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Danish Research Report, 1973

by

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Section I. Denmark (Greenland and Mainland), Subareas 1,2 and 3 and Baffin Island.

by

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Subarea 1

A. STATUS OF THE FISHERIES

1. General Trends

The nominal catches taken by Denmark (Greenland) in 1973 are given in Table 1. (Provisional figures)

Table 1. Denmark (Greenland) nominal catches in Subarea 1, 1973.

Species	Nominal catch (matric tons)	Increase or decrease from 1972 (%)
Cod	17713	- 24
Gadus ogoc	989	no landings in 1972
Redfish	1111	+ 355
Wolffish	4182	+ 21
Roundnose grenadier	12	no landings in 1972
Greenland halibut	3650	+ 24
Halibut	57	+ 470
American plaice	55	+ 104
Capelin	3214	+ 68
Atlantic salmon	1585	+ 20
Arctic char	117	+ 54
Lumpsucker (roe only, not converted to round, fresh fish)	18	- 85
Herring	81	+ 440
Industrial fish	30	- 81
Other fish	342	+ 107
Shrimp (Pandalus borealis)	8135	+ 9
Total (excl. lumpsucker roe)	41291	+ 0.3

Besides the catches by Denmark (G) in Subarea 1, Denmark (Mainland) reports nominal catch in the Subarea as follows: Salmon 385 (- 4% compared to 1972) and Shrimps 196 (+ 42%) but not all shrimp catches are yet reported. Faroese catches (Denmark (F)) will be reported separately.

The three most important species (in terms of income) for the Greenland fishermen in 1973 were salmon (32%), cod (30%) and shrimp (24%), approximately the same relative values as in 1972. Salmon has maintained its head position since 1969. This relative importance is, however, measured only by the direct payment to fishermen excluding employment and earnings by the land based production. Cod landings (in terms of weight) showed a rather severe decrease (24%) compared to 1972, but this decrease is more than balanced by an increase in landings of redfish, wolffish and Greenland halibut (especially in trawlers' landings) as well as in landings of capelin and shrimps (small boat fisheries). Another trend, although in terms of weight not yet very important, is the extension of the fisheries on species hitherto not landed in noteworthy quantities or not even fished such as Gadus ogac, American plaice, roundnose grenadier and herring.

Further details of the major fisheries are given below.

2. Cod

a) The fisheries. Nominal catch was 24% below that of 1972. In the course of the year the fleet of large, modern stern trawlers increased from 4 to 7, and trawlers' cod landings increased by about 15% over that in 1972. Trawlers' landings account for roughly 50% of the total landings of cod by Denmark (G). The decrease in the coastal and inshore small boat fisheries is, therefore, even much more severe than indicated by the decrease in total landings of cod.

Although total landings by trawlers have increased the result per trawler is disappointingly bad, and there are at present no plans for a further increase of the fleet.

In some periods the trawlers have had great difficulty in finding sufficient concentrations of cod at Greenland. They have then fished in other areas and/or on other species, mostly Greenland halibut in the western part of the Davis Strait and off Labrador.

By the end of February 1974 trawlers' catches were 23% over that by the same time in 1973. This increase, however, is less than the increase in numbers of trawlers operating in the two periods (4 in 1973, 6 in 1974). Small boat fishery has as usual been negligible in the first two months of the year.

As shown in Section B the fishery in 1973 was based mainly, in some fisheries nearly exclusively, on the 1968 year-class.

b) Forecast for 1974-75. The number of trawlers has, as mentioned above, been increased so that during 1974 and 1975 their total effort could be some 50-60% greater than in 1973. The cod stock itself is, however, not expected to show any increase, rather a further decline. The actual prospects for trawlers' opportunity to catch cod in 1974 and 1975 are to a great extent

depending on the schooling tendency of the important 1968 year-class when this year class forms the major part of the spawning stock. The individuals of this year class have now obtained relatively good weight, and if pronounced schooling occur in 1974 or 1975 the fleet of trawlers may well have some increase in their total landing although probably not in landings per vessel. The quota regulation will, of course, limit a possible increase.

The coastal and inshore small boat fishery, not regulated by quota regulation (but estimated as part of the overall TAC), seems to be facing a still worse future. It is extremely dependent upon the pound net fishery, in which fishery the major part of the catch will normally consists of cod newly recruited to the fishery (minimum size 40 cm total length). After the 1968 year-class no year class seems to be of any noteworthy strength, and the 1968 year-class itself is now so old that most individuals will be mature and tend to be distributed on offshore banks rather than in inshore waters. The possibility of fishing the other gadoid species, Gadus ogac, can only partly compensate the decline in the cod fishery.

3. Atlantic salmon

Previous years regulations prohibited fishing before August. The new quota regulations do not restrict fishing to certain periods, and in 1973 fishing started mid-July. Catches were good right from the beginning, remained good in August and unexpectedly good in September. Due to the quota regulations the fishing by Greenlanders was stopped late September (the quota was then exceeded at a time when catch rate was still very good). For further details see the Report of the ICES/ICNAF Joint Working Party on North Atlantic Salmon, March 1974. (ICNAF Summ.Doc. 74/17).

Forecast for the actual amount of salmon occurring at Greenland in 1974 and 1975 is difficult to give since it depends not only on smolt production in North American and Europeans rivers but also on migration to Greenland relative to other areas in the sea. Furthermore availability to the fishery depends on local phenomenons such as water temperature and weather. "Recent years" experience by the fishery does, however, suggest that it is more likely that the actual output of the fishery will be determined by the regulations rather than by fluctuations in stocks and availability.

4. Other fish

The most important increase in landings has taken place for Greenland halibut, wolffish and redfish. The increase for the species is due to the increase in trawlers' effort. The species together with American plaice constitute nearly the whole by-catch in the cod fishery, but American plaice is frequently discarded (the individuals seem to be much smaller than in the fisheries in other ICNAF subareas). Greenland halibut is sometimes the target species for the trawlers as well as for inshore small boat fisheries (or dog-sledge long line fisheries from the ice in northern Greenland). Part of the trawlers' catch of Greenland halibut has been taken in waters west of Subarea 1, by-catches then being small quantities of redfish and (in deeper water) roundnose grenadier.

A directed exploratory fishing has on some trips taken place on roundnose grenadier, mainly in November on the western slopes of the fishing banks in Divs. 1C-1D.

The landings of Greenland halibut, redfish, wolffish, grenadier and possibly American plaice is likely to increase somewhat in 1974 with the increase in trawlers' effort. For Greenland halibut and roundnose grenadier a directed fishery may occur at times when cod catches are too poor.

The small catch of herring (Table 1) has been taken inshore in Div.1F by set gill nets on places traditionally supporting a small herring fishery for local consumption. These catches may well increase somewhat in future but no observations on inshore stock size indicate that there is a great herring potential, nor is there any indication of an offshore herring ressource in the subarea.

5. Shrimp

The species fished is Pandalus borealis. The fishery in 1973 showed a slight increase over that in 1972 but not enough to balance the decrease from 1971 to 1972. The Disko Bay area (Div. 1A, inshore) is still the most important one, but increasing amounts are taken on offshore grounds by Greenlanders as well as Danish, Faroese and Norwegian fishermen. If this fishery is taken into account (although actual landings are not known when this report was written) there is no doubt that total exploitation of shrimps in 1973 was the highest so far.

With the increasing exploitation an evaluation of the stock size and its sustainable yield is important. A relatively greater part of the research effort than hitherto will be devoted to this problem in the coming years.

B. SPECIAL RESEARCH STUDIES

1. Environmental studies

a) Hydrography. The Danish hydrographical observations in 1973 are reported jointly with those made by Germany and the UK, see Res.Doc. . The following observations should be noted here:

(i) on the Fylla Bank section (Div. 1D) the average water temperature in the uppermost 40 m over the shallow part of the bank was 1.7°C in late June. This is rather warmer than in the preceding three years although probably not sufficiently warm to indicate the possibility of a good year class of cod;

(ii) generally there has been a slight increase in summer surface temperatures off West Greenland since 1970, but the temperature is still below the mean in the period 1950-66.

b) Plankton. Oblique hauls with 2 m stramin net (each haul half an hour, 225-0 m wire) were taken at some of the standard hydrographic sections in June and July, and at a standard station at Godthåb from May to October. On the Fylla Bank section the mean volume of plankton per half hour was 155 ml, the lowest figure but one since 1961.

c) Benthic studies, see Item e).

d) Observations on ice. A special section on the ice situation is presented by Hans Valeur in Section II of this Researc Report.

e) Other environmental studies. In connection with the establishment of a lead and zinc mine in Umanak district a great number of water samples and samples of bottom sediments, animals and algae have been taken at various distances from the planned outlet of the mine before the production started. This net of stations to be sampled also in future will permit measurements of the possible pollution. A special zone has been established to control that the very stringent restrictions to prevent more than local pollution are followed.

Observations have especially been concerned with the currents (water exchange) in the fjord and with analysis of the benthic animal communities (polychaets, mollusks, crustaceans etc.).

2. Biological studies

a) Cod: Eggs and larvae. As in 1972 very few cod larvae were found in the plankton (Fig. 1). Although water temperatures increased compared to that in 1972 the number of cod larvae observed does not give support to the hope that the 1973 year-class will be more than modest.

Occurrence of pre-recruit cod (age-groups I, II and III) has been studied only by few observations on pund net catches and by researoh trawling with fine meshed otter trawl (shrimp trawl) Table 2. The material is rather scarce for a real judgement of the strength on these age groups. On the other hand nothing in the material gives reason to change the predictions for the strength of the year-classes 1970-72 based on hydrographic observations and numbers of larvae in the years in question. All three year classes were estimated as very poor ones.

Table 2. Number of cod per hour's trawled on the standard station GODTHÅB DYBET, 63°48'N, 52°14'W, depth app. 300 m. Otter trawl, 36 mm cod end mesh size. + indicates less than one cod per hour but not total absence (indicated by 0).

Year	Date	Ref.No.	No.of hauls	Total time trawled (minutes)	Number of cod per hour and age group						
					II	III	IV	V	VI	VII	VIII+
1968	1 Apr	3941	2	105	2	96	214	395	78	22	3
	1-2 Apr	3964/-5	2	95	0	31	33	57	11	1	5
1969	8-9 Jan	4142	3	183	0	70	208	68	27	8	13
	21 Feb	4164	1	45	0	103	261	109	41	8	4
	4 Mar	4168	2	120	0	65	157	89	47	9	6
	7-8 May	4213	3	180	2	273	130	12	8	0	1
1970	4-5 Jun	4376	3	171	6	6	35	7	1	1	1
1971	17-21 Jan	4512	3	146	2	240	60	95	9	2	3
	13-14 May	4530	4	217	0	229	29	16	2	0	1
1973	6-7 Feb	4718	3	180	1	+	0	2	2	1	2
	17-18 Apr	4738	3	180	8	5	+	1	+	0	1
	22 Jun	4754	2	120	0	+	+	6	+	+	1
	23 Oct	4865	2	120	0	+	+	3	+	2	1

Age and size distribution of cod in landings. The most important material has been sampled from the trawlers' landings (Samples a-g in Fig. 2). As expected the year-class 1968, which started to recruit to the fishery in late 1972, has become the most predominant year class in the 1973 fishery. In some cases it accounts for more than 80% by numbers of trawlers' landings. It seems to be well represented offshore in all divisions sampled (Divs. 1C-1F). Also in inshore pound net catches (Sample i in Fig. 2) it seems extremely important, accounting for more than 90% by number in the one sample from this fishery.

Catches taken by long line or gill nets normally contain greater quantities of older cod than trawl and pound net catches. This is also the case for long line/gill net samples in 1973 (Samples h and j in Fig.2), where the 1968 year-class is occurring together with year-classes 1963 and 1964 in southern divisions (Sample j, Div. 1F) and together with year classes 1963-66 in more northern divisions (Sample h, Div.1C).

As mentioned earlier in this report the 1968 year-class is expected to be the predominant one in trawlers' landings also in 1974 and 1975, especially in the first half of the year when it schools in connection with spawning. Its importance in the long line and gill net fishery will increase in 1974 and 1975, whereas its importance for the inshore pound net fishery may decrease, at least in 1975.

Tagging experiments. 182 cod were tagged in Div. 1D near Godthåb.

b) Atlantic salmon. In connection with the participation of the R/V DANA in the ICES Overflow Programme in waters between Greenland and Iceland it was planned to carry out drift net fishing experiments for salmon in this area. Due to ice and to break-down on the vessel only five stations between Iceland and Angmagssalik (East Greenland) were fished in the period 2-9 August. Salmon was caught on all stations although total catch was only 14 specimens. On each station 35 nets, each 25 fathoms long, were set.

Further tagging survival experiments were conducted by the TORNAQ at Godthåb. These experiments as well as the above mentioned fishery have been reported to the ICES/ICNAF Joint Working Party on North Atlantic Salmon.

A report on the two-year survey of Greenland fresh water systems aimed at elucidating the possibilities of planting salmon in Greenland rivers has been completed. Copy of the report has been sent to laboratories engaged in the same kind of work.

c) Other fish. Lengths, weights, sex and otoliths have been collected from research vessel samples of American plaice, and 49 specimens were tagged in Div. 1D.

Lengths and weights of Greenland halibut have been collected, and 175 specimens were tagged in Div. 1A.

9 specimens of eel, very seldomly recorded in Greenland, were supplied by a local fisherman. The examination (e.g. counting of vertebrae) showed all of them to be the American type, Anguilla rostrata.

Re. capelin, see Section 3.

d) Crustaceans. Echo sounding surveys and experimental fishing for deep sea shrimps (Pandalus borealis) have been conducted especially in the Umanak district (Div. 1A) and in Julianehåb district (Div. 1F). Routine sampling of shrimps were made on other grounds, mainly in Divs. 1C and 1D.

The occurrence of snow crab (Chionoecetes opilio) in Godthåb inshore area (Div. 1D) has been studied and a material of lengths, weights, sex and maturity has been collected. 1016 specimens were tagged at a selected locality where the majority of the experimental fishing operations are conducted (no commercial fishing takes place yet). 86 specimens (8.5%) were recaptured during these experiments.

e) Seals. Results of age analyses of harp seals caught in Northwest Greenland up to 1972 were presented at the Annual Meeting last year (Res. Doc. 73/54).

Age analyses of 703 specimens collected in the same area in 1973 seems to agree very well with the findings in that report. Youngs of the year account for 60% of the total material and differences between samples from various localities in Northwest Greenland were found to be similar to those demonstrated for the 1972-material.

Jaws of hooded seals collected in South and Northwest Greenland 1972 and 1973 are under study. It is hoped that preliminary results of age analyses of this material will be ready for presentation at the 1974 Annual Meeting.

The seal studies also include sampling of material of ringed seals.

3. Gear and selectivity studies.

Experimental fishing with a small meshed one boat pelagic trawl for capelin was made in April-May and in November in inshore waters of Div.1C. Only on two occasions, both in November, were noteworthy catches obtained, best result being only 1020 kg in two hours trawling. A new type of trawl and installation of electronic trawl eye is hoped to improve the results in 1974.

Further experiments with various types of traps for crabs (Chionoecetes opilio) have been conducted, but no improvement has been obtained in the type already developed on the basis of experiments in 1972.

BAFFIN ISLAND AREA

A. STATUS OF THE FISHERIES

Greenland halibut.

In periods when cod fishing in Subarea 1 falls short the Greenland trawlers have directed their fishery towards Greenland halibut in areas outside Subarea 1, primarily off Baffin Island. Fishing on these grounds has taken place mainly in the period July-November. Total nominal catch in 1973 was approximately 900 tons. Greenland halibut is the target species. A small amount (app. 40 tons) of redfish was landed as by-catch together with some few tons of halibut. Some discarding of small redfish occurs.

B. SPECIAL RESEARCH STUDIES

Biological studies

Greenland halibut. A sample of a landing of 85 tons of Greenland halibut was taken in August, Fig. 3. Mean length was 67 cm. Discard rate was estimated to be 5-10% by numbers.

SUBAREA 2

A. STATUS OF THE FISHERIES

Greenland trawlers have been working occasionally in this subarea in June in Div. 2J where target species were cod and Greenland halibut. Nominal catch was 33 tons of cod and 42 tons of Greenland halibut.

SUBAREA 3

A. STATUS OF THE FISHERIES

Greenland trawlers have been operating in this subarea, Divs. 3K and 3L, occasionally in January-February and around May. Target species have been cod and by-catches landed consist mainly of redfish and Greenland halibut. Nominal catch was

cod	1653	tons
redfish	50	"
Greenland halibut	23	

B. SPECIAL RESEARCH STUDIES

Biological studies

a) Cod. A sample of trawlers' landings from Ritu Bank (Div. 3K) and northern part of Grand Bank (Div. 3L) was taken in May (Fig.4). 1128 specimens were measured out of which 252 were aged. Otoliths were read both by the Greenland laboratory and the Biological Station, St.John's with rather good although not complete agreement between readers. The year-class 1967 was found to be the predominant one (42%) closely followed by the 1968 year-class (36%). A rather heavy discard rate (up to 40% by numbers, mesh size presumably 130 mm) was, however, reported. Mean total length of the landed specimens of the 1968 year-class was 44.6 cm. It is, therefore, possible that a great part of the fish discarded may have belonged to the 1968 year-class although the occurrence (by 2%) of the 1969 year-class in landings could indicate that a part of the discarded fish belongs to the 1969 year-class.

By-catches reported were wolffish and redfish, both accounting for 1-2% by weight of total landings, and American plaice less than 1% of landings (rate of discard not known).

b) Cod - mean length and weight by age, 1973.

Sample of cod landings from Div. 3K and northern part of Div. 3L, May 1973. 1128 cod were sampled at random (measured) out of which a stratified sample of 252 was aged and weighted. Gear: Otter trawl, cod end mesh size 130 mm.

Nos. = numbers aged

% = age frequency in total sample

cm. = mean total length, cm below and standard deviation (s.d.)

kg. = mean weight in kg round fresh (observed gutted weight converted by factor 1.22) and standard deviation (s.d.)

Age group	Nos.	%	cm	±s.d.	kg	±s.d.
4	6	1.8	39.4	2.5	0.63	0.14
5	53	36.4	44.6	4.2	0.83	0.22
6	74	42.3	47.7	4.7	1.00	0.30
7	64	12.9	55.5	4.5	1.53	0.33
8	22	33.4	58.3	4.3	1.75	0.36
9	18	19.6	64.2	7.0	2.36	0.77
10	9	8.0	72.6	9.6	3.43	1.52
11	5	4.4	75.4	8.8	3.60	1.32
12	0	0.0				
13	1	0.9	80.0		4.51	

SECTION II. ICE CONDITIONS OFF THE GREENLAND WESTCOAST SOUTH OF 75°N IN 1973

by

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General

The ice conditions were close to normal, yet the 1973/74 polar ice season started as early as towards the end of September.

Polar ice

The areal extent and concentration of the polar ice was smaller than usually, but the duration of the season was longer.

The polar ice appeared from around new year and was present in moderate quantities during January and first half of February in Julianehåb Bugt. At the same time the occurrence of icebergs in the same area was unusually big.

During the latter half of February and most of March polar ice was completely absent in the area. The ice reappeared at the beginning of April and was present in light quantities in scattered areas with some interruption till sometime in July. The ice did not pass to the north of Frederikshåb (app. 62°N.).

As early as at the end of September scattered polar ice reappeared in the southernmost part of Julianehåb Bugt, and covered the whole of Julianehåb Bugt through October during which month light nilas was present in some of the fjords bordering Julianehåb Bugt.

The polar ice was absent during November but reappeared in very open concentrations at the beginning of December.

West ice

In January the west ice reached the westcoast at 66°N and blocked the whole coast to the north of this latitude except for Disko Bugt which remained navigable.

South of 66°N pancake ice was observed in several places.

During February the ice edge was situated about 30 nm from the coast off Godthåb (64°N) and reached the coast about 67°N.

Towards the end of April a 20 nm wide (or more) shorelead was present up to Disko Bugt, where fast ice only remained along the coast. The Umanak Fjord was covered with fast ice till the island Ubekendt Ejland.

During May the shorelead (flawlead) had extended right up to 75°N.

The west ice area decreased through the following months and in July the area was freely navigable right up till Kane Bassin.

At the beginning of December the seasonally advancing west ice had reached Upernavik, but did not reach the westcoast south of this settlement through that month. However, nilas formed and most of the fjords including Disko Bugt became more or less icecovered during the month.

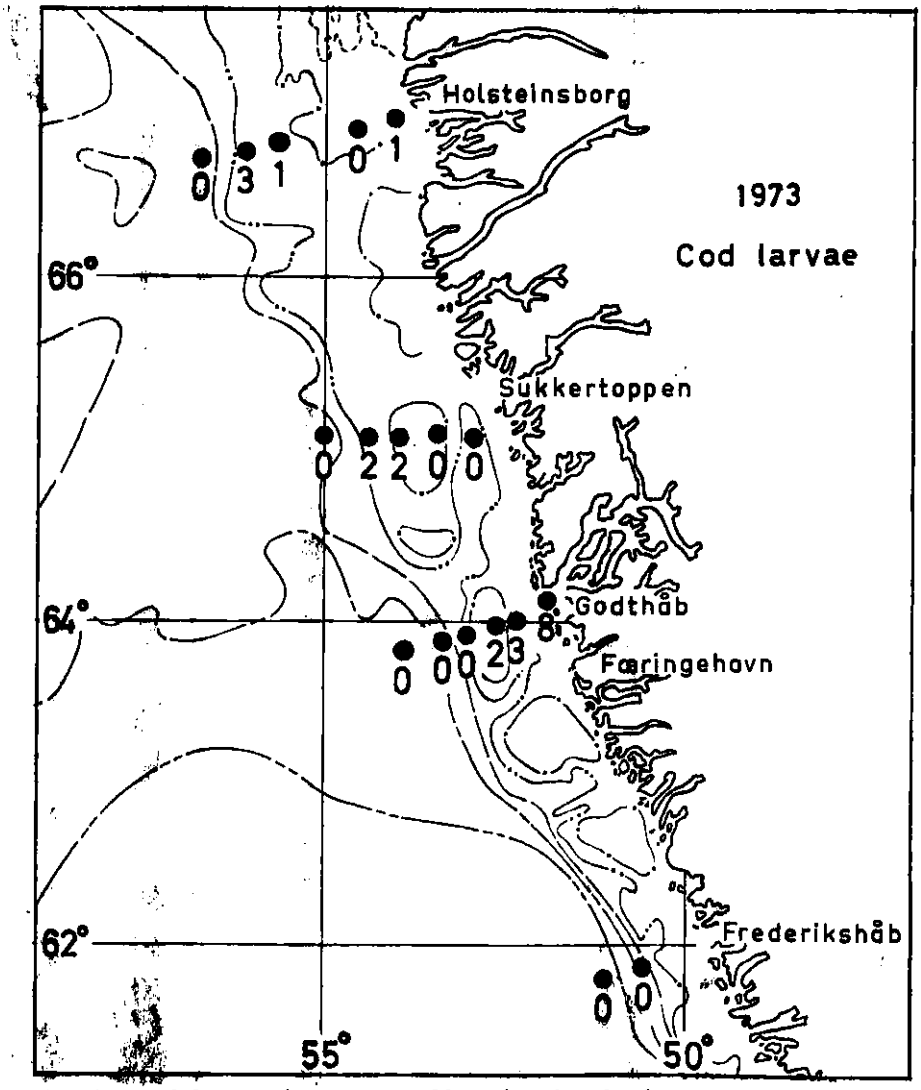
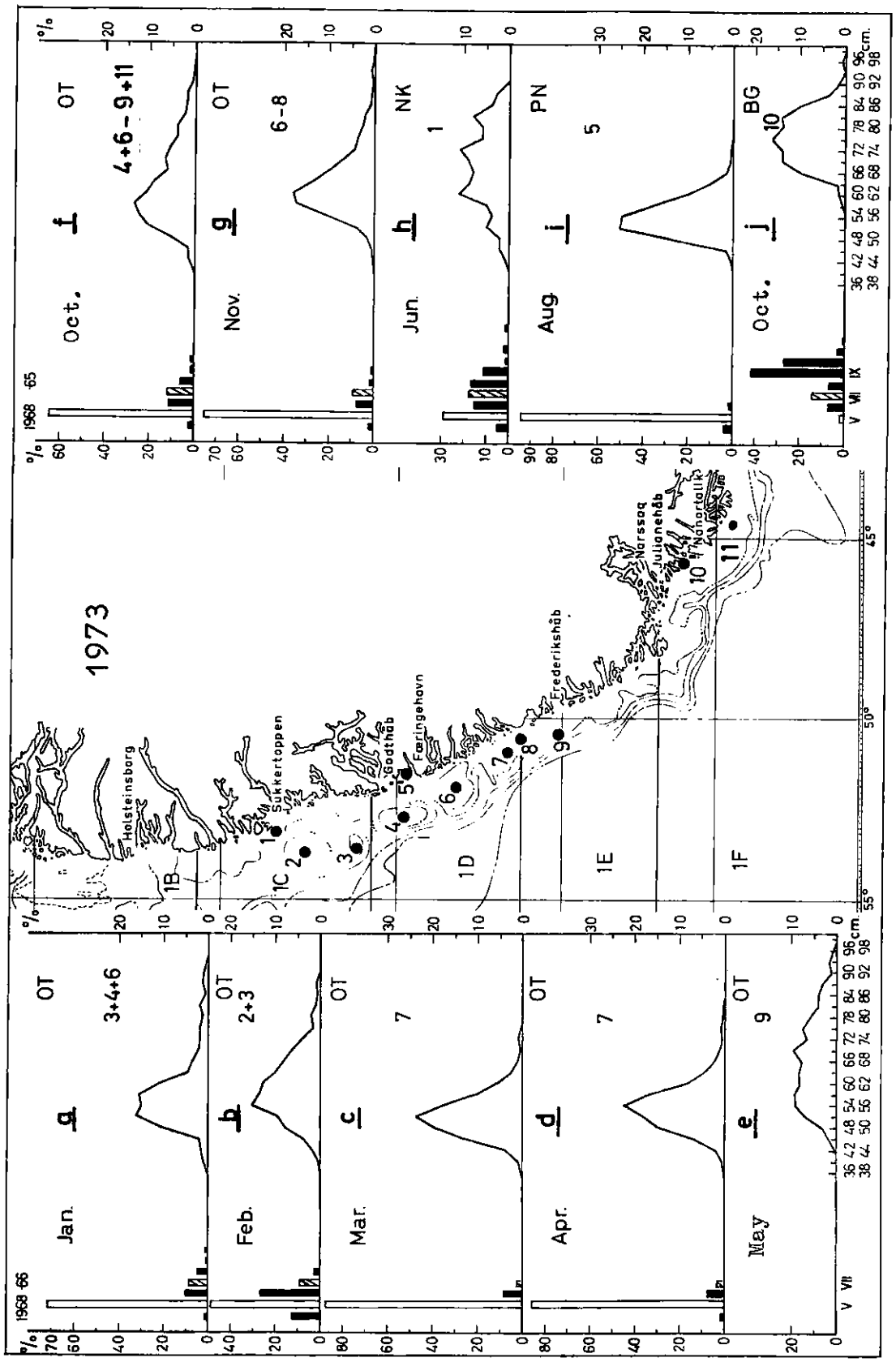


Fig. 1. Cod larvae (number per 30 min) taken by 2-m stramin net in the upper water layers (maximum depth 50 m). June-July 1973.



G 12

Fig. 2. Age and length composition of cod from commercial landings. OT=otter trawl, PN=pound net, BG=bottom gill net, and NK=gear not known, Sample h supposed to be taken by long line or bottom gill net. Numbers indicate fishing grounds from where landings originate, e.g. Sample a is taken from OT-landings from a trip to Banana Bank (3), Fylla Bank (4) and Fiskenæs Bank (6).

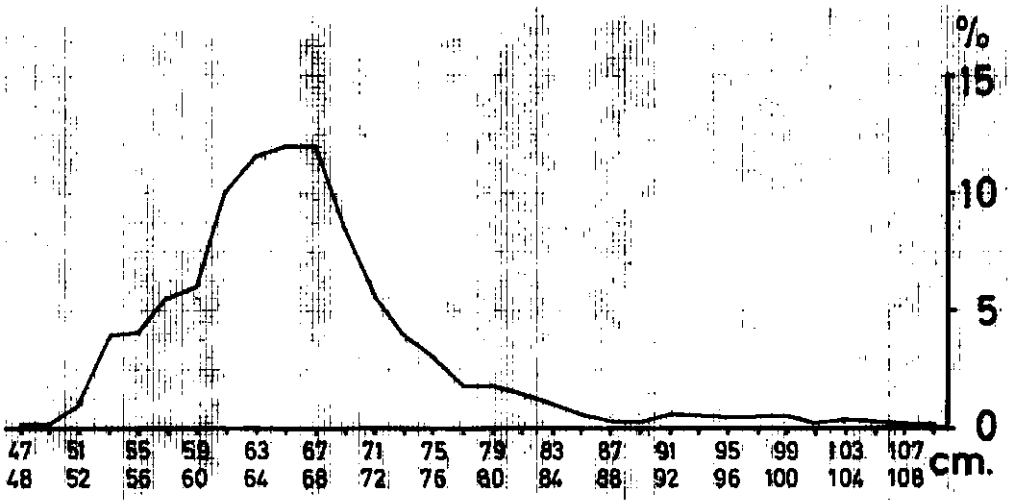


Fig. 3. Length distribution of landings of Greenland halibut, off Baffin Island, depth about 500 m. August, otter trawl, 895 specimens.

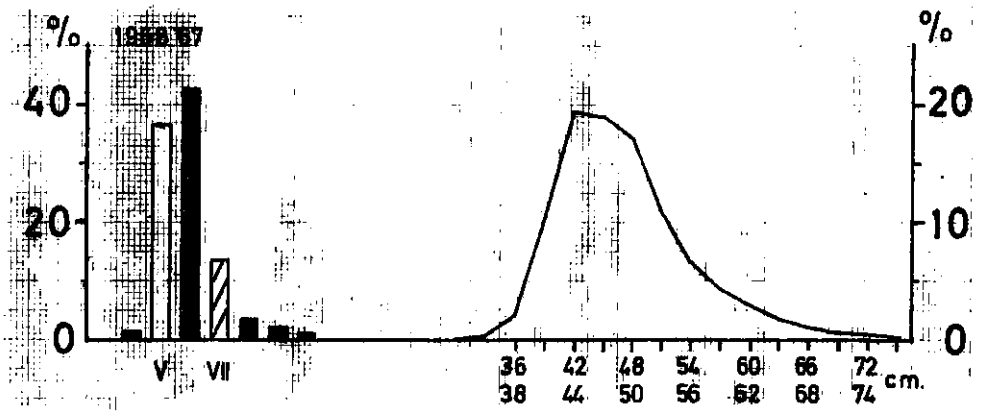


Fig. 4. Age and length distribution of cod, Divs.3K-L, otter trawl, May.