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German (FRG) Research Report, 1972

Section I. Subarea 1 and East Greenland

by

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A. STATUS OF THE FISHERIES

1. General Trends

Table 1 gives the nominal catch off West and East Greenland, taken by the Federal Republic of Germany fleet from 1962 to 1972. The total output decreased by 42% to 50,500 tons. This is the lowest catch since 1955 and only 25% of the maximum catch in 1963. Also the catch per fishing day has never been as small as in 1972 although most fishing was carried out only during the months with the highest fish concentrations.

2. West Greenland (Subarea 1)

The decrease in catch was most pronounced in the catches of cod in Subarea 1, where in 1972 only 17,000 tons were caught which in only 11% of the FRG catch in 1963. The reason for this drastic decline, in particular the 50% decrease in catch per fishing day, is due to poor stock size especially of the West Greenland stock and the hindrance to the fishery by severe ice conditions for the fourth consecutive year.

Also the catches of redfish decreased further. Only 2,650 tons were caught, which is less than 5% of the 1962 catch.

3. East Greenland

Although the catches off East Greenland decreased by 38% to 30,000 tons the FRG fleet caught 9,000 tons more fish off East Greenland than off West Greenland. Due to the still rather good stock size of mature cod the third highest catch was achieved in the FRG fishery for cod off East Greenland since its start in 1955. On the other side the redfish catch of 7,000 tons was by far the smallest since 1955. This surprising decrease in redfish landings is however more or less the consequence of less market demand.

4. Forecast for 1973

a) Subarea 1. Due to the reduced size of the cod stock of West Greenland origin and the gradual decrease in strength of the East Greenlandic spawning stock, which is feeding in Subarea 1, the catches will again be rather small and thus the West Greenland fishing grounds will loose much of their attraction for the FRG fleet. However after 4 heavy ice-years the ice situation in 1973 seems to be again normal (see Table 4). Thus, as in 1968, successful pelagic fishing on postspawners in May-June - non-practicable in 1969 to 1972 because of ice - could be possible. During the second part of the year a fishery on the northern banks based on the 1968 year-class could develop. The FRG cod landings in 1973 from Subarea 1 will also very much depend on the possibilities for paying cod (and saithe) catches in other areas such as Subarea 2 and 3, Iceland, the Norwegian Coast, and the Bear Island-Spitsbergen-Barents Sea area.

b) East Greenland. The consequence of the gradual decrease in size of the stock of mature cod due to fishing, emigration to Iceland, and poor recruitment (year-calsses 1965 to 1967) will lead to a further reduction of the FRG cod catches. The catches of redfish could in 1973 surpass the cod catches, especially as consequence of the "fishery war" off Iceland.

Table 1. Subarea 1 and East Greenland: FRG nominal catches including industrial fish (tons), 1962 - 1972

	Year	Days fishing	Cod Catch	Cod Catch per day fish.	Cod % ind.	Redfish Catch	Redfish Catch per day fish.	Redfish % ind.	Total Catch	Total Catch per day fish.	Total % ind.
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
	1969	3,234	67,431	20.9	4.0	6,964	2.2	5.2	75,293	23.3	4.3
	1970	1,722	38,551	22.4	4.0	4,501	2.6	9.1	44,283	25.7	5.9
	1971	1,545	37,950	24.6	1.9	3,335	2.2	2.0	42,482	27.5	2.4
	1972	1,312	16,963	12.9	0.3	2,650	2.0	1.9	20,732	15.8	1.8
E.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
	1969	2,164	14,292	6.6	0.9	24,587	11.4	4.6	40,505	18.7	4.2
	1970	1,532	14,388	9.4	0.9	15,672	10.2	4.5	31,104	20.3	3.3
	1971	1,737	28,735	16.5	0.6	14,037	8.1	2.9	44,062	25.4	2.4
	1972	1,732	21,664	12.5	0.4	7,153	4.1	1.6	29,742	17.2	0.9
Total	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
	1969	5,398	81,723	15.1	3.5	31,551	5.8	4.8	115,798	21.5	4.3
	1970	3,254	52,939	16.3	3.2	20,173	6.2	5.5	75,387	23.2	4.9
	1971	3,282	66,685	20.3	1.3	17,372	5.3	2.8	86,544	26.4	2.4
	1972	3,044	38,627	12.7	0.4	9,803	3.2	1.7	50,474	16.6	1.3

Table 2. Discarded fish in Subarea 1 in tons, 1972.

Division	Cod	Redfish	Species NK	Total
1C	16	1	1	18
1D	2	-	0	2
1E	-	-	1	1
1F	-	1	0	1
Total	18	2	2	22

Table 3. Average gross registered tonnage of FRG trawlers fishing in Subarea 1, 1962-1972.

Year	Average G.R.T.	Range of G.R.T.
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 - 255
1968	1163 G.R.T.	(640 - 2557)
1969	1319 G.R.T.	(651 - 2684)
1970	1320 G.R.T.	(645 - 2684)
1971	1504 G.R.T.	(691 - 2684)
1972	1542 G.R.T.	(691 - 3577)

B. SPECIAL RESEARCH STUDIES

1. Environmental Studies

Hydrographic measurements have been carried out by the *R/v Anton Dohrn* (ex. *Walther Herwig*) off West Greenland between Great Halibut Bank and Cape Farewell in December (1-10) 1972. The results are included in a special report about the hydrographic conditions by Frede Herman (see Res.Doc. 73/53).

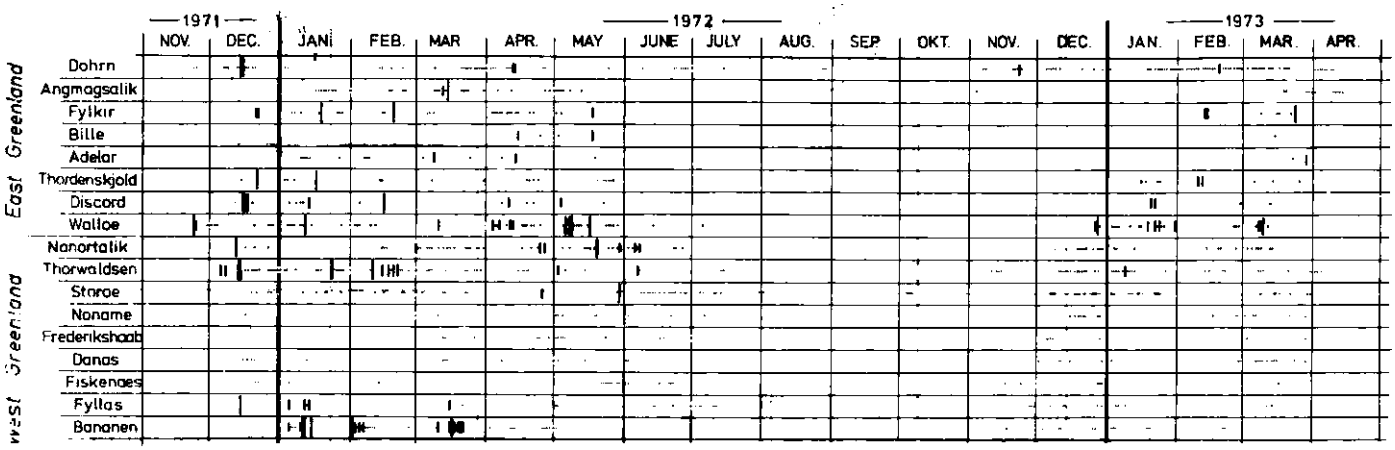
Table 4 represents informations on the appearance of ice on the fishing banks off East and West Greenland as they are included in the daily weather reports from the FRG commercial fishing fleet. The table is extended to 1971 and 1973 (up to 13 April) to comprise the two winter times 1971/72 and 1972/73. Whilst the winter 1971/72 was a heavy ice winter as in the three years before, the just ending winter seems to be normal. From West Greenland in 1972/73 ice was reported on one day only.

2. Biological Studies

In 1972, 26,449 length measurements and 8,497 age determinations of Greenland cod were made. They showed that 74% of the shoals of prespawners in February in Div. 1C and 1D consisted of the 1966 year-class (57%) and the 1965 year-class (17%). These 2 year-classes and the 3% of the 12 year old cod born in 1960 are real West Greenlandic year-classes. All the other older year-classes 1964, 1963, 1962, and 1961 are mostly of East Greenlandic origin and are dominating in the catches in the 2 southern divisions and off East Greenland. The 4 year-classes 1964 to 1961 made up only 12.6% in the shoals of West Greenlandic prespawners in February. However in May after spawning the percentage of these "East Greenlanders" increased to 28% in the southern part of Div. 1C (Banana Bank) and in Div. 1D, demonstrating the northward drift of East Greenlandic post-spawners in this area. As the consequence of this immigration the percentage of the 1966 and 1965 year-classes decreased to 47%.

In Div. 1E from the end of April to the beginning of June both stocks were more or less mixed, however the East Greenlandic year-classes 1964 to 1961 dominated with 50% against 36% of the "West Greenlanders" born in 1966, 1965, and 1960.

Table 4. Appearance of ice on the fishing banks off Greenland as reported by the FRG commercial fishing fleet. Dots indicate that a weather report was transmitted, the small and the long dashes stand for "ice" and "much ice" respectively within such a report.



Off South Greenland (Div. 1F) in February and March, when the spawners pass this area on their way to East Greenland, 90% of the catch consisted of the 1964 to 1961 cod with a clear dominance of the rich 1963 year-class with 43 to 48% and the moderate year-class 1964 with 21 to 30%. In May after spawning the 1964 cod prevailed in this area.

Growth studies showed again (see also Res.Doc. 73/38 by A. Meyer) that the West Greenland cod grow faster than the East Greenlandic cod which grow up in the southern Div. 1E and 1F, an area which is much more under the influence of the cold waters of the East Greenland current than the northern Div. 1D to 1A. The 6 and 7 year old cod of West Greenland origin caught in Div. 1C and 1E in February to May - before the beginning of the new feeding season - had reached a mean length of 66.9 cm and 75.6 cm respectively. The 8 (1964 year-class) and 9 year (1963 year-class) old "East Greenlanders" caught in Div. 1F in February and March had a mean length of only 70.6 and 76.0 cm respectively. That in the May catches in Div. 1C and 1D the cod of the 1964 and 1963 year-classes (see above) were real East Greenlandic immigrants could also be proved by their small mean length of 70.9 and 74.9 cm, which is very close to the mean lengths found in Div. 1F.

In the beginning of December 1972 *R/V Anton Dohrn* (ex. *Walther Herwig*) worked in Div. 1C to 1F. The otolith studies showed, that on Banana Bank, Fyllas Bank and on Nanortalik Bank the 1968 year-class dominated with 53 to 76%. This means that this year-class is more or less equally represented in both Greenlandic stocks. These 4 year old cod had reached at the end of their fifth feeding period a mean length of 52.1 cm in Div. 1C, 1D and 1E and of 45.4 cm in Div. 1F. At the moment nothing can be said about the question, whether this year-class 1968 is a rich one or is only so strongly deominating, because the stock is so weak. If we take into account, that the catches of the research ship never have been so poor as in December 1972 - and also the catches of the English *R/V Cirolana* (working together with *Anton Dohrn*) were so - probably no quick recovery of the Greenland stocks can be expected. On Little Halibut Bank where the average catch was only 0.22 t/h, the 1966 year-class dominated followed by the 1968, 1965, and 1966 year-classes. On Danas Bank the only substantial cod haul was made with 2.5 t/h. Here the catch was composed mainly of the year-classes 1966 (45%), 1968 (18%), and 1965 (15%). Off Cape Farewell a 0.8 t/h catch (within the fishery limit with the kind permission of the Danish Government) nearly exclusively consisted of the 1963 and 1964 year-classes (84%). Nearly no young fish was found in this area.

In the commercial catches of migrating and spawning cod off East Greenland during the first 5 months of the year again the good East Greenlandic year-classes of 1961 and 1964 dominated with together 90%. As in 1971 the rich 1963 year-class (with 49% in the southern part and with 55% in the northern part of East Greenland) was by far the most important year-class. In the southern part the 1964 year-class followed with 22%, whilst in the Angmagssalik-Dohrn Bank area the 1962 cod took the second place. The rich and important year-class of 1961 in the meantime is reduced to 7-8%.

German (FRG) Research Report, 1972

Section III. Subareas 3, 4, 5 and 6 (Herring only)

by

K. Schubert

A. Status of the Fisheries

Thirteen stern freezer trawlers were fishing with pelagic nets from the middle of July to December 1972. The total catch yielded in Subarea 3 (Subdiv. 3Ps) 110 t herring in October. In Subarea 4 the total catch amounted to 510 t herring in August and October. The main fishing area of the German fleet was the Subarea 5 and the catch yielded 30,635 t herring. Of this total 27,633 t came from Subdiv. 5Ze from July to December, 2,931 t herring from Div. 5Y in the same time and 71 t from Subdiv. 5Zw in October and November. No herring was fished in Subarea 6 in November and December. There was only a squid fishery (Table 1).

In Subarea 5 the catch decreased from 56,860 t herring in 1971 to 30,635 t in 1972. This decrease was due to the effort which decreased from 1,250 fishing days to 944 fishing days. The catch per day decreased from 45.5 to 32.5 tons herring.

The spawning on the northern part of the Georges Bank was not so strong this year. The German fleet caught spawning herring in this area only some days in the second and third week of September. The main fishing area was 1972 on the western side of the bank, east of Nantucket Shoal/Cape Cod between 41°-42°N, 68°30'-69°30'W. Spawning herring was caught here on definite places in September and October. Some spawning was observed in Div. 5Y in October too. One remarkable characteristic of the hydrographical situation on Georges Bank was the lower temperatures in 1972. Presumably, this hydrographical situation may have an influence on the spawning behaviour, but the lower stock density could be an explanation too.

Monthly catch, total catch, effort (fishing days), catch-per-unit effort (tons) and discarded fish (tons) are given in Table 1.

Figure 1 shows the catch per day in baskets (50 kg) on an average of about 5 days of 13 German freezer trawlers in 791 fishing days in Subdiv. 5Ze from the last week in July to the beginning of November 1972; as compared with the figures for 1971 and 1970, the stock density has strongly decreased in 1972.

B. Special Research Studies

Biological studies

On board a trawler herring investigations were made in Div. 4X, Subdiv. 5Ze and Div. 5Y from August to October; in addition one sample from a research vessel cruise in March from Subdiv. 3Ps was investigated. From 79 samples, 33,622 herring were measured in these Divisions as follows: 127 in Subdiv. 3Ps, 328 in Div. 4X, 429 in Div. 5Y, and 32,738 in Subdiv. 5Ze. The average length in Subdiv. 3Ps was 34.74 cm in March; in Div. 4X, 24.27 cm in October; in Div. 5Y, 32.25 cm in October; and in Subdiv. 5Ze, the average length was 32.19 cm in August and decreased to 30.59 cm in October. Compared to 1971, the average length was greater in Subdiv. 5Ze (Table 2).

Maturity stages 8 (606 ‰) and 7 (357 ‰) were dominant in Subdiv. 3Ps in March. Some herring were still in spawning condition (24 ‰), and some had maturity stages 4 (16 ‰). In Div. 4X in October, juvenile herring from maturity stage 2 were observed (1,000 ‰), whereas in Div. 5Y in October, only spawning herring (stage 6 = 1,000 ‰) were in the catches. Stage 5 formed the bulk (756 ‰) of the catches in Subdiv. 5Ze in August, some importance had the stage 4 (232 ‰); in addition, some herring of stages 2 and 3 were observed. In September the maturity was advanced. Stage 5 (631 ‰) was still predominant. Some spawning herring (stage 6 = 174 ‰) and further spent fishes (stages 7 and 8) were in the catches. The stage 4 (130 ‰) had still some importance. Finally in October, spawning herring (stage 6) were predominant (794 ‰) in the catches, some importance had juvenile herring in stage 1 (188 ‰) (Table 3b).

The age composition is shown in Table 3a. In Subdiv. 3Ps in March, herring over 8 years old (888 ‰) were dominant. Some herring from the year-classes 1964, 1965, 1966 and 1968 were present. In Div. 4X in October, only 2-year-olds (year-class 1970) were in the catches. In Div. 5Y in the same month, the 1967 year-class (227 ‰) were dominant, some importance had the year-classes 1966 (165 ‰), 1968 (155 ‰), 1964 (134 ‰) and the year-classes > 9 (113 ‰). No herring from the year-class 1970 was found. In Subdiv. 5Ze in August, the 6-year-old herring (274 ‰) were predominant, moreover, the year-classes 1967 (169 ‰), 1968 (165 ‰), and 1965 (156 ‰) had some importance. In September, the 4-year-old herring (year-class 1968) was dominant (270 ‰). In October the change to younger herring continued. The bulk of the catches was now formed from the 4-year-old (year-class 1968) herring (355 ‰). The portion of the

year-classes 1966, 1967, 1965 decreased, whereas the 3-year-old (1969 year-class) herring (112 ‰) increased. For the first time 2-year-old herring (year-class 1970) appeared in this month in the catches (132 ‰).

Table 3c gives the mean length and Table 3d the mean L_1 (cm) by age.

Tables 3e and 3f show the average number of vertebrae and gillrakers. Only the catch in March in Subdiv. 3Ps contained spawning herring, all other samples were autumn spawners. It seems from these Tables that the autumn spawners in the different months and divisions belonged to different stocks.

Table: 1 Nominal catch, effort, catch per unit effort and discards of German freezer trawlers

Subareas 3, 4, 5 and 6, in 1972

Fishery for herring

Subarea and Division / Month	3Ps X	4 Vn VIII	4Vs VIII	X	Total	4Vw X	4 Total	5Y VII	VIII	IX	X	XI	XII	Total	5Ze VII	VIII	IX	X	XI	XII	Total	5Zw X	XI	Total	5 Total
Nominal catches(tons)																									
Herring	110	1	2	508	510	79	590	319	1204	60	808	452	88	2931	320	5912	13004	8293	95	9	27.633	47	24	71	30635
Shad	-	-	-	-	-	-	-	-	5	-	-	25	-	30	-	5	13	5	7	-	30	-	60	60	120
Mackerel	-	-	-	-	-	-	-	40	73	-	-	52	2	167	-	39	93	114	88	50	384	-	197	197	748
Saithe	-	-	-	-	-	-	-	-	-	-	0	130	211	341	-	0	-	5	20	-	25	-			366
Otherfish	7	-	-	0	0	10	10	18	20	-	5	90	15	148	1	29	94	116	17	-	257	-	7	7	412
Squid	-	-	-					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			-
Total	117	1	2	508	510	89	600	377	1302	60	813	749	316	3617	321	5985	13204	8533	227	59	28.329	47	288	335	32281
Effort																									
Days fishing	6	1	1	7	8	3	12	24	51	3	22	28	9	137	25	152	318	273	19	4	791	2	14	16	944
Catch per day(tons)																									
Herring	18.3	1.0	2.0	72.6	63.8	26.3	49.2	13.3	23.6	20.0	36.7	16.1	9.8	21.4	12.8	38.9	40.9	30.4	5.0	2.3	34.9	23.5	1.7	4.4	32.5
Shad	-	-	-	-	-	-	-	-	0.1	-	-	0.9	0	0.2	-	0	0	0	0.4	-	0	-	4.3	3.8	0.1
Mackerel	-	-	-	-	-	-	-	1.7	1.4	-	-	1.9	0.2	1.2	-	0.3	0.3	0.4	4.6	12.5	0.5	-	14.1	12.3	0.8
Saithe	-	-	-	-	-			-	-	-	0	4.6	23.4	2.5	-	0	-	0	1.1	-	0	-	-	-	0.4
Otherfish	1.2	-	-	0	0	3.4	0.8	0.7	0.4	-	0.3	3.2	1.7	1.1	0	0.2	0.3	0.5	0.8	-	0.4	-	0.5	0.4	0.4
Squid	-	-	-	-	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			-
Total	19.5	1.0	2.0	72.6	63.8	29.7	50.0	15.7	25.5	20.0	37.0	26.7	35.1	26.4	12.8	39.4	41.5	31.3	11.9	14.8	35.8	23.5	20.6	20.9	34.2
Discards (tons)																									
Mackerel	-	-	-	-	-	-	-	3	8	-	-	-	-	5	24	-	-	-	-	-	24	-		-	29
Shad	-	-	-	-	-	-	-	4	6	-	-	-	-	10	9	-	-	-	-	-	9	-	-	-	19
Otherfish	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	10	-	-	-	10	-	-	-	10
Total	-	-	-	-	-	-	-	7	8	-	-	-	-	15	33	-	10	-	-	-	43	-	-	-	58

Fishery for squids

Subarea and Division / Month	5 Zw XII		6 A XI	XII	Total	6 B XII	6 Total
Nominal catches(tons)							
Herring	-		-	-	-	-	-
Shad	-		-	-	-	-	-
Mackerel	14		1	1	2	12	14
Saithe	-		-	-	-	-	-
Otherfish	7		0	18	18	8	26
Squid	63		10	303	313	86	399
Total	84		11	322	333	106	439
Effort							
Days fishing	7		2	40	42	12	54
Catch per day(tons)							
Herring	-		-	-	-	-	-
Shad	-		-	-	-	-	-
Mackerel	2.0		0.5	0	0.1	1.0	0.3
Saithe	-		-	-	-	-	-
Otherfish	1.0		0	0.5	0.4	0.7	0.5
Squid	9.0		5.0	7.6	7.4	7.1	7.3
Total	12.0		5.5	8.1	7.9	8.8	8.1
Discards (tons)							
Mackerel	-	-	-	-	-	-	-
Shad	-	-	-	-	-	-	-
Otherfish	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-

Average gross registered tonnage of German trawlers fishing for herring in the ICNAF Area
Subarea 3-5 (for herring) : 2261 GRT (1398-2684)
" 5-6 (for squids) : 1576 GRT (1572-1580)

Table 2. Length composition of herring in 1972 (‰)

Area		3 Ps	4 X	5 Ys		5 Z e	
Month		III	X	X	VIII	IX	X
		R*	C	C	C	C	C
cm	18						+
	19						1
	20		3			+	3
	21		24			1	6
	22		122			4	11
	23		244			5	14
	24		287			2	14
	25		293			2	7
	26		27		2	13	11
	27			7	10	41	45
	28			33	30	62	85
	29	16		107	70	116	139
	30	16		119	131	170	197
	31	8		168	191	190	185
	32	24		205	220	176	141
	33	173		159	205	117	86
	34	330		135	97	69	39
	35	260		56	40	27	14
	36	149		9	4	5	2
	37	24		2		+	+
	38					+	+
Total ‰		1000	1000	1000	1000	1000	1000
No. of Samples		1	1	1	5	37	34
No. measured		127	328	429	1823	14972	15943
Mean Length (cm)		34.74	24.27	32.25	32.19	31.34	30.59
Mean Weight (kg)		0.289	0.100	0.245	0.288	0.253	0.216

R* = Research Fishing
C = Commercial Fishing

Biological data for herring in Area 3, 4, 5, 1972.

Table 3 a)

Age composition (‰)

Area		4 X	5 Ys	5 Z e					3 PS
Month		X	X	VIII	IX	X			III
Year-Age class							Year-Age class		
1971	1	-	-	-	-	-	1971	1	-
70	2	1000	-	-	-	132	70	2	-
69	3	-	72	25	64	112	69	3	-
68	4	-	155	165	270	355	68	4	16
67	5	-	227	169	174	138	67	5	-
66	6	-	165	274	208	138	66	6	8
65	7	-	82	156	102	55	65	7	32
64	8	-	134	89	54	20	64	8	56
63	9	-	52	46	43	12	<64	>8	888
<63	>9	-	113	76	85	38			
Total		1000	1000	1000	1000	1000			1000
n		100	97	237	1118	757			126

Table 3 b)

Sexual maturity (‰)

Area	4 X	5 Ys	5	Z e		3 PS
Month	X	X	VIII	IX	X	III
Stages of maturity						
1	-	-	-	-	188	-
2	1000	-	4	4	12	-
3	-	-	8	4	-	-
4	-	-	232	130	-	16
5	-	-	756	631	2	-
6	-	1000	-	174	794	24
7	-	-	-	46	4	354
8	-	-	-	11	-	606
Total	1000	1000	1000	1000	1000	1000
n	100	98	95	686	492	127

Table 3 a)

Length (cm)

Area		4 X	5 Ys	5	Z e			3 PS
Month		X	X	VIII	IX	X		III
Year-Age class							Year-Age class	
1971	1	-	-	-	-	-	1971 1	-
70	2	$\bar{x}$ 23.51 s^2 1.363 n 100	-	-	-	22.38 2.389 100	70 2	-
69	3	-	27.79 0.571 7	28.33 0.566 6	27.68 1.389 72	27.75 1.259 85	69 3	-
68	4	-	30.17 1.095 15	29.88 0.979 39	29.95 1.072 302	29.91 1.040 269	68 4	30.00 0.500 2
67	5	-	30.91 0.443 22	31.58 0.737 40	31.20 0.964 195	31.13 0.935 104	67 5	-
66	6	-	31.81 0.495 16	32.53 0.811 65	32.13 0.882 232	31.90 0.961 104	66 6	32.50 - 1
65	7	-	32.50 0.285 8	33.01 0.645 37	32.95 1.063 114	33.00 0.695 42	65 7	31.75 2.916 4
64	8	-	33.35 0.307 13	33.50 0.700 21	33.48 0.864 60	33.50 0.571 15	64 8	33.26 1.809 7
63	9	-	34.10 0.800 5	34.23 0.218 11	34.06 0.761 48	34.06 0.777 9	<64 >8	35.06 1.077 112
<63	>9	-	34.77 1.018 11	34.67 0.735 18	34.68 0.871 95	34.67 0.790 29		
Total	$\bar{x}$	23.51	31.78	32.23	31.55	29.59		34.76
	s^2	1.363	3.994	3.003	4.239	11.697		2.002
	n	100	97	237	1118	757		126

Table 3 d)

L_1 (cm)

Area / Month		4 X X	5 Ys X	5 VIII	Z e IX	X
Year-Age class 1971	1	-	-	-	-	-
70	2	$\bar{x}$ 16.32 s^2 1.763 n 11	-	-	-	15.58 1.174 12
69	3	-	13.50 - 1	-	15.90 0.800 5	16.58 4.083 12
68	4	-	-	13.00 3.667 4	13.81 6.578 29	14.35 5.276 48
67	5	-	16.10 7.800 5	15.25 14.916 4	14.39 4.766 19	13.43 6.071 14
66	6	-	13.00 12.500 2	12.58 3.743 13	11.82 2.476 25	12.61 4.766 19
65	7	-	11.00 4.500 2	13.50 8.000 2	14.02 6.624 23	14.00 5.166 10
64	8	-	12.83 4.333 3	13.50 2.000 2	13.83 4.750 9	15.50 - 1
63	9	-	-	13.83 1.390 3	12.36 6.476 7	12.10 1.300 5
63	9	-	13.50 - 1	12.50 1.000 3	12.79 6.989 14	11.50 3.142 8
Total	$\bar{x}$ s^2 n	16.32 1.763 11	13.86 7.939 14	13.21 4.679 31	13.45 6.050 131	14.03 6.031 129

Table 3 e)

Vertebrae

Area / Month		4 X X	5 Ys X	5 VIII	Z e IX	X		3 PS III
Year-Age class 1971	1	-	-	-	-	-	Year-Age class 1971 1	-
70	2	$\bar{x}$ 56.55 s^2 0.372 n 99	-	-	-	56.33 0.325 98	70 2	-
69	3	- -	56.43 0.285 7	57.00 - 1	56.41 0.386 44	56.46 0.366 54	69 3	-
68	4	-	56.43 0.571 14	56.21 0.335 14	56.41 0.358 191	56.54 0.512 161	68 4	56.50 0.500 2
67	5	-	56.23 0.374 22	56.44 0.261 18	56.40 0.333 110	56.36 0.288 73	67 5	-
66	6	-	56.50 0.533 16	56.32 0.228 19	56.37 0.370 133	56.40 0.345 60	66 6	56.00 - 1
65	7	-	56.75 0.500 8	56.50 0.266 16	56.32 0.281 68	56.73 0.398 22	65 7	56.00 - 4
64	8	-	56.77 0.192 13	56.38 0.256 13	56.57 0.297 44	56.33 0.500 9	64 8	56.86 0.809 7
63	9	-	56.40 0.300 5	56.33 0.334 3	56.61 0.430 23	56.33 1.390 3	<64 >8	56.68 0.530 110
<63	>9	-	56.36 0.454 11	56.18 0.363 11	56.38 0.379 58	56.70 0.233 10		
Total	$\bar{x}$ s^2 n	56.55 0.372 99	56.46 0.419 96	56.36 0.274 95	56.41 0.351 671	56.45 0.403 490		56.66 0.534 124

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Section II

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German (FRG) Research Report, 1972

Section II. Subareas 2-5 (excluding Herring)

by

J Messtorff and W Lenz

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Subarea 2

A. Status of the Fisheries

The sharp decline of the FRG catches off Labrador since the peak year 1969 continued drastically also on 1972 to only 53% of the 1971 total catch. The 1972 nominal catches of groundfish as well as preliminary effort data are given in Table 1. The catch per day fished was somewhat higher as observed in 1971, but the total effort (days fished) had been reduced considerably by 53%. This reduction in effort again was primarily due to further increased severe ice conditions off Labrador in spring 1972.

On account of these adverse conditions the fishing activity was restricted to a very short season. 70% of the total catch was already taken during January, only 9% in February and the remainder in March. No fishing took place in Division 2G. Very few catches were reported from Division 2H but 99% from Division 2J. Cod amounted to 93% of the total catch in Subarea 2.

The redfish by-catch remained unimportant and amounted to only 5% of the total catch in Subarea 2.

The quantities of discarded fish were very small and much less than in 1971 as shown in Table 2.

Forecast for 1973

Fishing operations of German (FRG) trawlers in Divisions 2G-3K,L during the first quarter of 1973 were again restricted by very severe ice conditions. After preliminary estimates the total German (FRG) catch of cod may, however, exceed the

1972 catch somewhat to a level around 80% of the national quota allocation set for 1973.

B. Special Research Studies

1. Environmental Studies (W Lenz)

Hydrographical observations were carried out by R/V "Anton Dohrn" between 18 and 29 November 1972 consisting of three sections (fig. 1) across the shelf off Labrador: Middle Labrador (Div. 2H); Hamilton Bank (Div. 2J); Ritu Bank (Div. 3K, the stations are not positioned exactly on a straight line, but this section represents a strip of 50 n.m. width). The measurements were done by BT and hydro cast.

North of 58°N no hydrographic observations could be carried out because of drift ice . This appearance is very unusual so far south in fall. One could think this ice indicates only strong wind stress and/or a strong surface current, but the section off Middle Labrador shows, that Canadian Arctic Water (-1.75°C, 33.2‰S in the origin) was in progress in a tremendous amount. Water with negative tempoerature covered the whole shelf area down to the bottom - it was mostly even cooler than -1°C. This water was found up to Ritu Bank in some tongues in depths between 50 and 200 m. Above the outer part of Hamilton and Ritu Bank the layer of temperature minimum ascended to the surface according to upwelling processes.

In our research report for 1971 we stated a slight decrease in water temperature off Labrador compared to previous years. Now we have to call attention that again temperatures decreased, but even stronger: The water in the shallower part of the Labrador Current was now cooler by nearly one degree in November 1972 than in November 1971, while in greater depths the values of temperature and salinity remained the same in the West Greenland branch of this current.

The trend of decreasing water temperatures has lasted already for years; the first appearance of drift ice is drawn for the years 1969 to 1973 (see fig. 2) as was reported in the daily messages of the German fishing fleet. Since 1970 ice apeared about 10 days earlier each year, while the time of drifting between Hamilton and Ritu Bank remained about the same 22 ± 6 days, which would stand for an average drift speed of 9 nautical miles per day.

Table 1

German (FRG) nominal catches (tons) in Subareas 2 - 5 (excluding herring fishery) in 1972 (including industrial fish = converted to fish meal on board).

Subarea/Div.		days fished	COD catch	COD catch per day	COD % ind.	REDFISH catch	REDFISH catch per day	REDFISH % ind.	OTHER FISH catch	OTHER FISH catch per day	OTHER FISH % ind.	TOTAL catch	TOTAL catch per day	TOTAL % ind.
2	H	6	114	19.0	0.9	11	1.8	-	13	2.2	-	138	23.0	0.7
	J	342	9 681	28,3	3.9	562	1.6	67.3	129	0.4	40.3	10 372	30.3	7.8
2	Total	348	9 795	28.1	3.8	573	1.6	66.0	142	0.4	36.6	10 510	30.2	7.7
3	K	514	19 147	37.3	2.2	450	0.9	45.4	195	0.4	44.1	19 792	38.5	3.6
	L	11	17	1.5	-	19	1.7	-	5	0.5	100.0	41	3.7	12.2
	M	47	605	12.9	4.0	240	5.1	6.7	27	0.6	+	872	18.5	4.6
	Pn	2	-	-	-	30	15.0	13.3	+	+	-	30	15.0	13.3
3	Total	574	19 769	34.4	2.3	739	1.3	30.4	227	0.4	40.1	20 735	36.1	3.7
4	X	1	2	2.0	-	-	-	-	9[a]	9.0	-	11	11.0	-
5	Y	3	+	+	-	-	-	-	55	18.3	-	55	18.3	-
	Ze	6	-	-	-	-	-	-	49	8.2	-	49	8.2	-
5	Total	9	+	+	-	-	-	-	104[b]	11.6	-	104	11.6	-

a) Haddock 1, Pollock 8 b) Pollock 104

Table 2

Discarded fish (tons) in Subareas 2 - 5 (excluding herring fishery) in 1972 (1971)

Subarea/Div.		COD	REDFISH	OTHER FISH	TOTAL
2	G	- (2)	- (-)	- (-)	- (2)
	H	- (4)	- (-)	- (2)	- (6)
	J	5 (57)	- (7)	3 (35)	8 (99)
2	Total	5 (63)	- (7)	3 (37)	8 (107)
3	K	82 (27)	- (5)	8 (7)	90 (39)
4 + 5		no discards reported.			

B 2

131

2. Biological Studies

R/V "Anton Dohrn" (ex."Walther Herwig") carried out a groundfish survey in the Subarea during the second half of November 1972. Due to limited working time the survey area had to be restricted mainly to Division 2J (and the northern part of Division 3K). Even then the coverage as well as the number of random trawling stations per sampling stratum was probably not sufficient in order to obtain significant abundance indices. A standard bottom trawl with small meshed liner inside the cod-end was used throughout the survey. Towing time and speed were 30 minutes at 4 Kn. If not sampled for length frequency distribution, each species caught (> 30) was at least recorded by number and weight.

In Division 2J 20 hauls ranging from 150-600 m were carried out. All cod (2818 kg = 3489 fish, mean weight 0.8 kg) obtained in 16 hauls until 310 m were measured and 620 otoliths taken. No cod occurred in 4 hauls in deeper water between 450 and 600 m where redfish dominated with 59% of the total catches.

Four hauls in Division 2J gave a total catch of 586 kg, 32% of which were cod. One haul in 500 m consisted mainly of roundnosed grenadier (356 kg = 83%).

The proportion of older and larger cod seemed to have further decreased. With a mean length as low as 41.6 cm only 11% of cod measured more than 60 cm and 1‰ over 80 cm. The scarcity of cod of age 8 and older is also well reflected by the percentage age composition as given below. The recently recruited year classes 1966-68 make up already 72%.

year class	1970	1969	1968	1967	1966	1965	1964	1963	1962	1961	1960	+
age	2	3	4	5	6	7	8	9	10	11	12	12+
%	1	10	18	33	21	10	5	1	1	+	+	+
av. length	27.2	31.9	37.7	40.1	43.3	49.1	54.3	58.8	68.3	(68.1)	(87.5)	(88.5)

Subarea 3

A. Status of the Fisheries

Catches of German (FRG) trawlers increased considerably by 47% in Division 3K against 1971 due to diversion of effort from Subarea 2, thus fully compensating

for the loss caused by the worst ice conditions in Subarea 2. 94% of the total catch from Division 3K was taken in February after the Labrador fishery had to be given up.

The nominal catches in Subarea 3 as well as preliminary effort data are given in Table 1.

In spite of the increased fishing effort the catch per day fished also increased quite remarkably. This could be an indication of a possibly higher abundance of cod in the area because of good recruitment by the stronger 1966-68 year classes.

95% of the total Subarea 3 catch consisted of cod. The redfish by-catch remained at the same low level as in previous years. Only very small catches were taken in Divisions 3L, 3M and 3Pn. Discards zre given in Table 2.

Forecast for 1973 - see Subarea 2

B. Special Research Studies

1. Environmental Studies

Hydrographic sections across the Laurentian channel from Divisions 3P to 4V were carried out in March and November 1972 by R/V "Walther Herwig". Results are given in Res. Doc. 73/83 by W Lenz.

2. Biological Studies

A groundfish survey was conducted by R/V "Anton Dohrn" (ex. "Walther Herwig") during the second half of November 1972 in the northern part of Division 3K and in Subarea 2 (see remarks in Subarea 2 section).

In Division 3K 18 hauls ranging from 175-600 m were carried out. All fish species caught were recorded at least by number and weight. Length frequencies and ageing material were collected from priority species, especially cod. 15 hauls in depths between 175 and 350 m contained cod but they were most abundant between 250 and 300 m. All cod (1729 fish = 1714 kig, mean weight 1.0 kg) were measured and partly sampled for otoliths (798). Cod accounted for 38% of the total catch weight.

3 hauls made in 450-600 m contained no cod but 60% roundnosed grenadier and 26% redfish (total catch 1560 kg).

The percentage age composition of cod for the combined survey catches in Division 3K as shown below is very similar to that found in Division 2J of Subarea 2, and in fact also the length frequency distributions proved to be almost the same. Mean length of cod in Division 3K was 44.5 cm and larger fish of over 60 cm amounted to only 9% of the total number caught. 76% of the cod were 4-7 years old (year classes 1968-65).

year class	1970	1969	1968	1967	1966	1965	1964	1963	1962	1961	1960	
age	2	3	4	5	6	7	8	9	10	11	12	12+
%	2	8	14	28	20	14	9	3	2	+	+	+
mean length	25.3	31.2	37.9	40.7	45.0	52.0	56.6	61.8	70.6	(74.8)	(82.5)	(85.5)

Subarea 4

A. Status of the Fisheries

There was no significant fishery carried out by German (FRG) trawlers. Compare Table 1.

B. Special Research Studies

1. Environmental Studies

See Subarea 3, B.1.

Subarea 5

A. Status of the Fisheries

Besides the herring fishery (Res. Report, Part III) only few pollock catches were obtained (see Table 2).

B. Special Research Studies

1. Environmental Studies

Hydrographic observations were carried out by R/V "Anton Dohrn" (ex. Walther Herwig") in connection with the ICNAF larval herring survey during the first half of November 1972 (see Res. Doc. 73/19).

2. Biological Studies

R/V "Anton Dohrn" (ex. "Walther Herwig") took part in the international ICNAF larval herring survey in the Gulf of Maine and Georges Bank area (see Res. Doc. 73/19).

In February/March 1973 R/V "Anton Dohrn" conducted a young herring survey in Subarea 5 and Statistical Area 6 (see Res. Doc. 73/84).

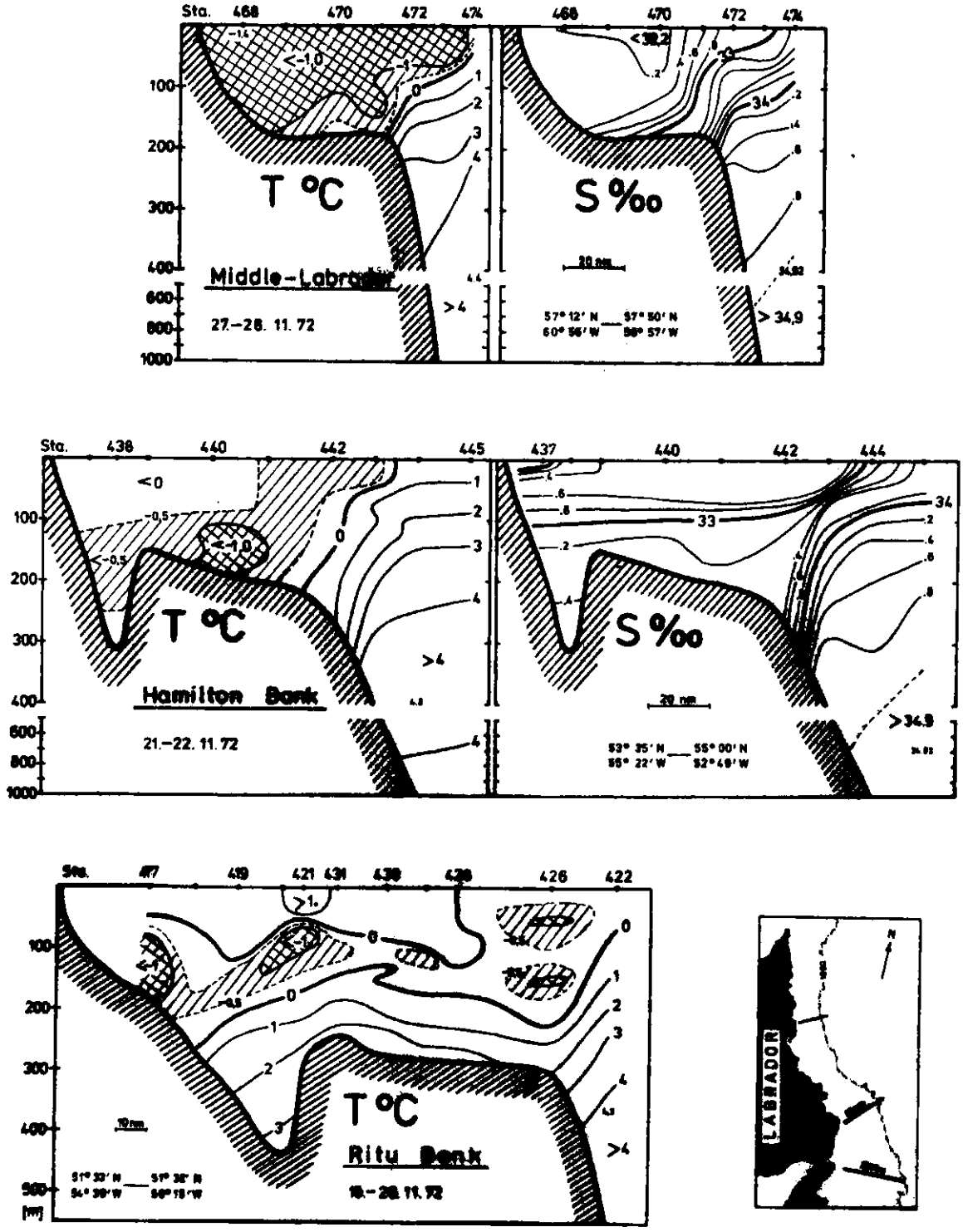

Fig. 1: Hydrographic sections off Labrador in November 1972

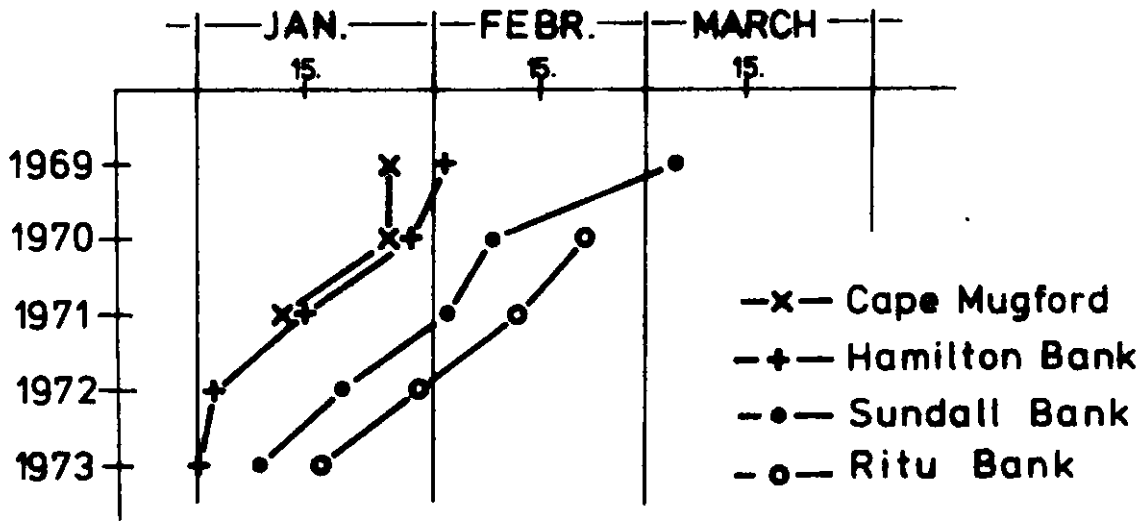

Fig. 2. First appearance of drift ice at different fishing areas off Labrador from 1969-1973 as reported by the German fishing fleet.