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German Research Report, 1967

Subarea 1 and East Greenland

by Arno Meyer

A. Status of the Fisheries

I. General

In 1967 German trawlers again fished off West Greenland throughout the year. Compared with earlier years there are now two trends in the German fishery in Subarea 1.

1. The percentage of landings of fresh, iced fish is decreasing (1967: only 12% of the round fresh weight of all fish landed). On the other hand the percentage of deep-frozen fish is rapidly increasing (1967: 70%). The share of salted products varies from year to year depending on the German and international market situation. In 1967 18% of the round fresh weight of fish sold for direct human consumption were salted.

2. Most fishing in Subarea 1 is carried out from December to June/July. Fishing activity during the slack period from July/August to November decreased more and more in the last two years, because of the low and not paying catches during these months (Fig. 1). Many trawlers are fishing now during the summer and fall period for herring either in the North Sea, off NE Iceland or (since 1967) in Div. 5Z and 6A (see Part 3 of the German Research Report, 1967, by K. Schubert). Thus we notice anew a trend for only seasonal fishing of the German trawlers. But the time of the fishing season has changed, i.e. from a fishery, as in previous years (1952-58), from early summer to autumn into a fishery nowadays from early winter to late spring. And this has great biological consequences for the Greenland stock of cod. During winter and spring mostly the large and paying concentrations of the larger, mature cod are fished while during the summer and fall the scattered shoals of smaller, immature cod are caught more. Thus, the winter and spring fishery is not only much more profitable for the fisherman, but results in a much higher utilization of the Greenland stock of cod (see A. Meyer, Redbook 1967, Pt. III, p. 3-21), giving the young cod, (which grow very fast until they become mature and almost double their weight each year) the chance to grow and not caught too early.

As shown in Table 1, for the first time since 1962, the year 1967 brought a considerable increase in the output of the German fishery off West Greenland as well as off East Greenland. The total nominal catch in Greenland waters increased by 44% from 134,000 tons to 193,000 tons. In 1967 the waters off Greenland were again the most important fishing grounds for German trawlers. The biggest increase was in Subarea 1, where the nominal catch increased by 53% from 102,000 tons to 156,000 tons, while the effort increased by only 34%. Thus the catch per fishing day after permanent decreases since 1962 increased for the first time from 21.7 tons to 24.7 tons per day. But we have to bear in mind that this increase in catch per unit effort is not only caused by better stock conditions, but is also the consequence of the trend to seasonal fishery mentioned above, that is less fishing during the 1967 slack period with its very low catches per fishing day. On the contrary, off East Greenland the increase in catch to 38,000 tons was only caused by a corresponding higher fishing effort. The catch per fishing day was again 17.5 tons, the same as in the preceding two years.

The mentioned trend to more seasonal fishing in winter and spring also gives the explanation for the decrease in the percentage of industrial fish (Table 1). The same applies for the decrease

in discarded fish in Subarea 1 (Table 2) from 1,264 tons in 1966 to 356 tons in 1967. But this decrease is also affected by less activity of those trawlers fishing only for fresh iced fish. Table 3 shows that the average gross tonnage of German trawlers fishing in 1967 in Subarea 1 for the first time has not further increased.

II. Cod

The great increase in nominal catch in 1967 was only due to the increase in catches of cod, particularly in Subarea 1. Here the nominal catch increased by 66% to 138,000 tons and the average catch per fishing day rose to 21.9 tons. The latter figure is the highest since the German trawlers started fishing in Subarea 1 in 1952. Also off East Greenland catches and catch per fishing day increased.

III. Redfish

The catches of redfish decreased further. The total output off West Greenland as well as off East Greenland was the lowest ever experienced. The same is true of the average catch per fishing day.

IV. State of Fisheries in the first 4 months of 1968 and forecast for the coming years

As expected the German trawlers again had a successful winter season due to the rich 1961 year-class. But a lot of factory trawlers left Greenland for off Labrador even larger concentrations were found. Because of the bad market situation for fresh frozen cod, almost no wet fish trawlers worked off West Greenland. Those few trawlers fishing for wet fish were working in Div.1E and 1F with the intention of catching redfish also.

In 1968 therefore there will probably again be a decrease in nominal catch as well as in effort and probably also a small drop in catch per unit effort. Possibly none of the next at least 5 following years will reach the 1967 figures. The trend observed in the German fishery off West Greenland for a real seasonal fishery only during winter and spring will continue. Possibly already in 1968 or 1969 German trawlers will stop fishing in Subarea 1 during the slack period.

B. Special Research Studies

I. Environmental Studies

1. Hydrography. Again, as in the preceding 4 years in late autumn several hydrographic stations from Cape Farewell to Great Halibut Bank were worked for temperature and salinity (Fig. 2-3). The Atlantic component of the West Greenland Current was well developed with temperatures up to 6° in the south, 5.45°C off Fyllas Bank, and 4.13°C off the southern part of Great Halibut Bank. As can be seen from Table 4, the temperatures on the slope of the shelf and on the banks were partly considerably lower in 1967 than in the very warm years 1964 and 1965.

The salinity of the Atlantic water was the highest ever found, and this observation can be taken for granted, for all salinity measurements were made twice. With the exception of the most northern section the salinity everywhere reached 35‰. The highest salinity was found off Fylla Bank in 910 m with 35.30‰. Even off the slope of the southern Great Halibut Bank in 300 m depth a salinity of 34.73‰ was measured. Thus again in winter 1967 off West Greenland probably there will be a great difference in salinity between the upper and the deeper water layers. This could possibly have caused a stratification and a diminution of the convection and the heat exchange during the first months of 1968. The consequence of such a hydrographic situation could be a poor year-class of cod again in 1968 (see Blindheim, Redbook 1967, Pt.IV, p.86-105).

For the first time Walther Herwig ran in the middle of the Davis Strait across the "Greenland-Baffinland Ridge" a south-north section along 58°W from 63°30'N to 66°25'N. Figure 4 shows on its left side the left branch of the West Greenland Current in depths of 200-1000

m on its way to Baffinland and Labrador. The temperature in the centre of this current was more than 5°C and the salinity ranged between 34.70 and 34.95‰. On the right side of the section beyond 200 m lies the deeper water of the Baffin Bay with temperatures between 1°C to 2.9°C and salinities from 34.00 to 34.56‰. The very sharp frontier between these two water masses was found at the end of October just in 65°N. In the upper water layers we see the very cold "Baffinland Current" running southward. The coldest water of less than -1°C flows in a depth of 70 to 200 m. Its salinity is 33 to 34‰. The salinity at the surface ranged between 32.43 and 32.78‰.

We know from the Denmark Strait that the Arctic bottom water passes in pushes or waves the ridge. From this very interesting section across the "Baffinland Ridge" we get the impression that on the northern side of the ridge (right side of the section) just a new wave of water with more than 2°C temperature and more than 34.50‰ salinity is approaching from the north to pass the ridge.

II. Biological Studies

1. Cod. The age determinations revealed - as predicted in the last report - that the very rich year-class 1961 (according to Horsted (1967) the second strongest since 1947) was the main reason for the increase in the catch per unit effort in 1967. The concentrations of pre-spawners as well as those of the spawners and post-spawners of this year-class (either first or second time spawners) made up 50 to 60% of the total catch on all fishing grounds in Div. 1D to 1F (Fig. 5a-d). The good 1960 year-class accounted for 20 to 30% during the winter and spring season. The age determinations again showed that fishing effort off West Greenland during the sixties was so high that after ten years of age even rich year-classes have completely lost their commercial importance as can be seen from the very low percentage of the rich 1957 year-class.

In winter and spring the percentage of industrial fish or discards is mostly nil or negligible. In summer however this percentage rises, especially when the trawlers lose the shoals of post-spawners which more and more disperse during their feeding migrations. Already in June on Fylla and Lille Hellefiske Bank, of 1,000 fish utilized for human consumption, at least 550 small fish had to be turned to fish meal (Fig. 5e). This demonstrated that during summer the younger year-classes 1962 to 1964, cod of 3 to 5 years of age, made up more than 50% of the catches by numbers.

The research catches of Walther Herwig (Fig. 6) show best the real age composition in autumn. Because of the wide dispersion during the feeding migration of the 1960 and 1961 year-class and the weakness of the 1962 to 1964 year-classes the catches were small. The research ship fished with a 110 mm net and it was again interesting to note that, e.g. off Holsteinsborg (where two biologists of Walther Herwig boarded a German factory trawler and measured the catches fished at the same time on the same ground) the commercial trawler not only had the same poor catches as the research ship but that the average length composition of cod was slightly smaller than that found on board Walther Herwig. This shows again (see A. Meyer, Redbook 1967, Pt. III, p.13 and Fig. 3) that for several reasons the effective mesh size of commercial trawlers is much smaller than the measured one and that biologists are right in taking 100 mm as the effective mesh size in their recent stock calculations and stock assessments.

The age composition found by Walther Herwig on the different fishing grounds shows clearly that the mentioned trend to seasonal winter and spring fishing by the German trawlers and a possible future temporary cessation of the Greenland fishery during the more or less unprofitable slack period would result in a very simple but effective conservation method for the stock of

small, immature cod in Subarea 1. Germany is by far the leading fishing nation in Greenland waters. Thus the new trend to increased herring fishery in autumn will be of some benefit for the Greenland cod fishery and is in itself a new form of a conservation measure in regulating the fishery of heavily fished stocks.

Off Southeast Greenland (Fig. 7a-c) the percentage of the 1961 year-class reached up to 80% in 1967, as well in winter as in summer. This shows that the 1961 year-class is not only of West Greenland origin but is especially of East Greenland origin. Owing to the later onset of maturity, the percentage of this year-class makes up only 20% on the real spawning grounds (Fig. 7b). On the spawning grounds Bille and Falker Bank, the 1960 and the 1957 year-classes were of greatest commercial importance. Further to the north on Heimland Ridge, Angmagssalik, and especially on Dohrn Bank (Fig. 7d-e), the East Greenland year-class 1958 was again, as in 1966, by far the most important year-class during the spawning season. The other good East Greenland year-class 1956 is decreasing; however the few, though very large, 11-year-old cod of 87 to 117 cm (average 97 cm) of length and 6 to 15 kg of weight are still of great commercial importance. During autumn, also on Dohrn Bank, the 1961 cod were by far the strongest year-class (Fig. 7e).

While mostly the year-class composition off Iceland and off East Greenland is almost the same, it is interesting to note that, for the first time, a strong East Greenland year-class is only of medium size in Icelandic waters. For mostly with 8 years the majority of an East Greenlandic year-class matures and migrates to the spawning grounds off East Greenland, we may expect a very profitable fishery for spawning cod in March and April 1969, possibly (if ice conditions are not too bad) with a greater total output than in the record year 1964, when the good 1956 year-class matured. Of further interest will be whether the 1961 year-class will only spawn off East Greenland or will also migrate to Iceland.

2. Redfish. New special studies for ageing of redfish began in the laboratory in Bremerhaven. The first results will be discussed at the Redfish Symposium in Lowestoft in 1968.

3. Haddock. Small quantities of haddock - up to 100 baskets per trip - are often caught mostly in the winter months off Southeast Greenland. These haddock are always large. The average length of a market sample in February 1967 was 64.9 cm. The age composition is given in Table 5. We cannot say whether the haddock off SE Greenland is a small and independent Greenlandic stock. In some years we found young haddock off SW Greenland. From the comparison with the Icelandic age composition of catches of German trawlers off SW Iceland in April-May 1967 we might presume that this could be an independent small stock. A captain also reported to have seen large female haddock with running eggs off Southeast Greenland.

Table 1

German nominal catches in tons (industrial fish included) off Greenland, 1962-1967

Year	days fishing	Cod	catch per fish.day	% ind.cod	Redfish	catch per fish.day	% ind.refd.	Total	catch per fish.day	% ind.total
West	1962	133,404	20.3	5.1	57,902	8.8	5.2	200,932	30.5	7.7
	1963	152,934	21.3	4.2	44,355	6.2	4.7	202,923	28.3	8.6
Greenland	1964	107,982	19.1	7.7	22,956	4.1	10.0	137,794	24.4	10.9
	1965	107,127	18.2	13.3	18,476	3.1	10.3	131,445	22.3	14.7
(Subarea 1)	1966	82,928	17.7	12.8	14,911	3.2	6.1	102,029	21.7	13.1
	1967	137,773	21.9	9.1	13,600	2.2	3.0	155,606	24.7	9.4
East	1962	14,317	8.6	0.5	25,032	15.1	1.2	40,999	24.7	1.2
	1963	13,677	6.3	0.5	31,368	14.4	1.4	47,700	21.9	2.2
Greenland	1964	29,400	8.9	0.2	38,154	11.6	2.3	71,364	21.7	2.5
	1965	11,746	4.3	0.6	33,491	12.2	4.5	47,877	17.5	4.4
	1966	7,231	4.0	0.7	23,222	12.7	6.3	32,006	17.5	6.0
	1967	13,025	6.0	0.1	22,879	10.6	4.7	37,803	17.5	4.4
Total	1962	147,721	17.9	4.6	82,934	10.1	4.0	241,931	29.3	6.6
	1963	166,611	17.8	3.9	75,723	8.1	3.3	250,623	26.8	7.4
Greenland	1964	137,382	15.4	6.1	61,110	6.8	5.2	209,158	23.4	8.0
	1965	118,873	13.8	12.1	51,967	6.0	6.5	179,322	20.8	11.9
	1966	90,159	13.8	11.8	38,133	5.8	6.2	134,035	20.5	11.4
	1967	150,798	17.8	8.4	36,479	4.3	4.1	193,409	22.9	8.4

Table 2

Discarded fish in Subarea 1 in 1967 in tons

	Cod	Redfish	Spec.unknown	Total
1B	48	0	2	50
1C	185	0	63	248
1D	344	11	76	431
1E	35	8	35	78
1F	17	18	14	49
Total	629	37	190	856

Table 3

Average gross tonnage of German trawlers fishing in Subarea 1 from 1962 - 1967

1962	832 BRT	(589 - 1561)
1963	864 BRT	(566 - 1561)
1964	890 BRT	(648 - 1561)
1965	1015 BRT	(651 - 2557)
1966	1094 BRT	(537 - 2557)
1967	1095 BRT	(632 - 2557)

Table 4
in different depths

Temperatures (°C) in late autumn of 1963-1967 on the western slopes and on the banks of Nanortalik, Fyllas and Great Halibut Bank

Year date	Nanortalik (60°N)					Fyllas Bank (64°N)					Great Halibut Bank (66°40'N)						
	772					772					772						
	500	400	300	200	150	500	400	300	200	100	500	400	300	200	100	on the Bank	
1963	-	-	-	-	-	9.Dec. 5.3	4.7	4.3	3.1	0.9	0.8-0.2	7.Dec. -	5.1	5.0	4.2	2.0	2.0- -0.1
1964	6.Nov. -	-	-	>5	5.0	10.Nov. <6	<6	>6	>6	5.2	5.0-3.9	12.Nov. -	-	-	5.8	3.0	2.9-1.6
	23.Nov. -	-	-	>6	5.0												
1965	19.Nov, 6.4	6.4	6.4	6.2	4.7	21.Nov. 6.1	6.1	6.0	5.0	2.5	2.7-2.1	30.Nov. -	5.3	5.4	5.1	2.6	2.0-0.0
1966	8.Oct. 5.7	5.3	4.4	3.8	3.6	13.Oct. 6.0	5.9	5.8	5.6	2.6	2.6-2.4	-	-	-	-	-	-
1967	4.Nov. 5.4	5.3	4.9	4.2	3.7	1.Nov. 4.8	5.2	5.0	3.6	2.0	2.0-1.2	27.Oct. 1.9	2.5	3.8	2.8	1.7	1.8-1.5

Table 5

Age composition of haddock caught off South East Greenland in February 1967 and off South West Iceland in April-May 1967 in ‰.

year-class	S.E. Greenland	S.W. Greenland ^{Iceland} (autumn)
1964	-	12
1963	64	264
1962	203	304
1961	248	143
1960	243	250
1959	219	12
1958	23	1
1957	-	13
1956	-	1

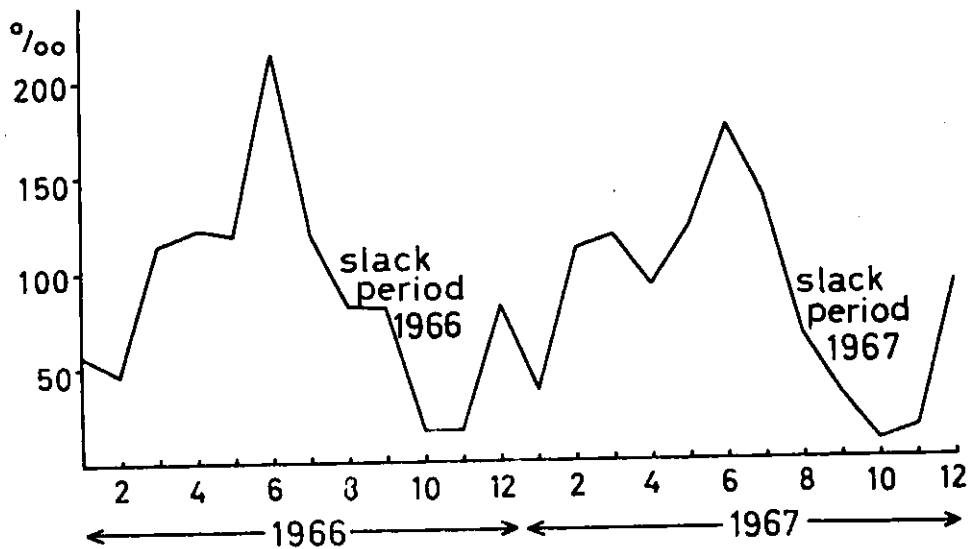


Fig. 1. Monthly herring landings (in round fresh weight) from Subarea I in 1966 and 1967 in ‰ of the total yearly landing. Because of the long trips of the factory trawlers, the corresponding curve for the time of the catches would lie 1-1½ month to the left.

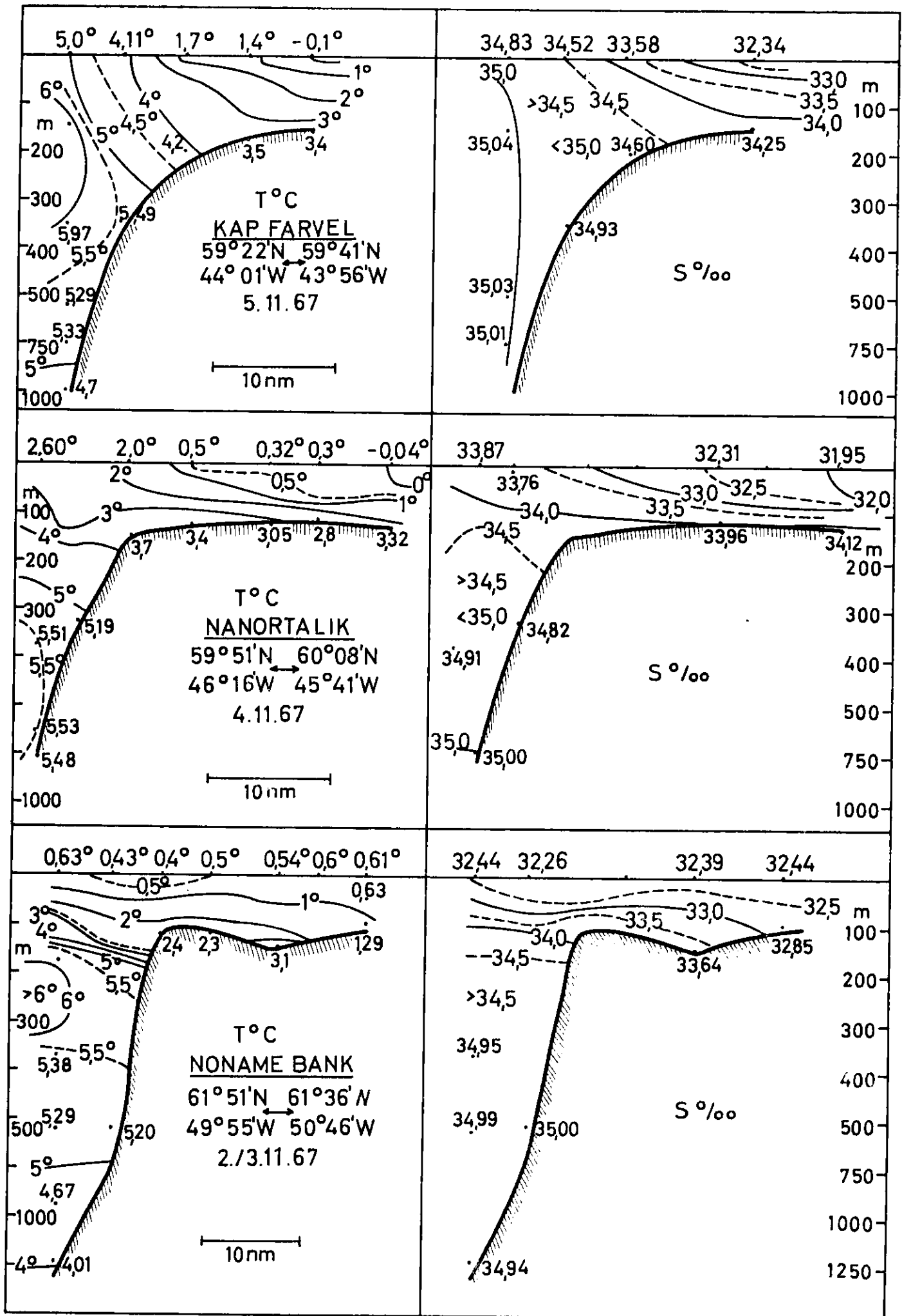


Fig. 2. Hydrographic sections off West Greenland (temperature and salinity) in October/November 1967.

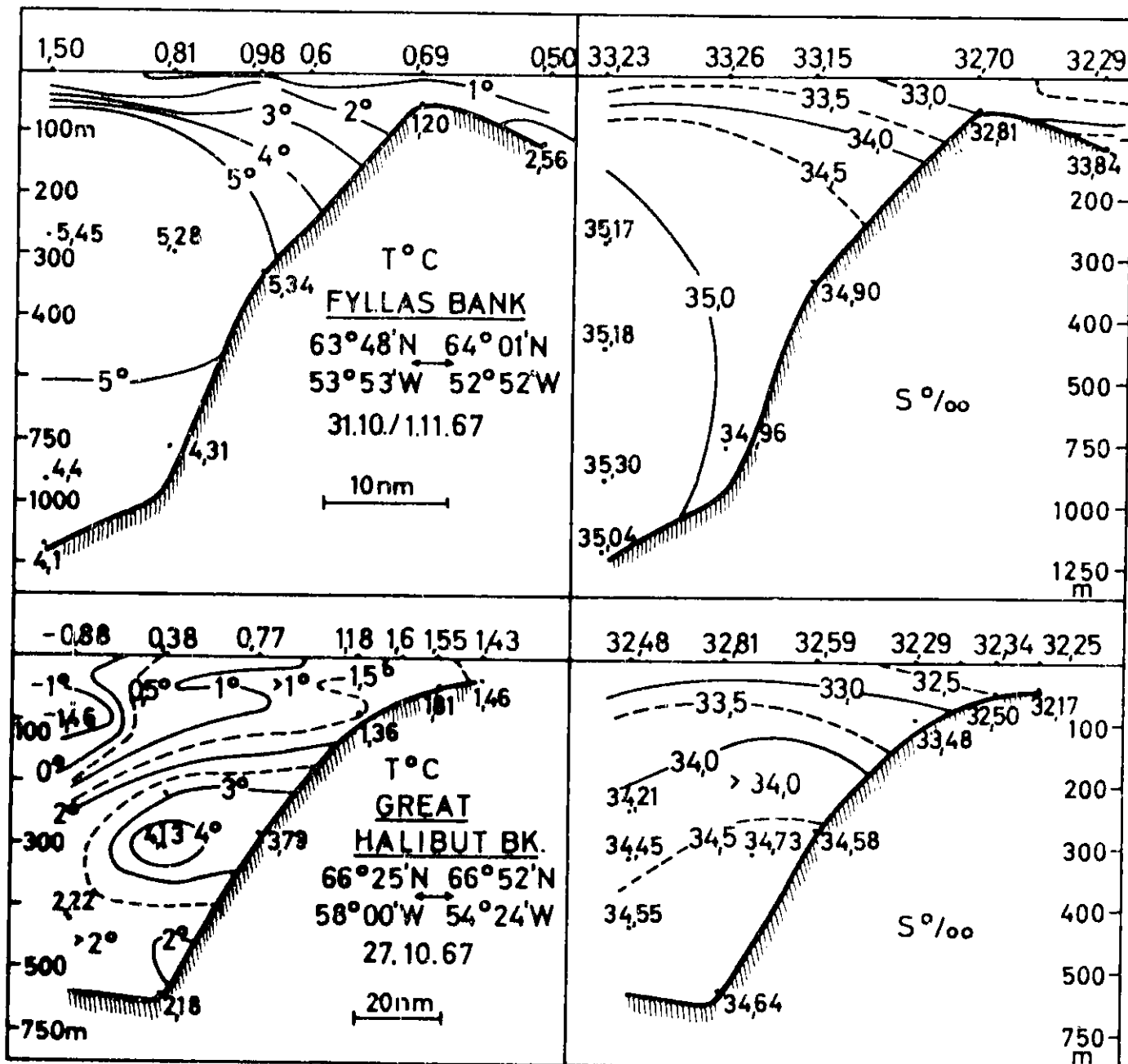


Fig. 3. Hydrographic sections off West Greenland (temperature and salinity) in October/November 1967.

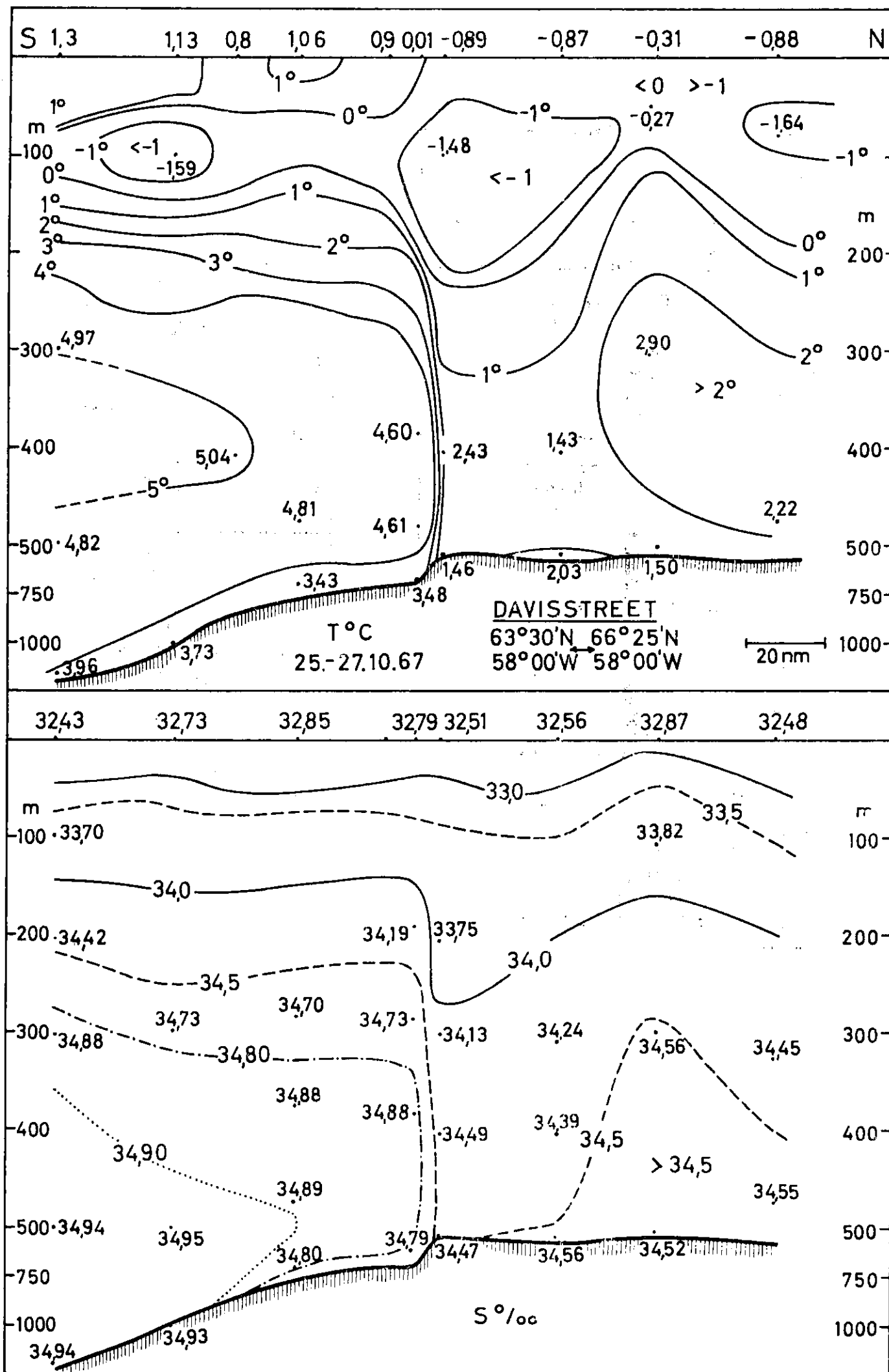


Fig. 4. Hydrographic section across the "Greenland-Baffinland Ridge" along 58°W from 63°30'N to 66°25'N (temperature and salinity) on 25-27 October 1967.

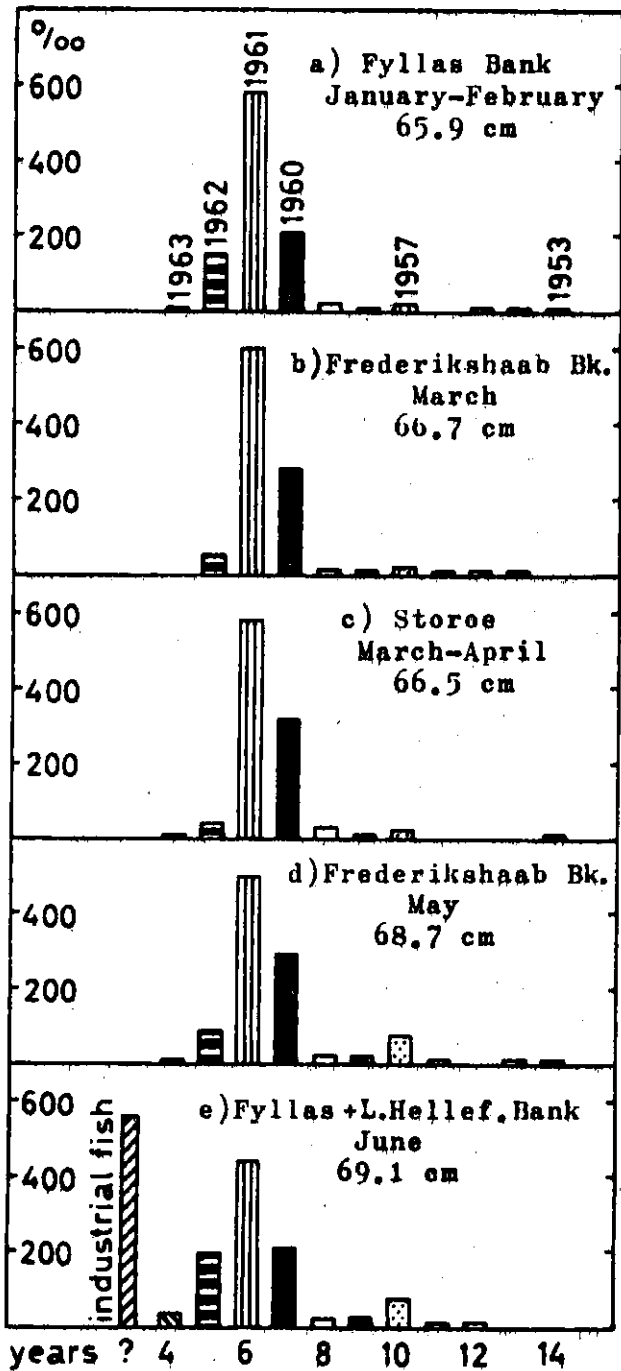


Fig. 5. Age composition of commercial catches in Subarea 1 in 1967 in %. Catches a-d without any industrial fish; catch e with additional industrial fish (see text).

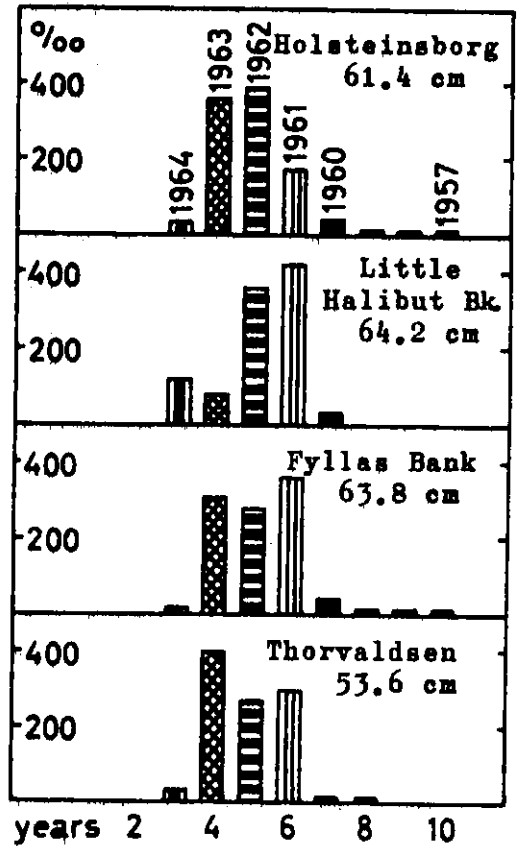


Fig. 6. Age composition of research catches of Walther Herwig in Subarea 1, October/November 1967 in %.

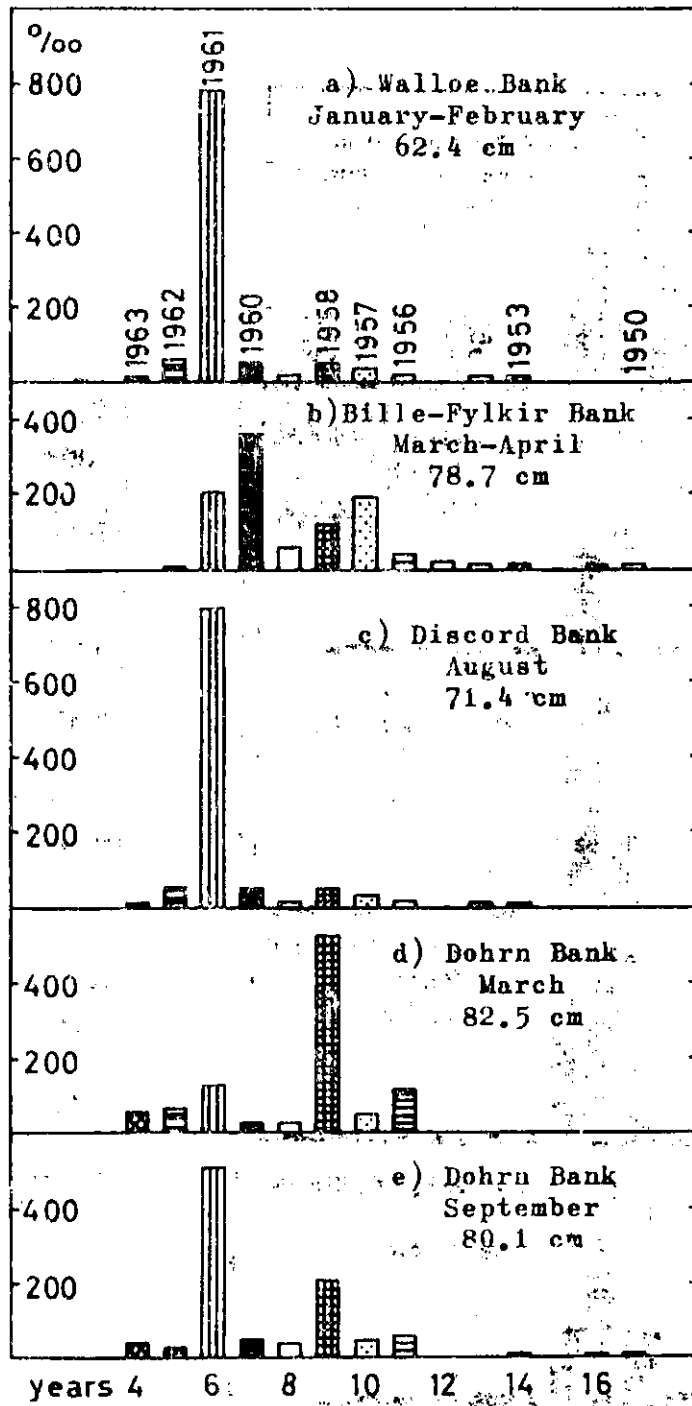


Fig. 7. Age composition of commercial catches off East Greenland in 1967 in %.



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German Research Report 1967

Subareas 2 - 4

by J. Messtorff

SUBAREA 2

A. Status of the fisheries

The German fishing activity as well as the total catch off Labrador decreased sharply in 1967. For comparison with the preceding years the nominal catches and catch per day fished of German trawlers from 1965 to 1967 are given in table 1. The quantities of fish discarded at sea are given separately for 1966 and 67 in table 3. Against 1966 the total catch of 1967 amounted to only 49 % and was still by 12.500 t less than in 1965. Although the fishing effort (days fished) decreased below the level of 1965 the average total catch per day fished dropped remarkably from 34.5 t (1965) to only 26.5 t in 1967.

As in the years before the main fishing operations took place at the beginning of the year from January to April. No fishery at all was carried out during July and August. Altogether there were only few trawlers which landed pure Labrador catches. Almost all fishing vessels operating in Subarea 2 were factory trawlers which often changed fishing grounds several times during one trip between Labrador and Greenland.

1. Cod

As in the years before the German fishery off Labrador was confined to a pure off-shore cod fishery (93 % of the total catch). The fishery during the seasons mentioned above took place namely in Divisions 2 H and 2 J along the edge of the continental shelf and on Hamilton Inlet Bank. As shown in table 1 the nominal catch of cod in 1967 reached barely half the yield of the year before and also the catch per day fished decreased considerably although the fishing effort was even lower than 1965.

2. Redfish

The redfish catches reported in table 1 have been entirely taken as by-catch of the off-shore cod fishery and amounted to nearly 5 % of the total catch in the Subarea. Compared with the preceding year the redfish proportion did not change significantly (4 - 5 %) and the catch per day fished remained on the same low level.

B. Special Research Studies

I. Environmental Studies

During a survey by R/V. Walther Herwig from 13-23 October four hydrographic sections across the Labrador Current (Fig. 1-3) were taken between Cape Chidley (2 G) and Hamilton Inlet Bank (27). The location of the fourth and southernmost sections coincided with the Canadian standard section from Seal Island across Hamilton Inlet Bank and was occupied on 19-20 October and one week later by the Canadian Rv. A.T. Cameron. For comparison both observations are published separately in Res. Doc. 68/96.

Off Cape Chidley (Fig.1) the frontier between the colder water masses of lower salinity from the Baffin Land Current and the warmer Atlantic water (isolines of 2° C and 34 ‰) reached the bottom at the slope of the shelf in almost 300 m. In 450 m bottom temperatures increased to 4.5° C and extremely high salinities up to 35.40 ‰ were recorded. Such high salinities were also found somewhat later on the same cruise off Westgreenland (Subarea 1). On the shelf shallower than 200 m water temperatures were found to be lower than 1° C from surface to bottom.

At the steeper slope of the shelf in the southern part of Division 2 G (Fig. 2) the 2° - respectively 34 ‰ - isolines already reached the bottom in abt. 200 m. But water warmer than 4.5° C did not reach the bottom until 1000 m and salinities did not exceed 35 ‰.

Similar hydrographic conditions were revealed by the third section in Division 2 H (Fig. 3). Here also the deep inshore channel west of the bank was supplied with warmer Atlantic waters of higher salinity in depths over 250 m, whereas the top of the bank was covered by cold water masses.

The hydrographical conditions at the southeastern slope of Hamilton Inlet Bank were found to be almost the same as described above. Only the core of the cold water near the shelf edge between 100 - 200 m was of greater volume at the time of the first observation.

II. Biological Studies

1. Cod. Due to the unsteady character of the German fishing operations off Labrador, only few samples for length and age distribution of commercial catches could be obtained from January until March. Compared with the length frequency distribution obtained in the same season of the preceding year about 22% more cod below 55 cm lengths were caught and the average length decreased from 61.1 cm (1966) to 57.8 cm (1967). Due to the relatively small number of samples, however, these figures might not be entirely reliable.

A survey was carried out by R/V Walther Herwig from 13-23 October to study the abundance of cod off Labrador (2 G-I) in autumn. On 33 stations preferably near the edge of the shelf where temperature conditions were more favourable and on Hamilton Inlet Bank 30 min. hauls with the bottom trawl were made. These include comparative fishing trials with the Canadian research vessel A.T. Cameron, the results of which are reported in Res. Doc. 68/96. Fishing conditions for cod were very moderate. Maximum catches of 1000 kg per hour trawling were obtained in the southern part of division 2G and in Division 2H. In Division 2I cod were considerably smaller (m. L. 45.5 cm) as in the northern Divisions (m. L. 53.0 cm)

2. Redfish For the same reasons as for cod no sampling of commercial catches could be obtained. During the survey carried out by R/V Walther Herwig in autumn the length distribution of adult redfish in the catches was determined and additionally some samples of young redfish could be obtained to study the validation of age determinations.

SUBAREA 3

A. Status of the Fisheries

The German fishing activity as well as the total catch in the subarea decreased considerably. For comparison with the preceding years the nominal catches and catch per day fished by German trawlers from 1965 to 1967 are given in table 2. Contrary to subarea 2 no fish have been reported as being discarded at sea. Against 1966 the total catch of 1967 amounted to only 10.6%. The fishing effort (days fished) reached only 11.6% of that of 1966, but the average total catch per day did not drop considerably. Fishery took only place in Divisions 3 k and 3 l and was restricted to several short visits of single trawlers at different times of the year.

1. Cod The cod fishery yielded 61% of the total catch from the subarea and amounted to only 6.9% of the catch in 1966. Also the catch per day fished decreased considerably against the years before.

2. Redfish The redfish catches increased by 17% against 1966 although there was a remarkable reduction in the total fishing effort as mentioned above. Accordingly the catch per day fished increased from 0.5 t in 1965 to 5.3 in 1967.

No Special Research Studies were carried out

SUBAREA 4

There was no German fishery in the subarea and no Special Research Studies were carried out.

Table 1: Subarea 2, nominal catches in tons (1965 - 1967) (including industrial fish - fish converted to fish meal on board)

year	days fished	catch	COD		REDFISH		OTHER FISH		TOTAL			
			catch per day fished	% industrial	catch per day fished	% industrial	catch per day fished	% industrial	catch per day fished	% industrial		
1965	1323	41556	31.4	13.3	2.2	1.2	1151	0.9	60.0	45598	34.5	13.8
1966	2132	63610	29.8	7.8	1.3	13.2	1541	0.7	46.4	67901	31.8	8.9
1967	1251	30589	24.5	8.4	1.3	17.1	310	0.2	80.0	33115	26.5	9.3

Table 2: Subarea 3, nominal catches in tons (1965 - 1967) (including industrial fish - fish converted to fish meal on board)

year	days fished	catch	COD		REDFISH		Haddock*		Polllock*		OTHER FISH		TOTAL	
			catch per day fished	% industrial	catch per day fished	% industrial	catch	catch	catch per day fished	% industrial	catch per day fished	% industrial	catch per day fished	% industrial
1965	724	8147	11.3	3.1	1.5	4.2	44	6	1420	2.0	53.4	10674	14.7	9.9
1966	572	8806	15.4	15.6	0.5	36.7	-	-	268	0.5	80.2	9379	16.4	18.1
1967	66	613	9.3	18.3	5.3	2.0	-	-	39	0.6	43.6	999	15.1	13.5

*) Catch per day fished not calculated, because days fished not splitted into Divisions where Haddock and Polllock are abundant. - Industrial fish not known.

Table 3: Subarea 2, discarded fish per Division in tons 1966 and 1967 (not included in nominal catches of table 1)

Year	Total	COD			REDFISH			OTHER FISH			ALL SPECIES			
		2G	2H	2J	2G	2H	2J	2G	2H	2J	2G	2H	2J	
1966	564	40	200	324	32	-	32	8	39	63	706	48	239	419
1967	200	1	103	96	19	14	5	-	26	38	283	1	143	139

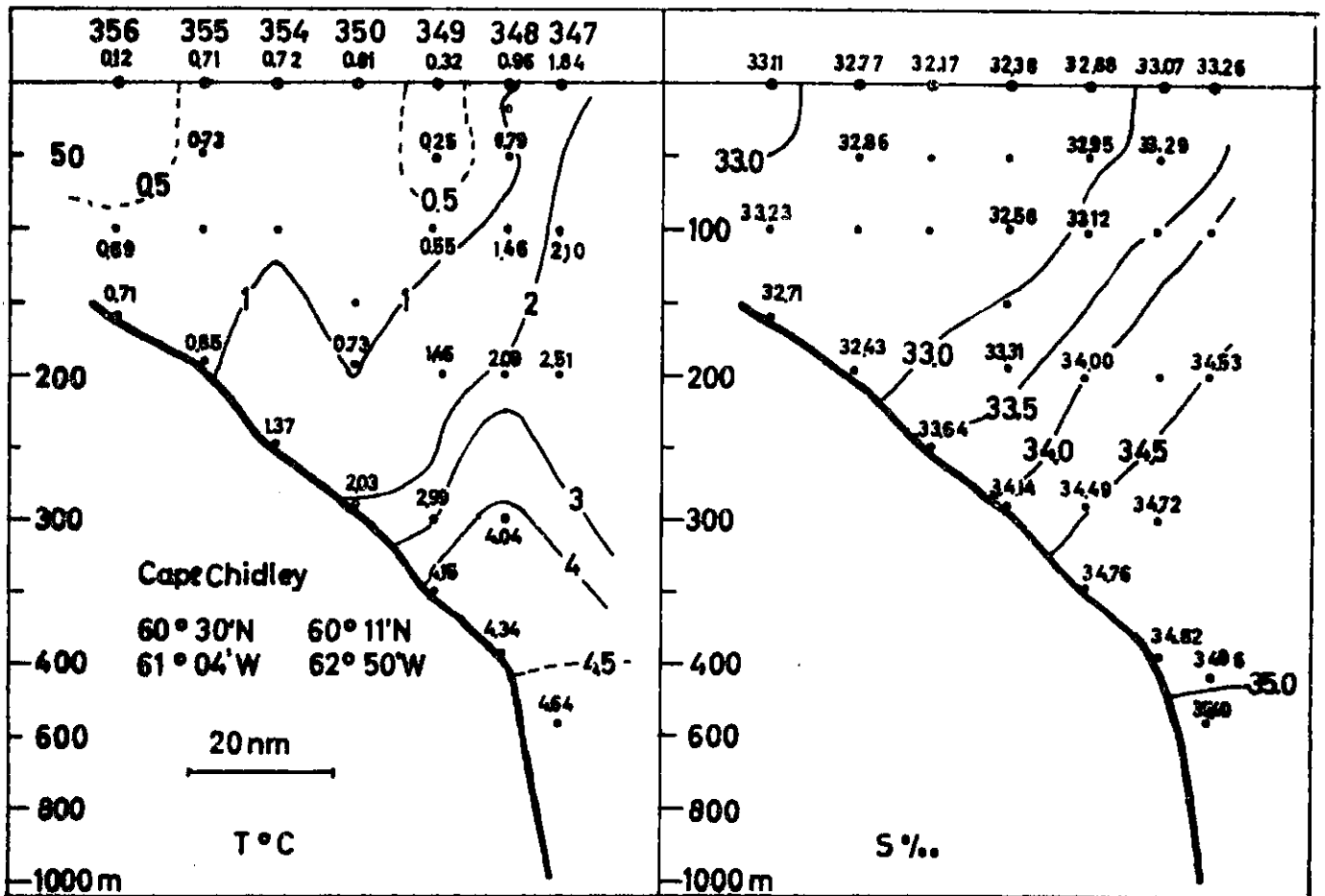


Fig.1. Temperature and Salinity distribution off Cape Chidley (2 G) compiled from Walther Herwig data, 13-14 October 1967.

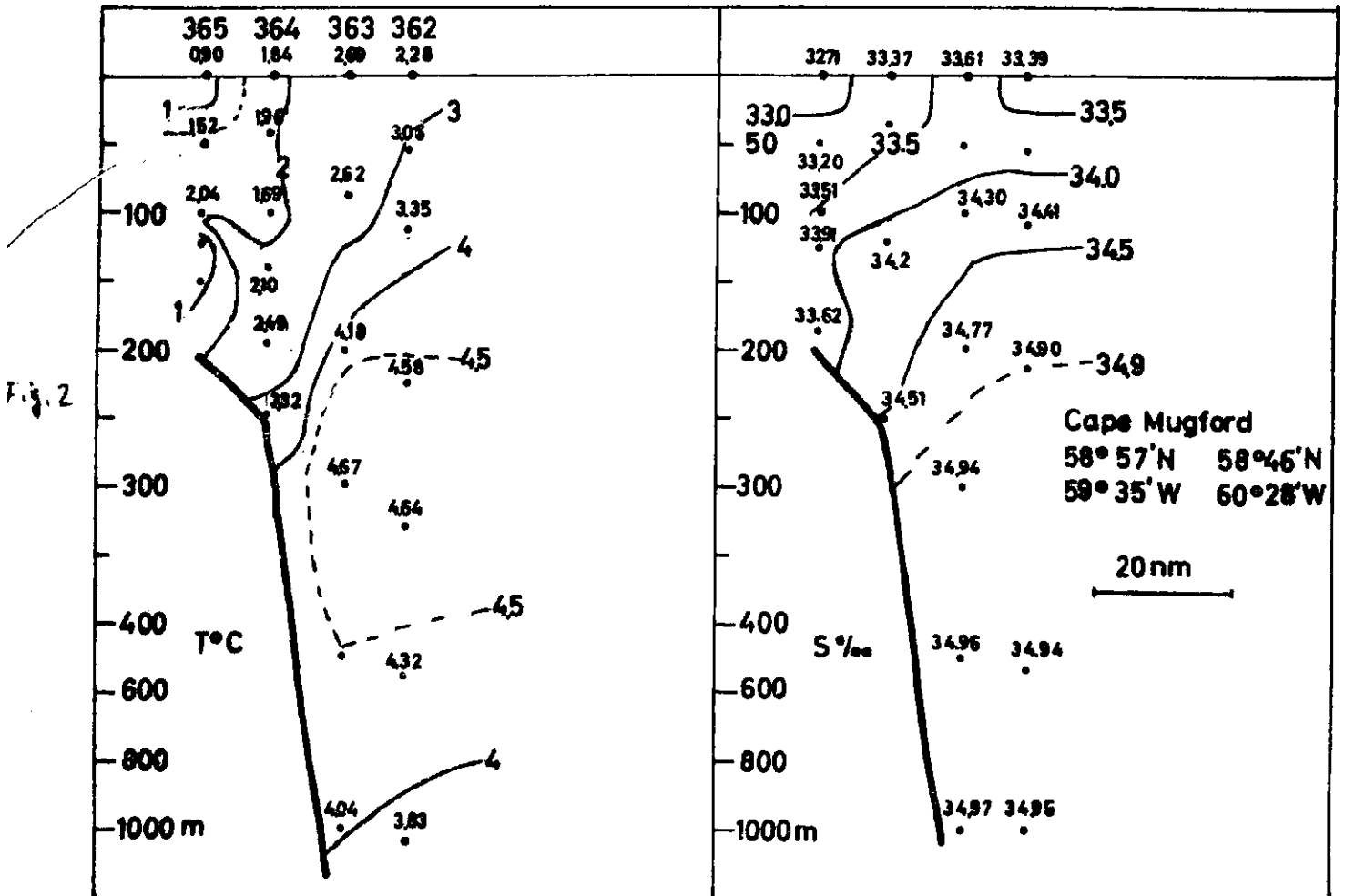


Fig.2. Temperature and Salinity distribution off Cape Vivuk (southern part of 2 G) compiled from Walther Herwig data, 16 October 1967.

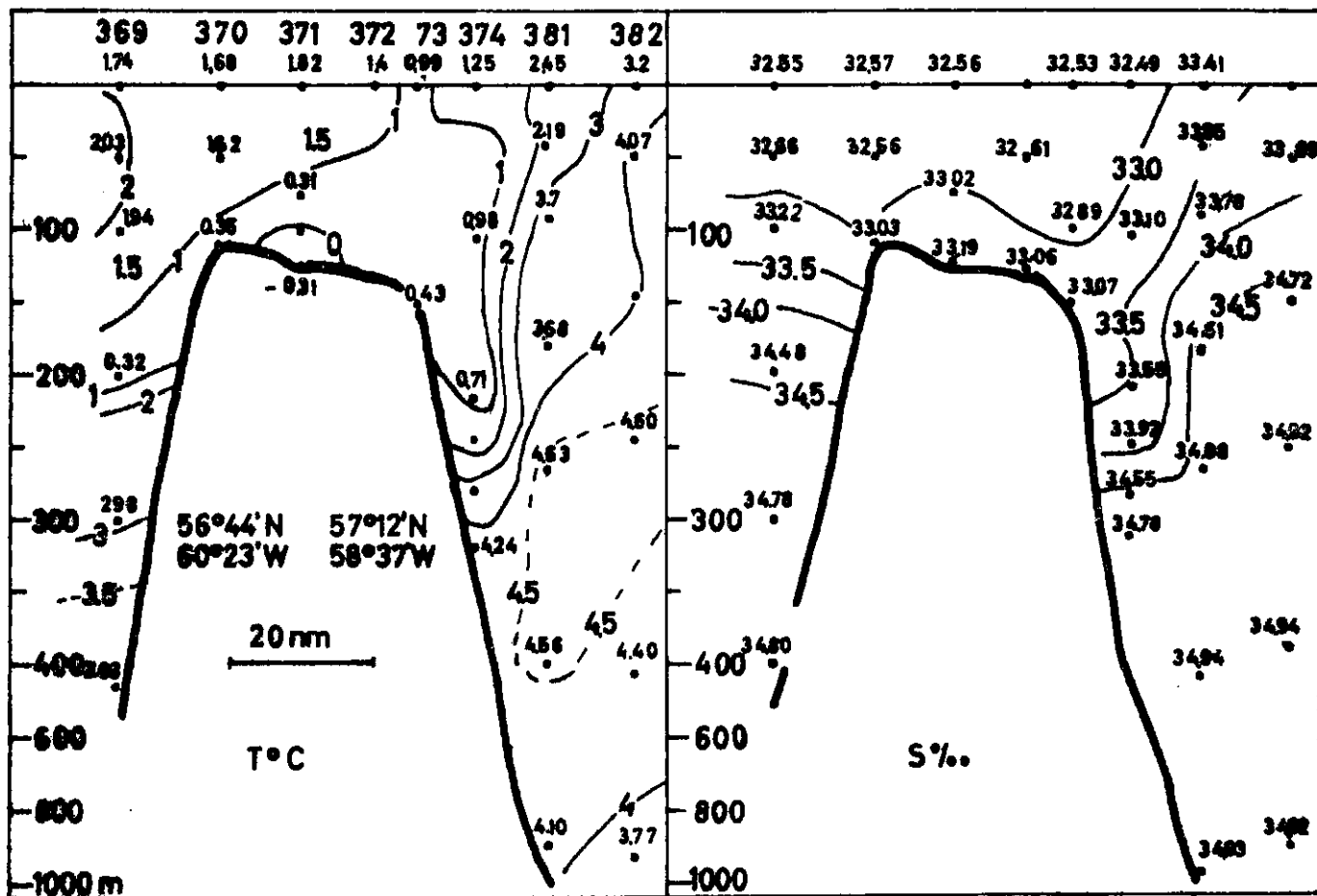


Fig. 3. Temperature and Salinity distribution off Dog Island (2 H) compiled from Walther Herwig data, 17-18 October 1967.



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German Research Report, 1967

Subarea 5 and 6

by K. Schubert

A. Status of the Fisheries

Thirteen stern freezer trawlers operated with pelagic nets in Subareas 5 and 6 and made 25 trips from July to December mainly for herring (99.6%). Catch, effort and catch per unit effort are given in Table 1.

Table 1. Nominal catch, effort and catch per unit effort of German (Fed. Rep.) factory freezer trawlers in Div.54 and 6A, August-December 1967, including industrial fish.

Month	Aug	Sep	Oct	Nov	Dec	Total
<u>Nominal catches (tons)</u>						
Herring	2,330	1,311	2,799	5,861	11,815	24,116
Mackerel	-	-	-	-	91	91
Spined Dogfish	-	-	-	-	2	2
Others	3	1	-	1	9	14
Total	2,333	1,312	2,799	5,862	11,917	24,223
<u>Catch per day (tons)</u>						
Herring	54.2	23.8	50.0	40.9	41.0	41.7
Mackerel	-	-	-	-	0.3	0.1
Spined Dogfish	-	-	-	-	0	0
Others	-	-	-	-	0	0
Total	54.2	23.8	50.0	40.9	41.3	41.8
<u>Effort</u>						
Trips	2	2	3	6	12	25
Days of trip	90	96	93	200	540	1,019
Days per trip	45.0	48.0	31.0	33.0	45.0	40.8
Fishing days	43	55	56	136	288	578
Fishing days per trip	21.5	27.5	18.7	22.7	24.0	23.1
Fishing hours	425	508	896	1,087	3,309	6,225
Fishing hours per trip	213	254	299	181	276	249
Fishing hours per day	9.9	9.2	16.0	8.0	11.5	10.8

Table 2 shows the discarded fish in these subareas.

Table 2. Fish discarded by German factory freezer trawlers in Div.54 and 6A, August-December 1967.

Month	Aug	Sep	Oct	Nov	Dec	Total
Species unknown	20	325	775	1,995	1,500	4,290

The fishing began in July on Georges Bank between 41°-42°N and 66°-67'W (See Div.52e). In August the fleet shifted along the northern slopes of the Bank to 68°30'N. With the beginning of spawning in September the fishing was between 67°-67°30'N. In the first ten days of October the trawlers continued fishing in the same area. However, in the second and third ten days they shifted westward where between 69°-69°30'W a good fishery was established until the first ten days of November. In the second ten days the herring was rediscovered near Nantucket Lightship (Div.52). They were often very runaway and moved westward. At the beginning of December the fleet was fishing off Long Island (Div.6A). The fishing ceased during the second ten days of December off New York and New Jersey (Fig.1).

Fig. 2 shows the daily catch per hour of a German freezer trawler during the season.

B. Research Work

I. Biological Studies

4 samples of 508 herring from different localities and months (September-December) were examined.

The average length of all herring was 30.41 cm. The length range varied from 24-35 cm, with a peak at 31 cm (Fig. 3).

Maturity stage 5 was predominant in the September sample (90%), whereas 6% and 4% were stages 4 and 6 respectively. The main spawning was in September between 67°00'N-67°30'N and around 42°W. The October sample showed that the spawning in this area was finished. Ninety-seven percent of the herring were spent and only 2.6% were maturity stage 5. However, we must suppose, after reports from the fisherman who found full herring (stage 5) in larger concentration in October between 68°-69'W along the 100 m line, that there are other spawning areas. The sample in the Nantucket area (Div.52w) in November was formed of spent herring (95.3%), only 4.7% were recovering fish. The sample in December from Div.6A showed that the maturity stage 8 was predominant (95%), 5% were spent herring (stage 7).

The investigation of meristic characters showed that the herring fished in the different months presumably belonged to the same stock. Table 3 shows the average number of vertebrae and gillrakers in herring in the different months.

Table 3. Meristic characters of herring, Div.52 and 6A, September-December 1967

Month	Sep	Oct	Nov	Dec
Vertebrae (av. no.)	56.33	56.37	56.37	52.21
Gillraker (av. no.)	49.68	50.20	49.62	49.79
No. of fish sampled	100	41	43	100

The age composition (Fig. 4) showed the predominance of the 1960 year-class (460%). This year-class, now 7-years-old, seems to be a very strong one. Of some importance also were the 1961 (185%), 1962 (165%) and 1963 (85%) year-classes.

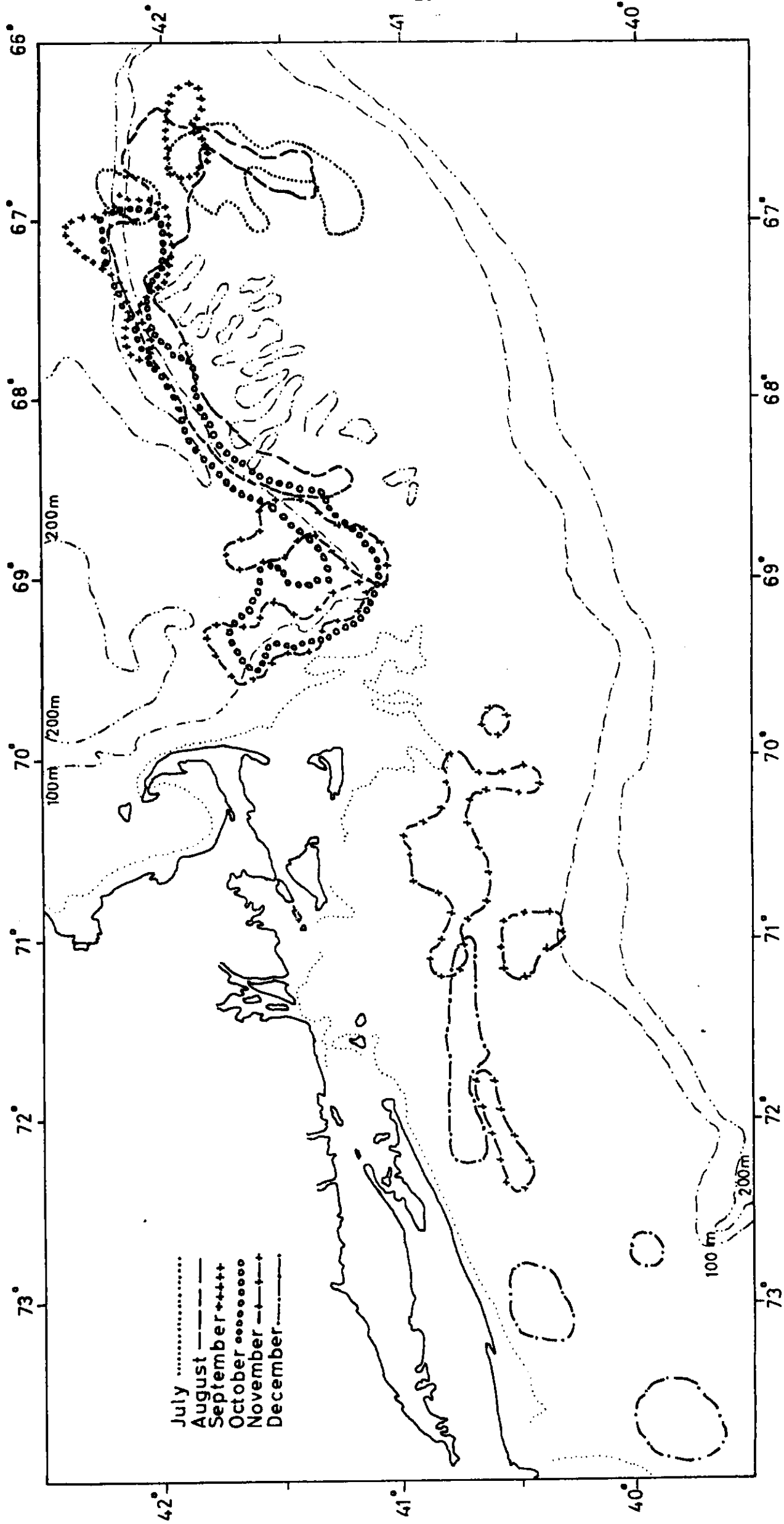


FIG. 1. Herring. Fishing area of German (Fed. Rep.) freezer trawlers in Div. 54 and 6A. July-December 1967.

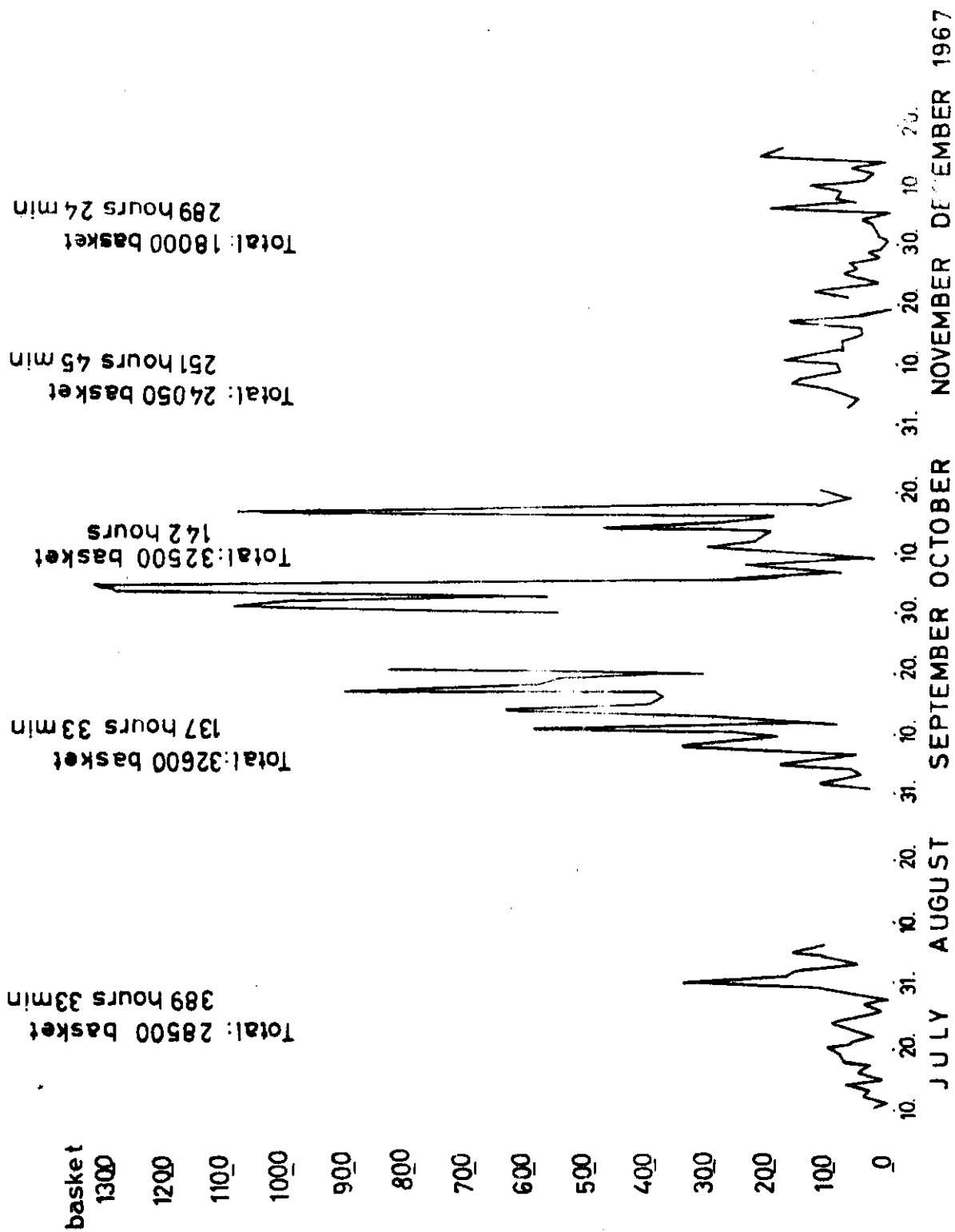


Fig. 2. Herring. Daily catch per hour (baskets) of Herring from trawlers in 617.51 and 6A. July-December 1967.

Fig. 3 Herring. Length composition. Div. 54 and 6A, September-December 1967

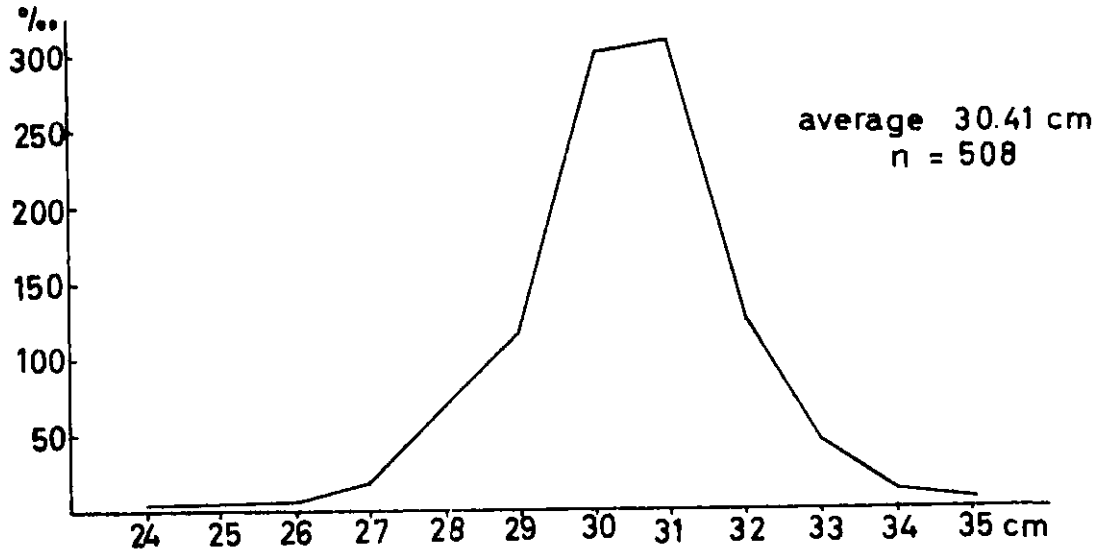


Fig. 4 Herring. Age composition. Div. 54 and 6A, September-December 1967.

