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Part I of 3 Parts)

ANNUAL MEETING - JUNE 1969

German Research Report, 1968

Subarea 1 and East Greenland

by Arno Meyer

A. Status of the Fisheries

I. Subarea 1

The two trends in the German fishery off West Greenland, mentioned in last year's report, continued:

1. The percentage of landings of fresh iced fish decreased further and made up only 6% of the round fresh weight of all landed fish. In 1968 most of the fish was deep-frozen and a small part salted (for export).

2. The trend to seasonal fishery from winter to early summer further increased, as is shown by Figure 1. From August to December the fishing activity off West Greenland nearly came to an end. More and more the German factory ships exploit the bigger cod only (the schools of prespawners, spawners, and postspawners), and thus preserve the schools of young immature cod, which mainly are fished in the second part of the year. Thus this new type of seasonal fishery during the first half of the year is of great benefit for better and more rational utilization of the Greenland stock of cod and has already reduced considerably the percentage of industrial fish and discards.

Table 1 shows that the nominal catch in Subarea 1 slightly decreased from 155,000 t to 146,000 t. This small decrease was not the consequence of unfavourable stock conditions but due to less fishing activity. Although fishery off West Greenland was very profitable a lot of trawlers left Greenland for Labrador (see Fig.1) where from February to middle of April extremely heavy concentrations were found (see Part II by J. Messtorff).

The good fishing conditions during the first half of 1968 off West Greenland resulted in a further increase in the average catch per fishing day to 22.8 t, the highest figure since 1952, when German trawlers started fishing in Subarea 1. This further increase in catch per fishing day was mainly due to the very paying catches by midwater trawls in Division 1E from end of May to the beginning of July.

On the other hand the decreasing trend in the redfish fishery continued, as well in total output as in catch per fishing day.

II. East Greenland

As a consequence of decreasing market demand for fresh iced fish German fishing activity off East Greenland decreased by 37%. The fishery, however, was better than during the 3 preceding years. The catch per fishing day increased as well for cod as for redfish.

III. Forecast for 1969

The two mentioned trends in the German fishery off West Greenland will continue. The fishing effort will decrease further and will be extremely high in the 2nd quarter of the year only. The catch per fishing day will probably increase further for: (1) the trawlers will only work during times with highest daily output, (2) all ships will be equipped with midwater trawls, (3) the very rich 1961 year-class will probably give its greatest output in 1969, all the more since all cod of this year-class will have reached maturity, and (4) the stock of mature fish will be enlarged by the spawners of the 1962

and 1963 year-classes. Owing to the probable poor state of the younger year-classes the following years will result in a continuing decrease in total output as well as in catch per fishing day. A further increase in mesh size at least to 150 mm and thus a better conservation of the young but very fast growing immature cod, would result in a much better utilization of the Greenlandic cod and help to reduce this impending decrease in total international output.

The total output of cod and redfish off East Greenland cannot be predicted. It is conditioned by the further market demand for fresh fish and as in all years by the varying ice conditions on the fishing grounds. The catch per day probably will increase further for (1) the mass of the 1961 year-class will spawn off East Greenland, and (2) the fishery on the rocky grounds of East Greenland is carried out more and more only by the few very experienced captains.

B. Special Research Studies

I. Environmental Studies

1. Hydrography. Unfortunately in 1968 there was no possibility to repeat the hydrographic work in late autumn as in the 5 preceding years. The *Walther Herwig* was ordered to go earlier and worked the standard sections from Cape Farewell to Great Halibut Bank already in July and August.

The hydrographic investigations (Fig. 2 and 3) showed, that the arctic component of the West Greenland Current was well developed and reached great depths. The 2°C isotherm went down to 200 and 250 m. The banks were covered by very cold water. On Fyllas Bank even temperatures below 0°C were measured. On Little Halibut Bank the temperatures in 60 to 200 m ranged between 0.6 and 0.9°C. Off South Greenland (Cape Farewell and Nanortalik Bank) low temperatures were also found. The western part of Noname Bank was covered exclusively by water of more than 2°C. Comparing these 1968 temperatures with those measured at the same time of the year by F. Hermann in 1961 and 1964 and by W. Templeman in 1965, we see that the July-August temperatures in 1968 were extremely low and that in 1961, 1964 and 1965 on Fyllás and Little Halibut Bank the temperatures were 2 to 2.5°C higher. Also, the surface temperatures were considerably lower in 1968. On the 24th July for instance, surface temperatures down to -0.31°C were found over Noname Bank. The Atlantic part of the West Greenland Current had temperatures up to 4.6°C, whilst in 1965 and 1964 more than 5°C was measured.

All captains fishing off West Greenland reported the most severe ice conditions ever experienced during the first half of the year 1968. Even in July and August *Walther Herwig* met great quantities of ice, forcing the ship on its way north to often steam westward, maximal up to 54°W.

In October 1968, *Anton Dohrn* worked 3 sections across Dohrn Bank. Two parallel sections from South to North showed that the eastern part of the bank was covered by very cold arctic water, the western part, however, by warm Atlantic water. A section across the northern part of Dohrn Bank parallel to the border of the shelf running from ENE to WSW (Fig. 4), gives a good picture of this hydrographic situation. The very cold arctic water of the East Greenland Current is coming from the North East. The warm water over the western part of the bank is water of a right branch of the Irminger Current. The water of this branch is running in northern direction along the eastern side of the Storfjord Deep and brings warm water to the Øst Bank area. There may be the possibility that in summer and fall the cod follows this warm water and that there may exist catch possibilities for cod along the eastern side of the Storfjord Deep and the western and northern part of the Øst Bank.

The rather cold bottom water in station 1152 with salinities of 34.80 to 34.90°/oo must be the so-called "intermediate water" originating from the left branch of the West Spitzbergen Current, which is running parallel to the East Greenland Current to the south and coming to an end between Dohrn Bank and Angmagssalik.

II. Biological Studies

1. Subarea 1. In 1968 the 1961 and 1963 year-classes of cod dominated, the 7 year-old in the first half of the year and the 5 year-old in the second half. Owing to the fact that the major part of these 2 year-classes are of East Greenlandic origin, the best fishing possibilities were off southwest and south Greenland. Fishery on the northern banks gave bad results and we must conclude that the younger year-classes are poor.

Again in 1968 no real spawning places were found off West Greenland. After spawning, very big concentrations of postspawners mixed with a varying percentage of older immature cod were fished in Div. 1E. These very inactive schools were mostly pelagic and were successfully fished by midwater trawls. Figure 5 gives the age composition of these schools on Frederikshaab Bank. The year-class 1961 dominated with 55%, followed by the 1962 year-class with 29%. Maturity studies showed that in the middle of June 12% of the 5 year olds, 65% of the 6 year olds , 82% of the 7 year olds and 100% of the 8 year old cod were mature and had spawned. Towards the end of the pelagic fishing season the percentage of immature cod increased, thus showing that the spawned fish left the area and were starting for feeding migration.

The main task of the research trip of *Walther Herwig* in July and August was to search for further catching possibilities by midwater trawl. But all pelagic echo traces found were not schools of commercial fish but consisted of capelin, sand-eels, squids, jelly fish and young flat-fishes. The catches of cod with bottom trawl on the northern banks (1B - 1D) were more than poor. Only in the southern part of Div. 1E and on Nanortalik Bank some cod concentrations were found on the bottom. In these catches the 1963 year-class dominated with 50 to 60%. A similar age composition was also found in cod catches of the few commercial trawlers fishing off South Greenland in the last quarter of the year.

2. East Greenland. Also off East Greenland, most cod was fished during the first half of the year. The age composition shows that off Southeast Greenland, Angmagssalik and Dohrn Bank the 1961 year-class dominated with 55 and 59% respectively. On the spawning grounds off southeast Greenland (Discord, Bille and Fylkir Bank) the 1960 year-class was second strongest with 17%, whilst off Angmagssalik and in the Dohrn Bank area the 1961 year-class was followed by the 1963 year-class.

In spring 1968 a considerable emigration of the 1961 year-class from Greenland to the Icelandic spawning grounds must have occurred. This can be deduced from the age composition of the Icelandic cod catches off southwest and northwest Iceland. Further arguments are the reduced mean length of the 7 year old cod in Iceland and the structure of the otoliths. This immigration into Icelandic waters already in 1968 was rather unexpected, for normally east Greenlandic year-classes emigrate to Iceland at 8 years of age. We may expect that in 1969 a further emigration to Iceland of this very rich year-class will take place (see Meyer; German investigations of Icelandic cod 1953-1968, Annales Biologiques, Vol. 25, 1969).

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Berichte der DWK, N.F. Band XV, 1959

ble 1. German nominal catches in tons (industrial fish included) off Greenland, 1962-68.

	Year	days fishing	Cod	catch per fish.day	% ind.cod	Redfish	catch per fish.day	% ind.redf.	Total	catch per fish.day	% ind.total
West Greenland (Subarea 1)	1962	6,584	133,404	20.3	5.1	57,902	8.8	5.2	200,932	30.5	7.7
	1963	7,175	152,934	21.3	4.2	44,355	6.2	4.7	202,923	28.3	8.6
	1964	5,639	107,982	19.1	7.7	22,956	4.1	10.0	137,794	24.4	10.9
	1965	5,882	107,127	18.2	13.3	18,476	3.1	10.3	131,445	22.3	14.7
	1966	4,696	82,928	17.7	12.8	14,911	3.2	6.1	102,029	21.7	13.1
	1967	6,305	137,773	21.9	9.1	13,600	2.2	3.0	155,606	24.7	9.4
	1968	5,819	132,498	22.8	5.3	11,858	2.0	1.8	146,432	25.2	5.3
East Greenland	1962	1,660	14,317	8.6	0.5	25,032	15.1	1.2	40,999	24.7	1.2
	1963	2,182	13,677	6.3	0.5	31,368	14.4	1.4	47,700	21.9	2.2
	1964	3,287	29,400	8.9	0.2	38,154	11.6	2.3	71,364	21.7	2.5
	1965	2,734	11,746	4.3	0.6	33,491	12.2	4.5	47,877	17.5	4.4
	1966	1,827	7,231	4.0	0.7	23,222	12.7	6.3	32,006	17.5	6.0
	1967	2,157	13,025	6.0	0.1	22,879	10.6	4.7	37,803	17.5	4.4
	1968	1,361	9,825	7.2	0.2	15,432	11.3	2.0	26,417	19.4	2.0
Total Greenland	1962	8,244	147,721	17.9	4.6	82,934	10.1	4.0	241,931	29.3	6.6
	1963	9,357	166,611	17.8	3.9	75,723	8.1	3.3	250,623	26.8	7.4
	1964	8,926	137,382	15.4	6.1	61,110	6.8	5.2	209,158	23.4	8.0
	1965	8,616	118,873	13.8	12.1	51,967	6.0	6.5	179,322	20.8	11.9
	1966	6,523	90,159	13.8	11.8	38,133	5.8	6.2	134,035	20.5	11.4
	1967	8,462	150,798	17.8	8.4	36,479	4.3	4.1	193,409	22.9	8.4
	1968	7,180	142,323	19.8	4.9	27,290	3.8	1.9	172,849	24.1	4.8

Table 2. Discarded fish in Subarea 1 in tons, 1968

	Cod	Redfish	Spec.unknown	Total
1B	1	-	-	1
1C	470	15	78	563
1D	649	36	105	790
1E	0	36	54	90
1F	26	30	56	112
Total	1146	117	293	1556

Table 3. Average gross tonnage of German trawlers fishing in Subarea 1, 1968

1962	832 G.R.T.	(589 - 1561)
1963	864 G.R.T.	(566 - 1561)
1964	890 G.R.T.	(648 - 1561)
1965	1015 G.R.T.	(651 - 2557)
1966	1094 G.R.T.	(537 - 2557)
1967	1095 G.R.T.	(632 - 2557)
1968	1163 G.R.T.	(640 - 2557)

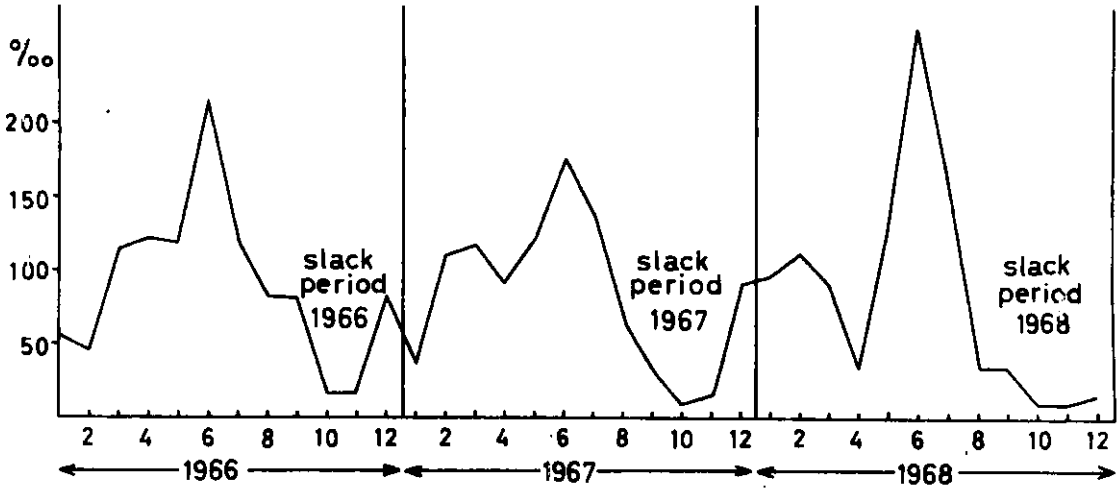

Fig.1. Monthly German landings (in round fresh weight) from Subarea 1 in 1966, 1967, and 1968 in percent of the total yearly landings. Because of the long trips of the factory trawlers, the corresponding curve for the time of the catches would lie 1 - 1½ month to the left.

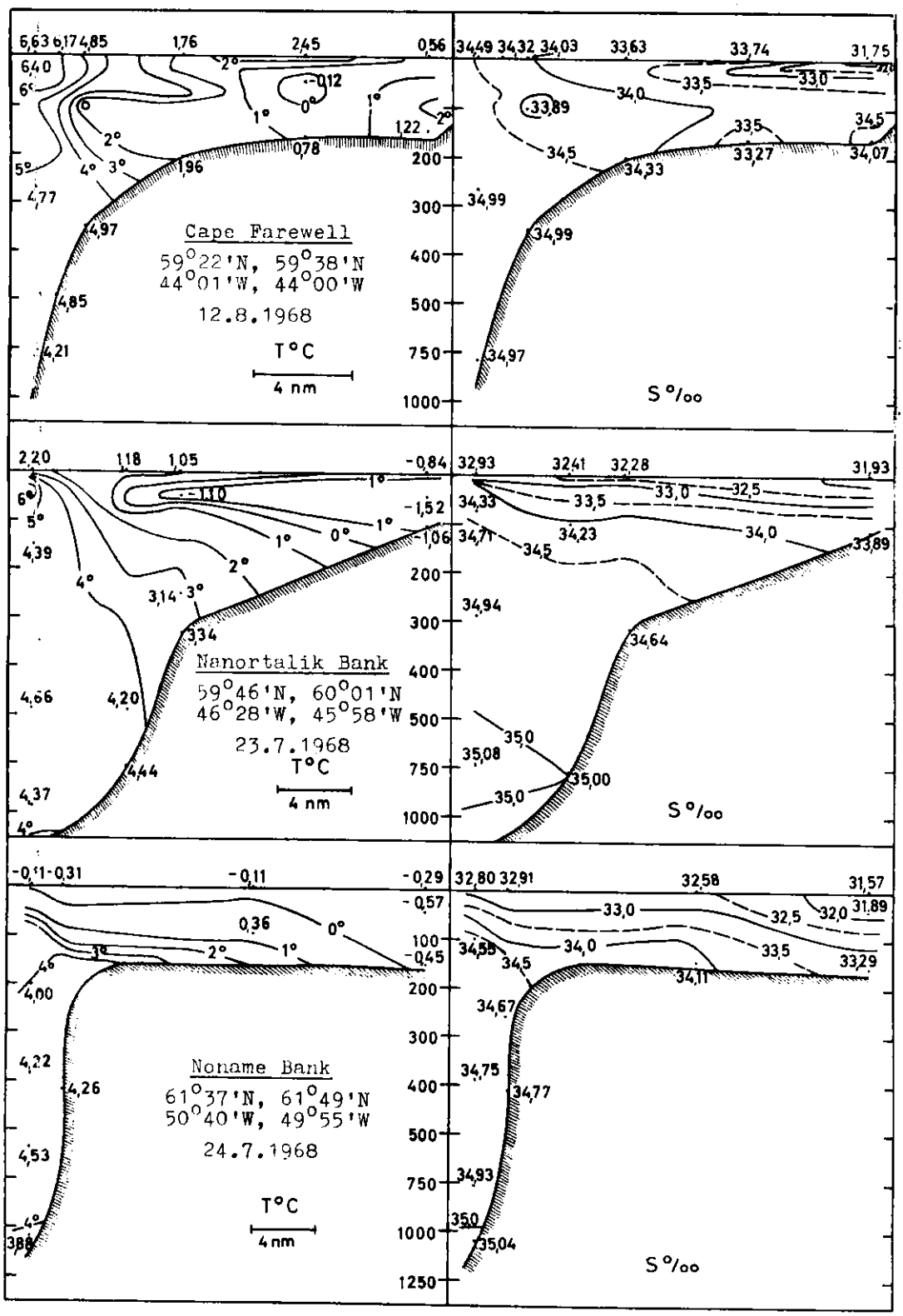

Fig.2. Hydrographic sections off West Greenland (temperature and salinity) in July-August 1968.

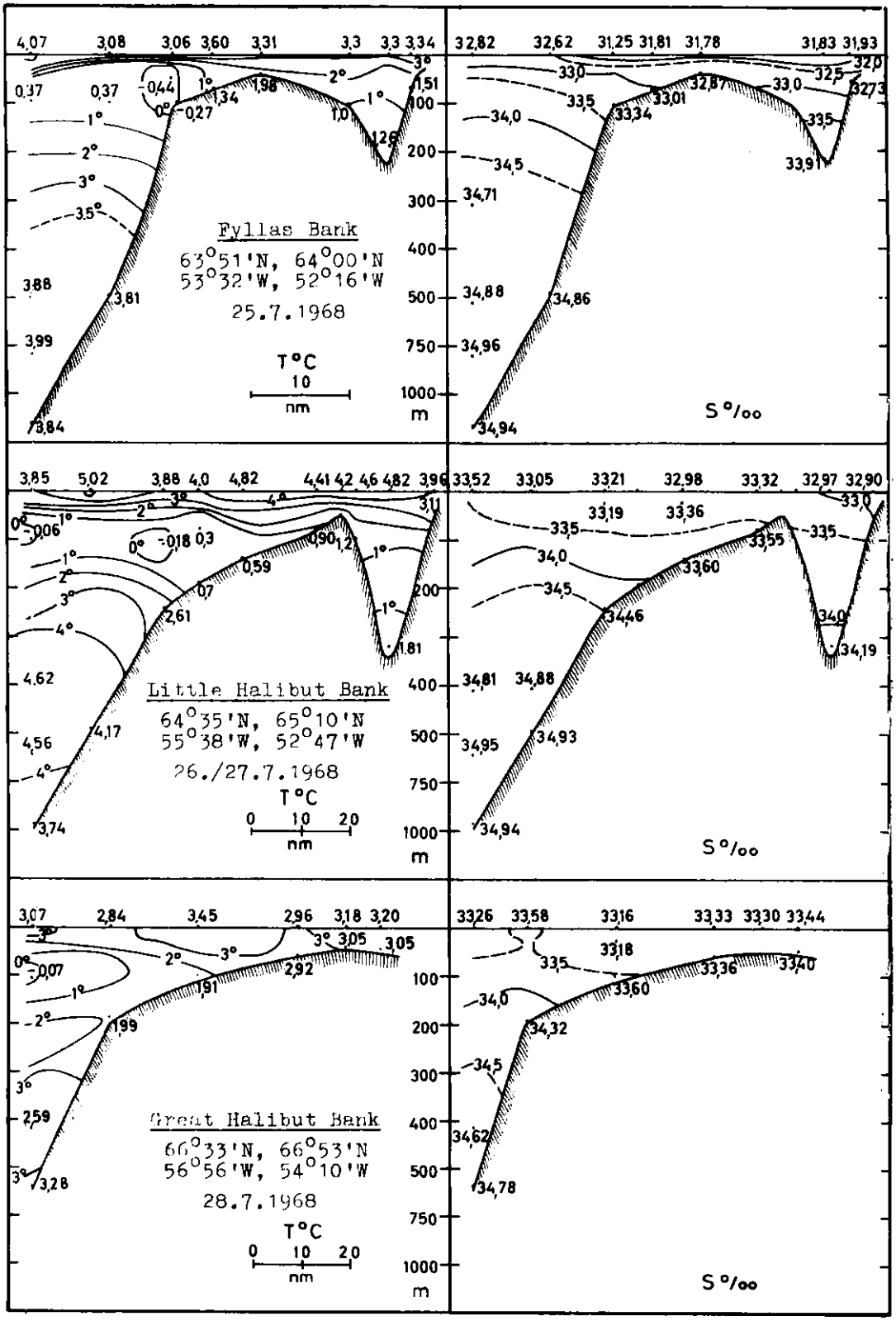

Fig.3. Hydrographic sections off West Greenland (temperature and salinity) in July-August 1968.

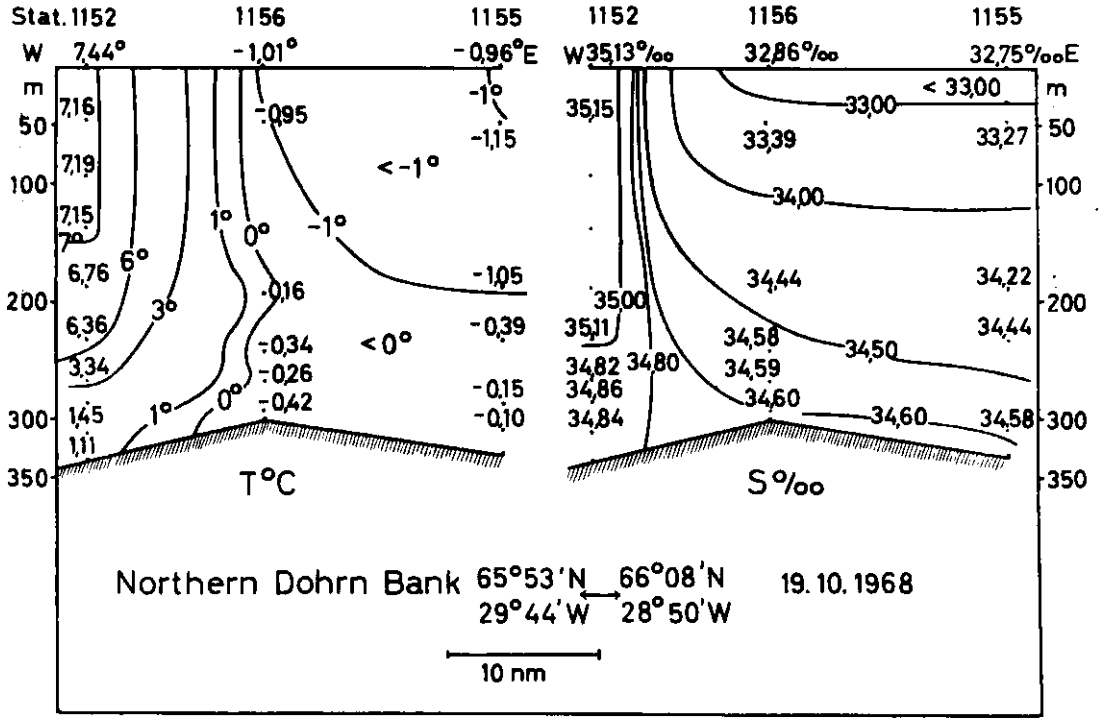

Fig.4. Section across the northern part of the Dohrn Bank in October 1968.

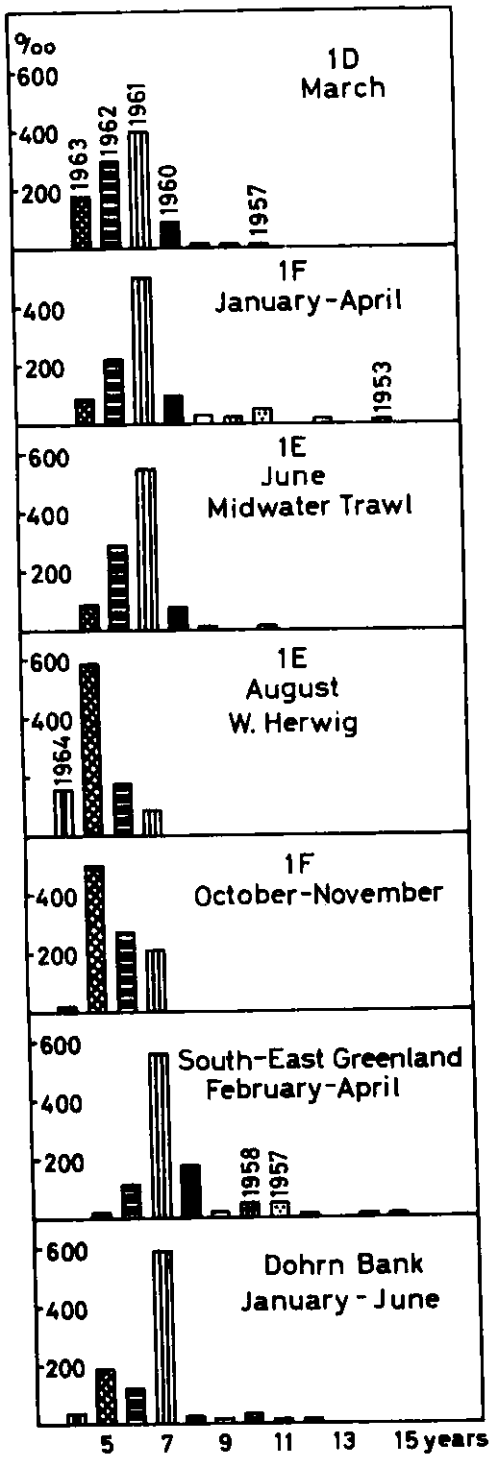

Fig.5 Age composition (in ‰) of commercial catches and by "Walther Herwig" in Subarea 1 and off East Greenland.

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German Research Report 1968

Part II, Subarea 2 - 5

by J. Messtorff

SUBAREA 2

A. Status of the fisheries

Extremely good cod fishing conditions from February to middle of April resulted in a seasonal increase of the German fishing activity off Labrador. No fishing at all was carried out during the summer months and later in the year only few factory trawlers tried to fish but soon left the subarea again because of unsatisfactory catches until the winter/spring season 1968/69 started at the very end of December. The German fishery took place namely in Div. 2J (Hamilton Bank) but was occasionally extended to Div. 2 H.

The preliminary catch and effort data for 1966 given in table 1 therefore refer mainly to the successful spring season, which yielded the second highest total catch since the beginning of the German Labrador fishery in 1958. In spite of a 16 % higher fishing effort (days fished) than in 1967 the average total catch per fishing day increased by about 10 t and reached a maximum value since 1961 when the redfish catches started to decline considerably. The fishing on pure cod concentrations by German trawlers in 1968 is clearly demonstrated by the fact that 98 % of the total catch consisted of cod. The average catch per fishing day of 35.7 t had never been reached before by the German cod fishery in the Northwest Atlantic.

There was no redfish fishery at all. The small redfish by-catch was negligible and even less than the amount of other by-catch fish.

The percentage of whole ("Industrial") fish converted to fish meal on board was extremely low in 1968 (table 1). On the other hand there was a slight increase of discarded cod (table 2). This happened because the capacities of the fish meal plants on board were often fully occupied only by removing and converting the large amount of processing offal from the very big catches.

B. Special Research Studies

There was no field research in 1968 but during a Northwest Atlantic survey R.V. Walther Herwig recently carried out some hydrographic observations and biological studies on the cod concentrations at Hamilton Bank (Div. 2 J) in February 1969. The working -up of this material is not yet completed. Further field work off Labrador is planned for autumn 1969.

Market sampling of commercial catches could not be carried out because the landings consisted entirely of deepfrozen and processed fish. At present the introduction of sampling commercial catches at sea is being tested

SUBAREAS 3 - 5

A. Status of the fisheries

Apart from the herring fishery in subareas 4 and 5 (see Part III by K. Schubert) there was no German activity in these subareas.

B. Special Research Studies

No special research studies except on herring (Part III) were carried out in 1968. But R.V. "Walther Herwig" undertook a survey in January - February 1969, during which observations about the hydrographic conditions, and the abundance of fish as well as biological studies were carried out in each subarea. The material is not yet worked up but it may be noted that the abundance of haddock on Georges Bank (Div. 5 Ze) was found to be extremely poor. An echo survey went completely negative and the total haddock catch of 8 test hauls consisted in 2 specimen. In subarea 4 haddock was more but only moderately abundant especially on Browns Bank (Div. 4 X) with a maximum catch of 350 kg and in "The Gully" (Div. 4 Vs) with 1000 kg per trawling hour.

Table 1: Subareas 2, nominal catches in tons (1958 - 1968) (including industrial fish - fish converted to fish meal on board)

year	days fished	COD catch	COD catch per day fished	COD % industrial	REDFISH catch	REDFISH catch per day fished	REDFISH % indust.	OTHER FISH catch	OTHER FISH catch per day fished	OTHER FISH % indust.	TOTAL catch	TOTAL catch per day fished	TOTAL % industr.
1958	622	61[illegible]	[illegible].0		22909	37.[illegible]		516	0.8		24043	38.7	
1959	900	3238	[illegible].[illegible]		34604	38.5		345	0.4		38187	42.4	
1960	1156	12145	11.4		29181	25.2		1305	1.1		42631	36.7	
1961	732	11088	15.2		8307	11.4		1599	2.2		20994	28.8	
1962	93	882	9.5	4.1	1939	20.8	15.9	68	0.7	0	2889	31.1	11.9
1963	76	1050	13.8	12.3	941	12.4	12.0	59	0.8	67.8	2050	27.0	13.8
1964	495	3559	7.2	14.[illegible]	5079	10.3	10.5	1029	2.1	91.3	9667	19.5	20.5
1965	1323	41556	31.4	13.3	2891	2.2	1.2	1151	0.9	60.0	45598	34.5	13.8
1966	2132	63610	29.8	7.[illegible]	2750	1.3	13.2	1541	0.7	46.4	67901	31.8	8.9
1967	1251	30589	24.5	8.4	1616	1.3	17.1	310	0.2	80.0	33115	26.5	9.3
1968	1489	53186	35.7	1.5	301	0.2	4.7	747	0.5	24.8	54234	36.4	1.9

Table 2: Discarded fish in Subarea 2 in tons, 1968 (1967 in brackets)

Div.	COD	REDFISH	OTHER FISH	ALL SPECIES
2 G	-- (1)	- (-)	- (-)	- (1)
2 H	28 (103)	2 (14)	5 (26)	35 (143)
2 J	362 (96)	22 (5)	20 (38)	404 (139)
Total	390 (200)	24 (19)	25 (64)	439 (283)

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C. Subarea 4, 5 and 6

by K. Schubert

A. Status of the Fisheries

Nineteen stern freezer trawlers operated with pelagic nets in Subarea 4 (11 trawlers), 5 (19 trawlers) and 6 (1 trawler) in March and from July to December mainly for herring.

Moreover, for the first time, the German lugger fleet participated in this fishery in Subarea 5 Ze with ten ships from July to November. Catch, effort, catch per unit effort and discarded fish are given in Table 1 and 2.

In March only 1 trawler was working in 6 A. The trawler fleet returned to 5 Ze at the end of June working here until the beginning of November. In the same month a part of the fleet shifted to the Subarea 4 Vn and 4 Vs, where they were fishing until the end of December (Fig. 1 and 2).

The lugger fleet started at the end of May and were fishing until November in the Subarea 5 Ze (Fig.3).

Fig. 4 shows the mean catch per hour on a five days basis of three German (Fed. Rep.) freezer trawlers in Div. 5 Ze, 4 Vn and 4 Vs in 1968, and Fig. 5 the correspondent figures in kantjes per hour of six German (Fed.Rep.) luggers in Div. 5 Ze in 1968.

B. Special Research Studies

I. Biological Studies.

Four samples (888 herring) from the Georges Bank in August and two samples (239 herring) from the Misaine Bank in December were examined (Table 3).

The average length on all Georges Bank herring was 30.59 cm. The length range varied from 24-35 cm, with a peak at 31 cm. On the Misaine Bank the average length was 34.09 cm with a fluctuation from 28-39 cm and a peak at 34 cm (Fig. 6).

On the Georges Bank maturity stages 5 (656 ‰) and 4 (207 ‰) were predominant, whereas on the Misaine Bank stage 8 formed the bulk of the catches (955 ‰).

The investigations of meristic characters showed that the herring of the two Subareas belonged to different stocks. The average number of vertebrae were 56.36 and 56.60.

The age composition on the Georges Bank showed a change against 1967. In 1968 the year-class 1963 (305 ‰) dominated. Of some importance also were the 1961 (196 ‰), 1960 (182 ‰), 1962 (116 ‰) and 1964 (111 ‰) year-classes. On the Misaine Bank a very old stock was met. The year-classes older than 1959 were predominant (632 ‰) but also the year-classes 1960 (130 ‰) and 1959 (114 ‰) had some importance (Fig.7).

Table 1 Nominal catch, effort, catch per unit effort and discards of German (Fed.Rep.) factory freezer trawlers Subarea 4,5 and 6, in 1968 (including industrial fish).

Subarea	4 Vn,4 V/s		5 Ze							6 A	
Month	Dec.	Total	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	March	Total
					Nominal catches (tons)						
Herring	10,555	10,555	4,573	12,532	14,322	17,739	10,001	3,504	62,671	413	413
Mackerel	—	—	—	6	7	28	116	163	320	2	2
Others	2	2	3	7	1	8	3	2	24	0	0
Total	10,557	10,557	4,576	12,545	14,330	17,775	10,120	3,669	63,015	415	415
					Effort						
Days fishing	191	191	102	344	309	354	299	126	1534	11	11
					Catch per day (tons)						
Herring	55.3	55.3	44.8	36.4	46.3	50.1	33.4	27.8	40.9	37.5	37.5
Mackerel	—	—	—	0	0	0.1	0.4	1.3	0.2	0.2	0.2
Others	0	0	0.1	0.1	0.1	0	0	0	0	0	0
Total	55.3	55.3	44.9	36.5	46.4	50.2	33.8	29.1	41.1	37.7	37.7
					Discards						
Herring	—	—	—	—	50	654	165	—	869	—	—
Others	—	—	—	100	—	—	—	25	125	—	—
Total	—	—	—	100	50	654	165	25	994	—	—

Table 2 Nominal catch effort and catch per unit effort of German (Fed.Rep.) Luggers in Subarea 5.

Subarea	5 Ze					
Month	July	Aug.	Sept.	Oct.	Nov.	Total
				Nominal catch (tons)		
Herring and Total	1,021	2,201	2173	2,290	152	7,837
		Effort				
Days fishing	216	310	221	216	36	999
		Catch per day(tons)				
Herring and Total	4.7	7.1	9.8	10.6	4.2	7.8

Table 3 :

German biological data: ~~NEAFC~~ ICNAF area 5 Ze + 4 Vs 1968

Length composition ‰					Age composition								Stages of maturity							
					‰		Length		Weight		Vertebrae		Gill rakers		‰		Vertebrae		Gill rakers	
Area	Georges Bank	Misaine Bank			Georges Bank	Misaine Bank	Georges Bank	Misaine Bank	Georges Bank	Misaine Bank	Georges Bank	Misaine Bank	Georges Bank	Misaine Bank	Georges Bank	Misaine Bank	Georges Bank	Misaine Bank	Georges Bank	Misaine Bank
Month	VIII	XII			VIII	XII	VIII	XII	VIII	XII	VIII	XII	VIII	XII	VIII	XII	VIII	XII	VIII	XII
Gear	PT	PT																		
Sample	S	S																		
cm																				
23.0	6		Year-class	Age																
23.5	1														Stages					
24.0	2		1967	1	-	-	-	-	-	-	-	-	-	-			$\bar{x}_2$			
24.5	12														1	21	-	s 0.613	-	1.113	-
25.0	9						22.00		13.50		57.50		48.00					n 9		9	
25.5	12		66	2	5	-	4.750	-	-	-	0.500	-	-	-			55.50	56.00	49.25	51.00
26.0	17						2		1		2		2		2	9	1.083	-	0.937	2.000
26.5	17																4	2	4	2
27.0	26						24.96		14.25		56.39		49.07				56.30	56.00	49.00	46.00
27.5	20		65	3	68	-	1.896	-	5.791	-	0.846	-	1.773	-	3	25	0.466	-	5.400	18.000
28.0	32	4					28		8		28		28			10	10	2	11	2
28.5	32	8																		
29.0	55	17					27.46		12.83		56.40		49.20				56.47	56.00	49.59	50.00
29.5	71	25	64	4	111	-	1.731	-	6.764	-	0.562	-	1.935	-	4	207	0.507	-	1.156	2.000
30.0	78	13					46		9		43		44			10	86	2	84	2
30.5	90	21																		
31.0	146	17					29.73	29.88	12.50	9.50	56.42	56.29	49.79	50.29			56.31		49.61	
31.5	129	17	63	5	305	43	0.915	0.859	2.419	-	0.493	0.489	2.442	0.232	5	656	0.520	-	2.648	-
32.0	96	33					126	8	44	1	123	8	118	8		-	281		270	
32.5	68	88					30.88	31.80	13.85		56.28	57.10	49.88	49.10			56.50	58.00	49.00	47.00
33.0	50	63	62	6	116	54	0.795	1.132	3.000	-	0.609	1.212	2.610	2.101	6	11	0.333	-	2.000	-
33.5	9	117					48	10	17		46	10	41	10		5	4	1	5	1
34.0	10	117					31.30	32.10	12.19		56.28	56.40	49.56	50.60			56.40	56.00	49.58	49.00
34.5	10	126	61	7	196	27	1.061	2.840	6.572	-	0.436	0.300	2.982	1.840	7	71	0.737	-	2.324	2.000
35.0	2	129					81	5	13		79	5	75	5		10	30	2	31	2
35.5		84																		
36.0		50					31.45	33.21	13.46	11.50	56.36	56.36	49.54	50.00				56.62		49.79
36.5		25	60	8	182	130	0.943	0.567	5.159	-	0.715	0.240	2.611	3.739	8	-	-	0.520	-	2.276
37.0		21					75	24	26	1	72	22	74	24		955		178		182
37.5		13																		
38.0		-					31,50	34.21	13.50		57.00	56.40	47.00	50.05						
38.5		-	59	9	2	114	-	0.718	-	-	-	0.366	-	1.548						
39.0		8					1	21	1		1	20	1	21						
39.5		4																		
							33.67	35.30	13.00	12.70	56.33	56.68	49.50	49.34						
			<59	>9	15	632	0.972	1.883	0.500	6.710	0.289	0.533	0.350	2.539						
							6	117	2	5	6	116	6	117						
Total	1000	1000													Total	1000	1000			
n	888	239	Total Number		1000	1000	$\bar{x}_2$	29.94	34.36	13.13	12.07	56.37	56.61	49.57	49.57	Number	439	191	$\bar{x}_2$	56.36	56.60	49.57	49.62
Mean length cm	30.59	34.09			413	185	s	4.801	3.422	4.104	4.983	0.564	0.529	2.493	2.476				s	0.551	0.520	2.483	2.680
							n	413	185	121	7	400	181	389	185				n	426	187	414	191

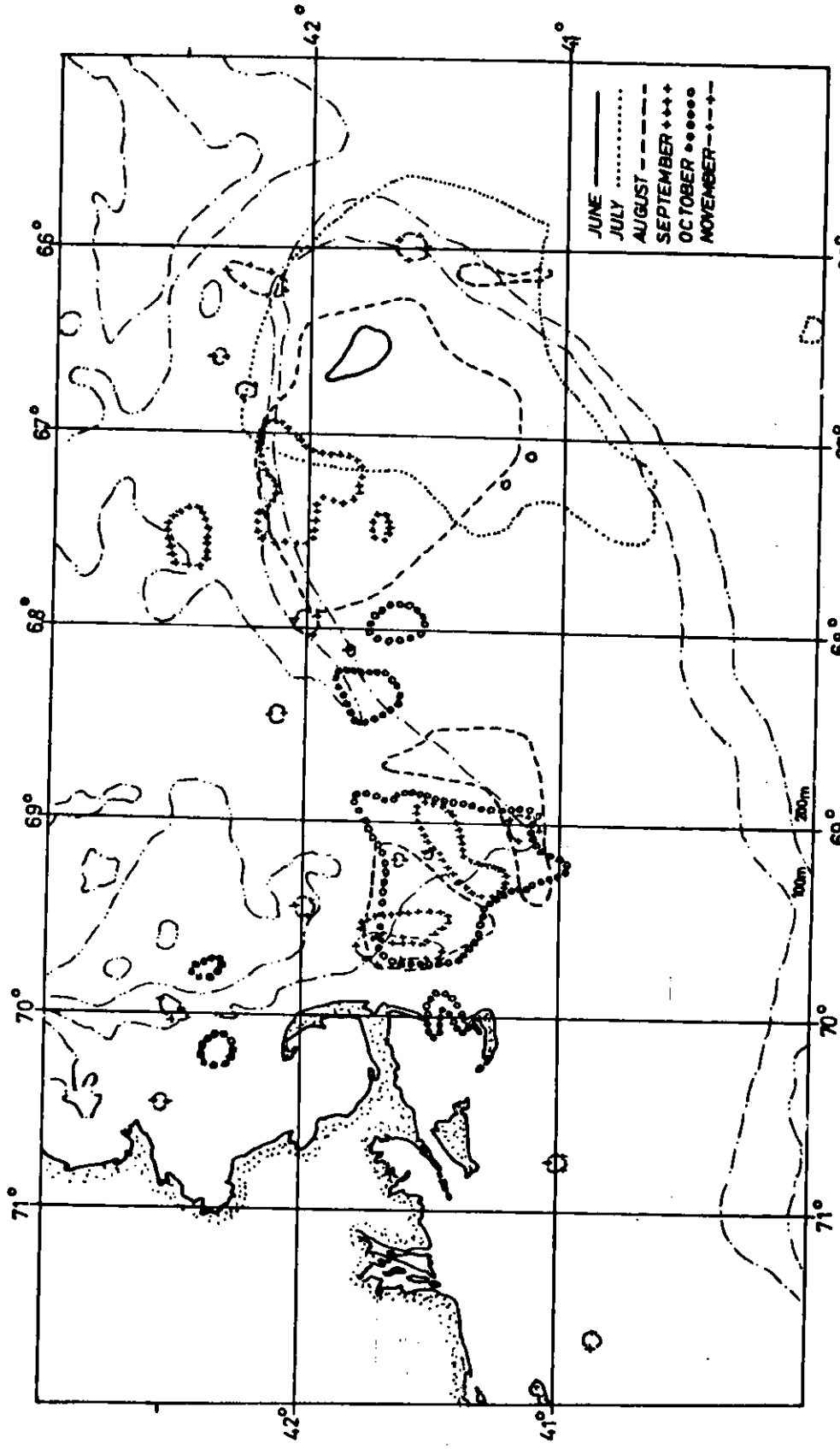

Fig. 1. Herring, Fishing area of German /Fed, Rep./ freezer trawlers in Div,5Z.

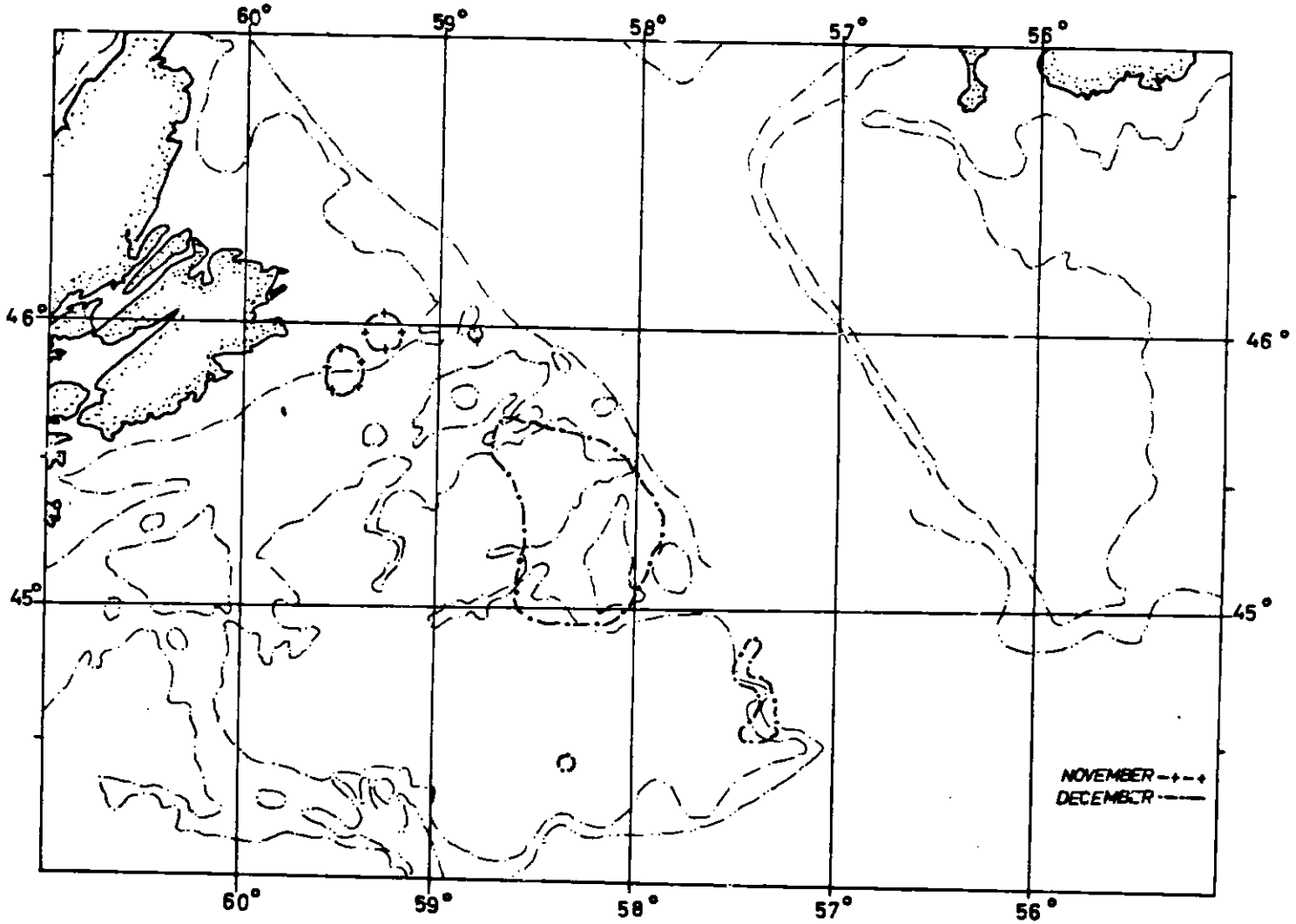

Fig. 2. Herring. Fishing area of German /Fed.Rep./ freezer trawlers in Div.4V.

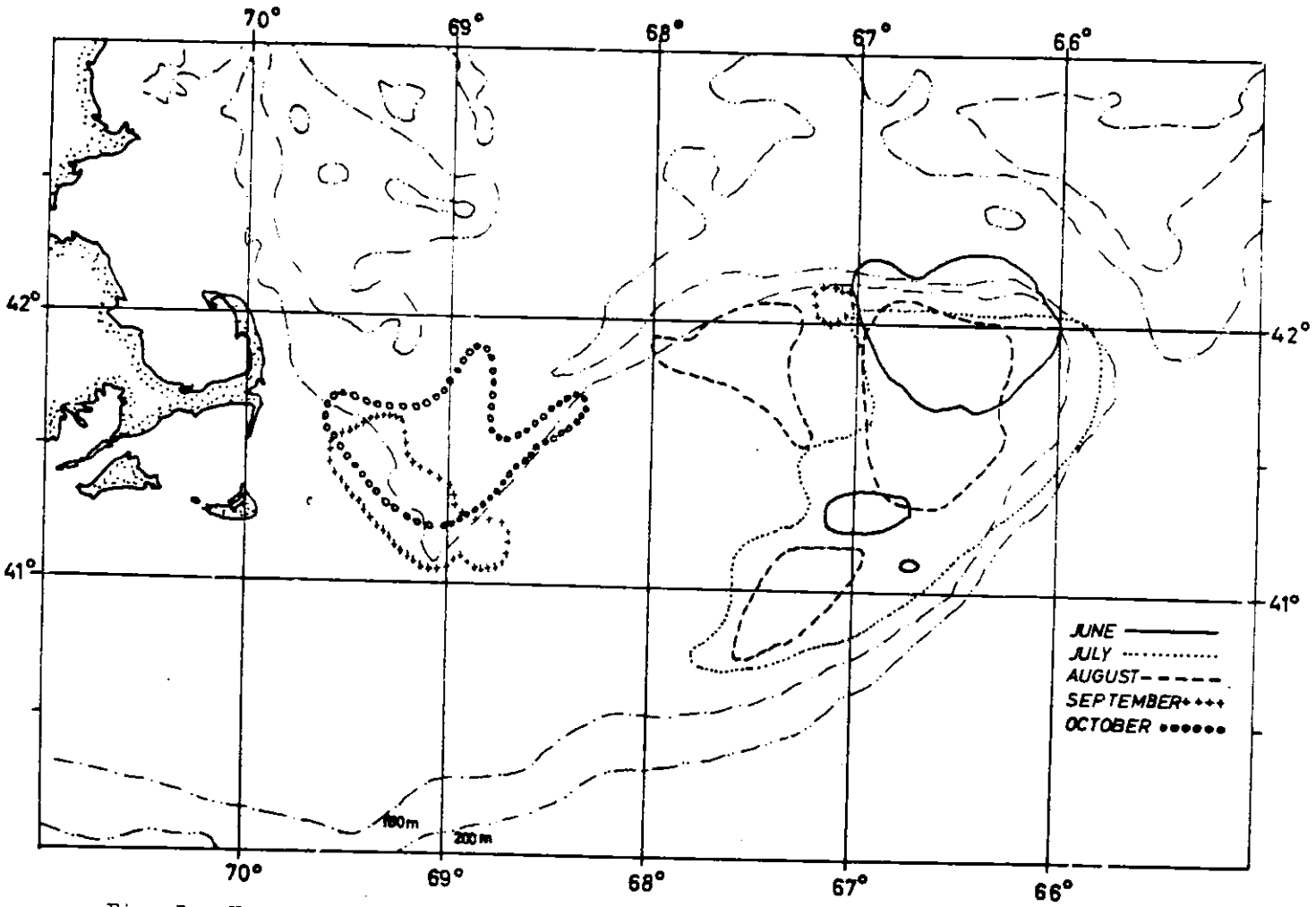

Fig. 3. Herring. Fishing area of German /Fed.Rep./ lugger in Div.5Z.

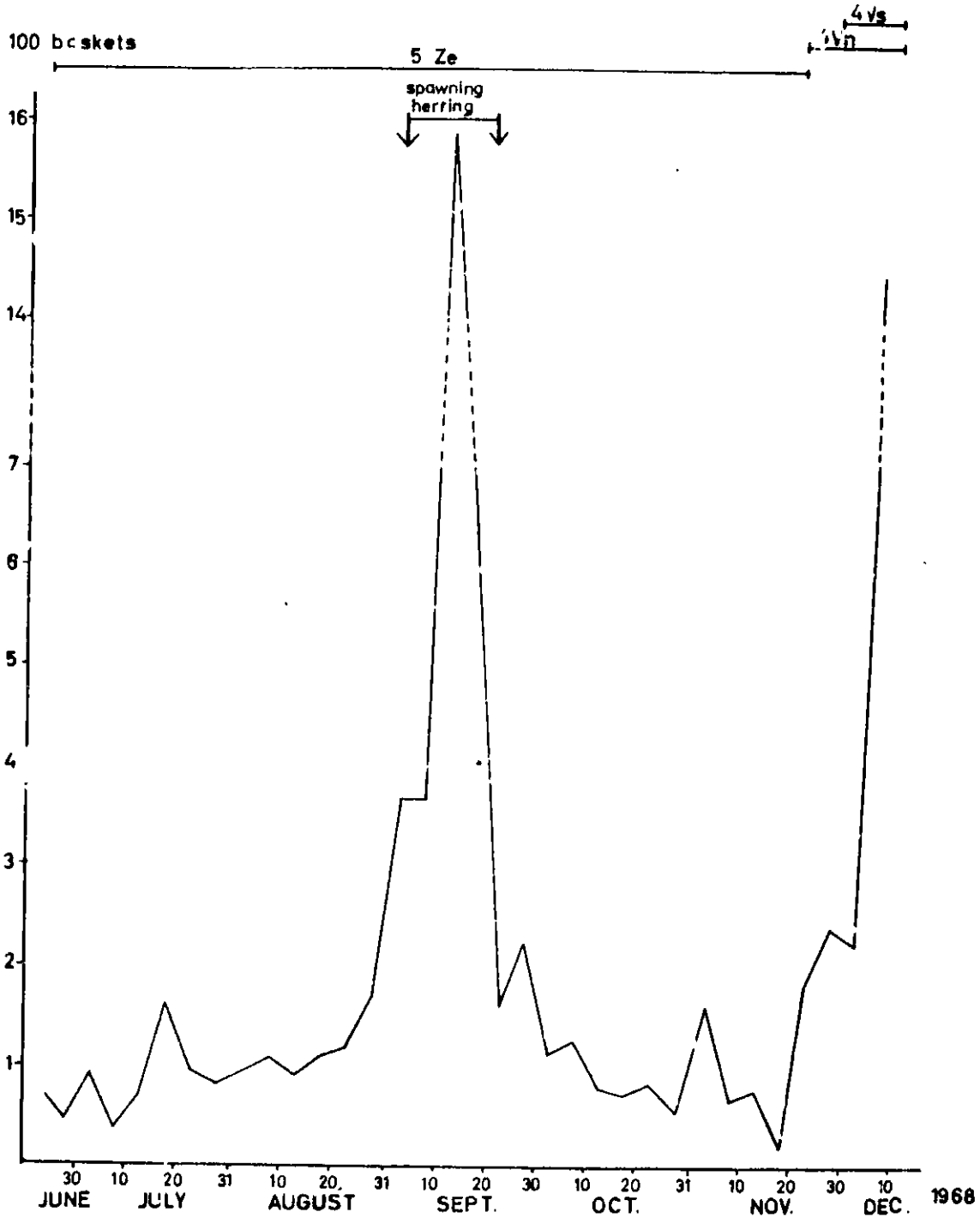

Fig. 4, Herring. Catch per hour /baskets/ on an average of about 5 days of 3 of German freezer trawlers in Div.5Z and 4V.

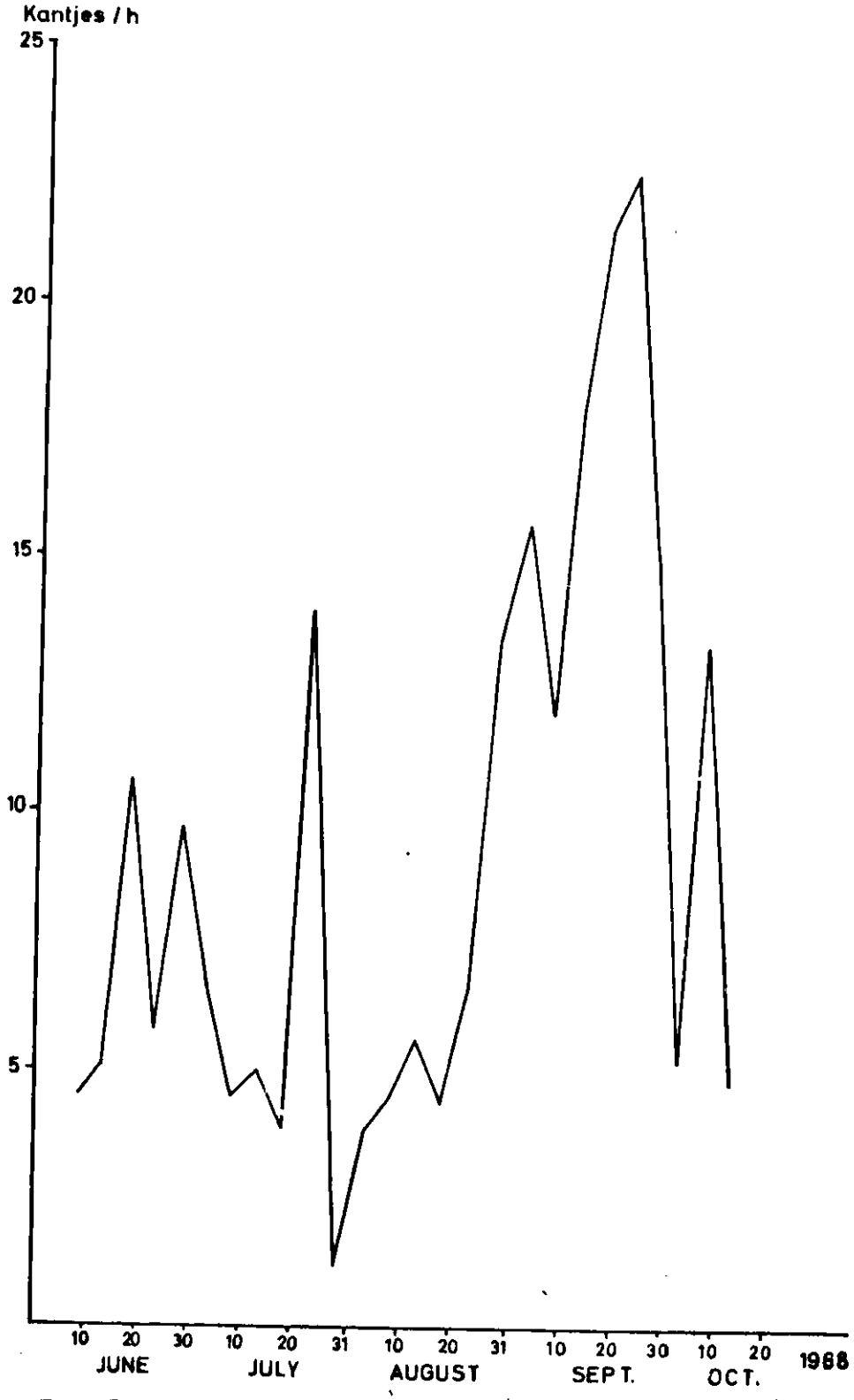

Fig. 5. Herring, Catch per hour /1 Kantjes=2 baskets/ on an average of about 5 days of 6 German luggers in Div.5Z.

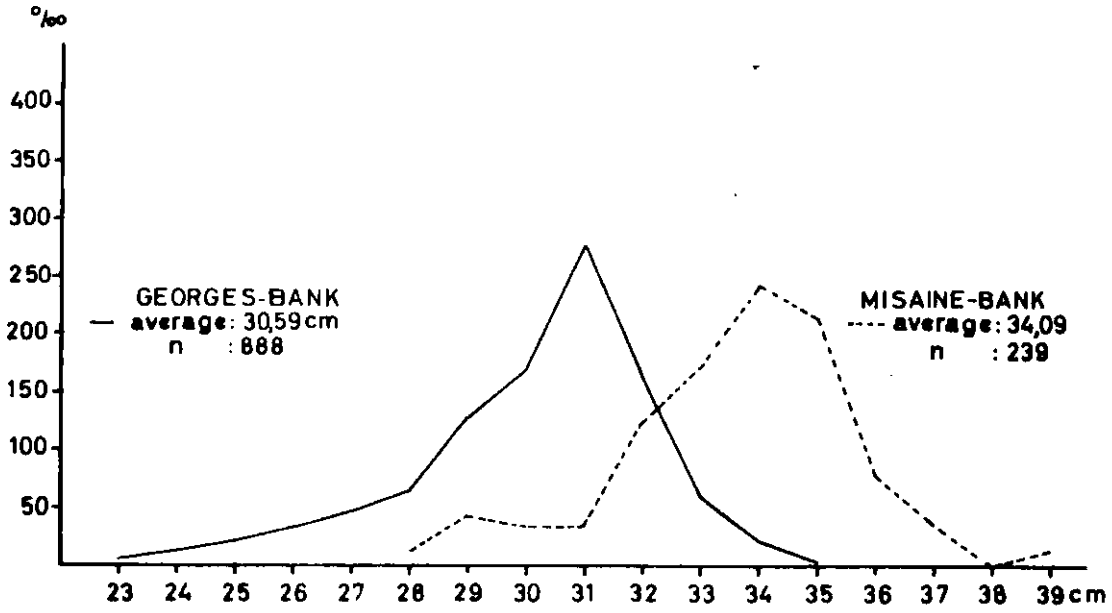

Fig. 6. Herring. Length composition, Div.5Z and 4V.

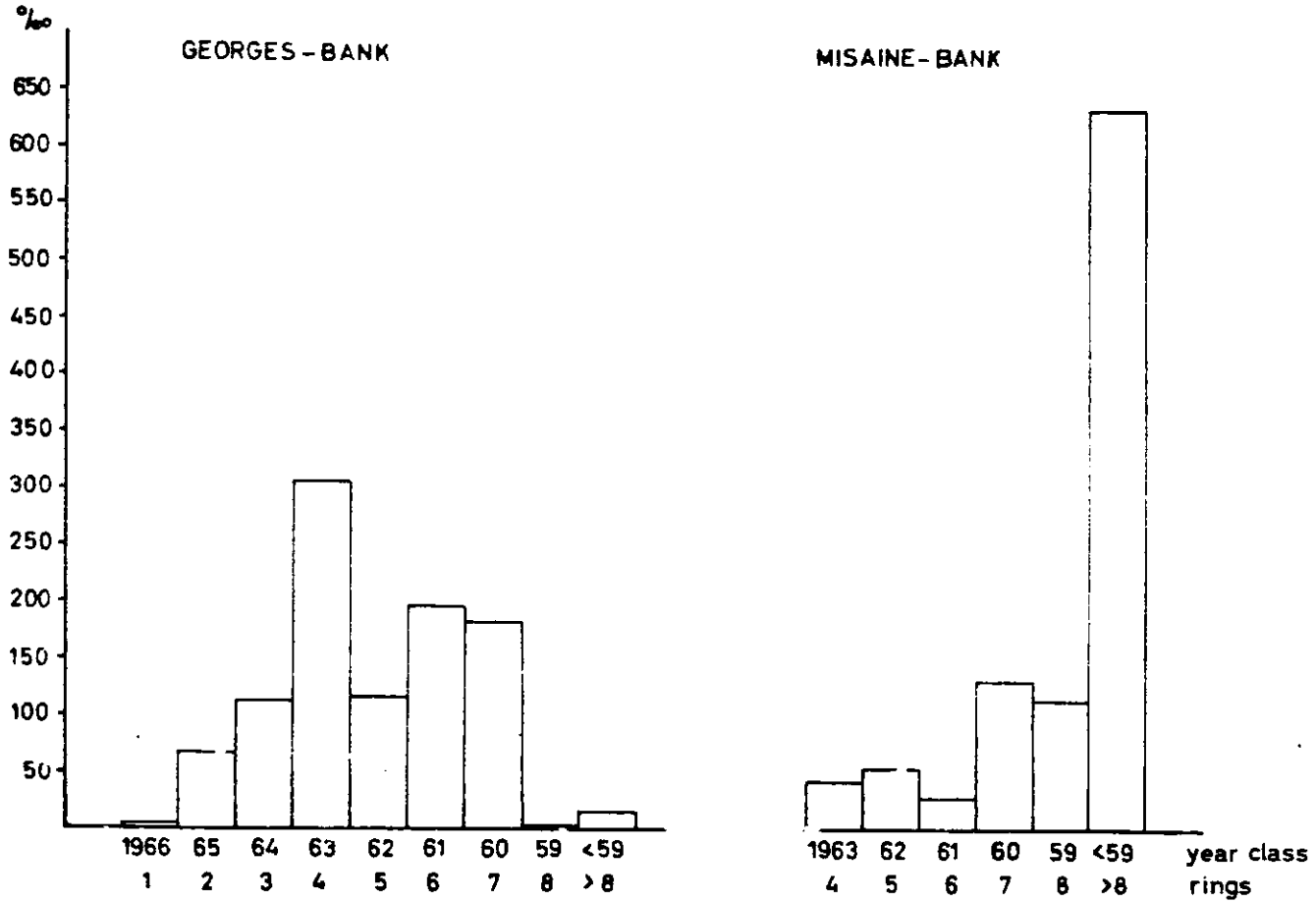

Fig. 7. Herring. Age composition, Div,5Z and 4V.