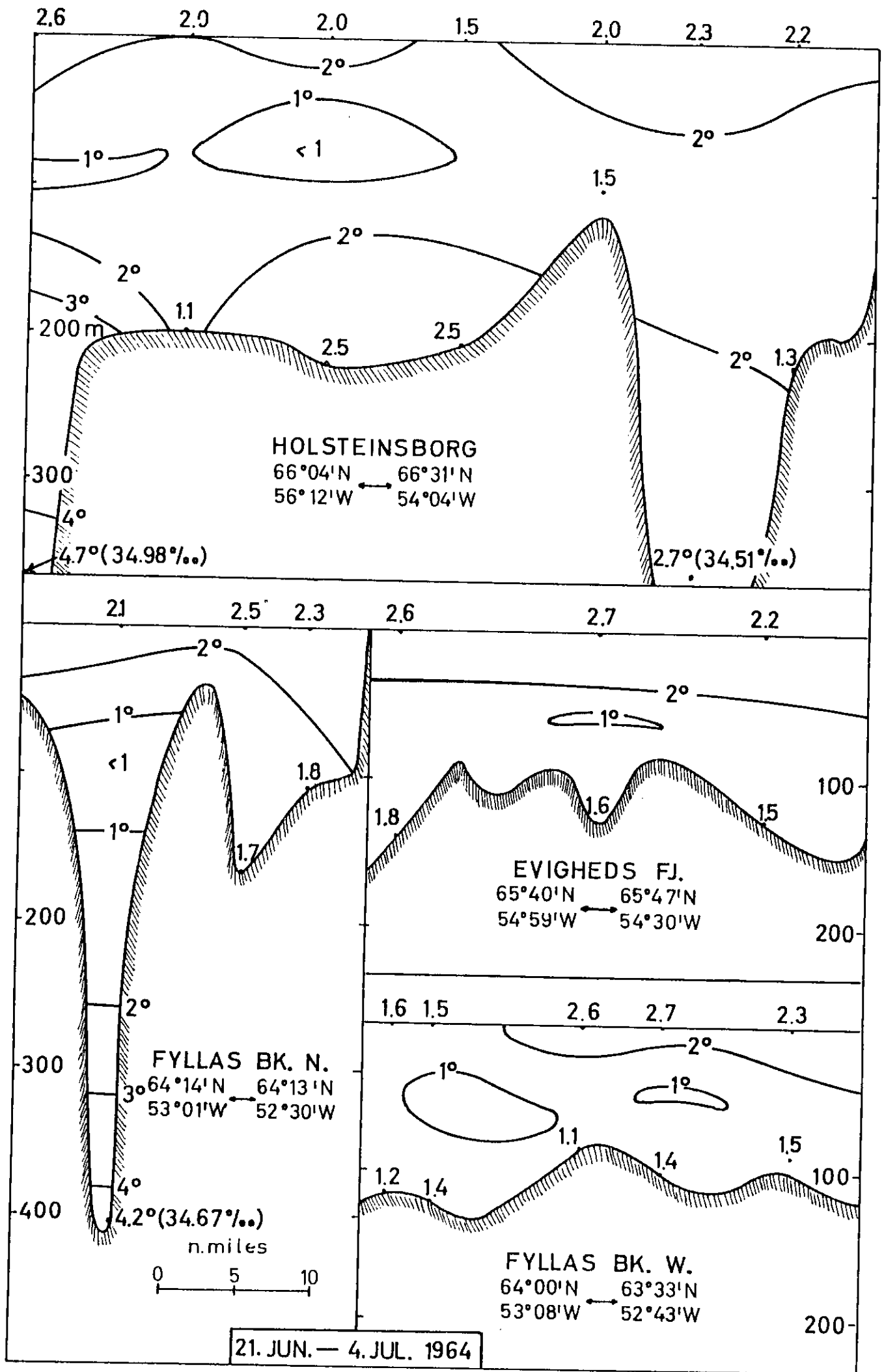
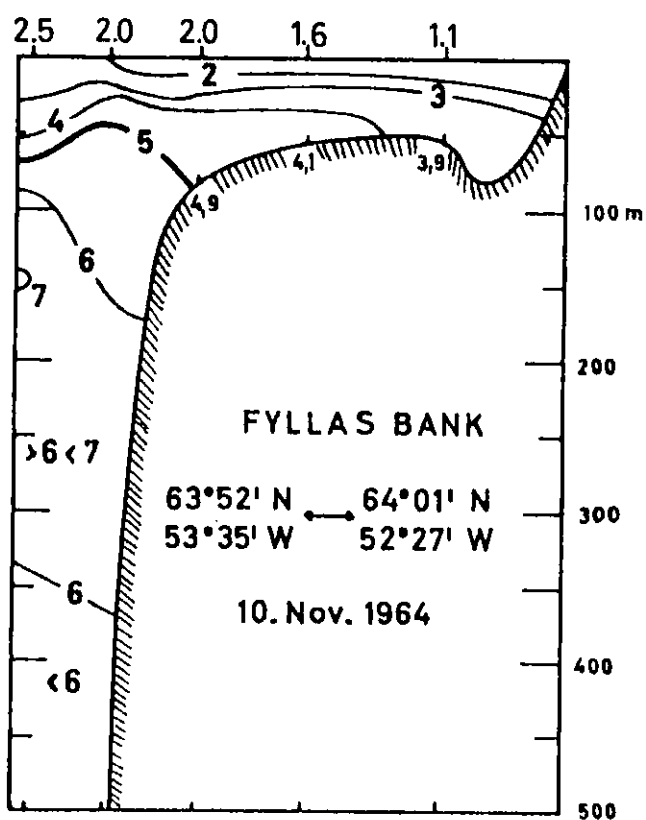
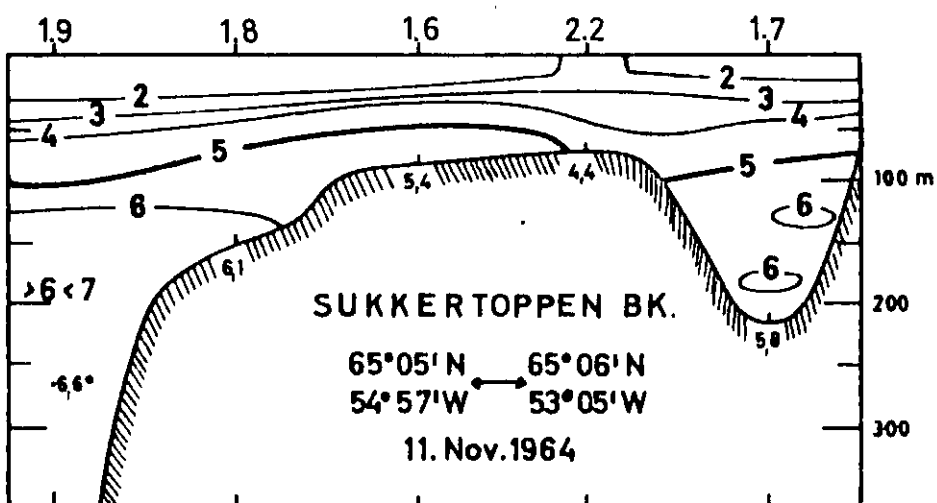
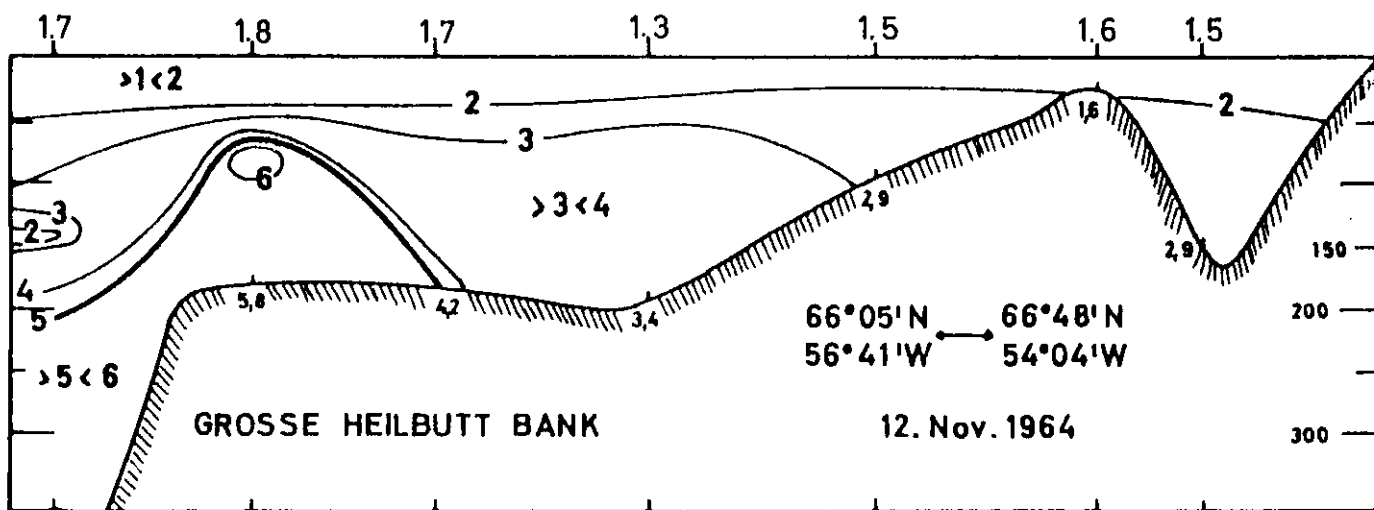


Fig. 5 Hydrographic sections off West Greenland, June-July 1964



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Fig.6 Hydrographic sections off West Greenland, November 1964

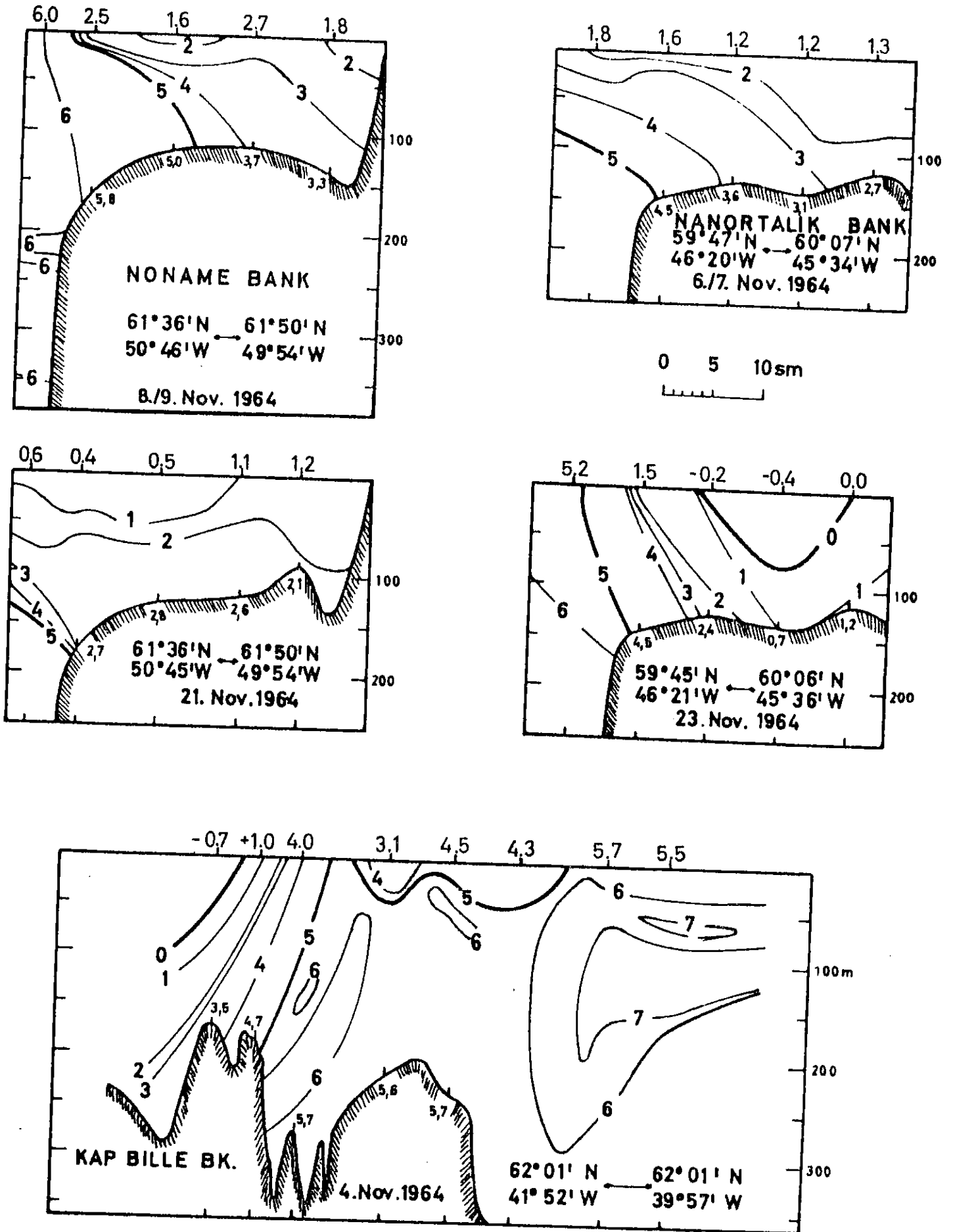


Fig.7 Hydrographic sections off West and Southeast Greenland, November 1964