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Denmark (Greenland) Research Report, 1976

by

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STATISTICAL AREA 0

A. STATUS OF THE FISHERIES

Whereas Greenland trawlers conducted some fishing in this area in 1975 provisional data for 1976 does not indicate any fishing activity by Greenland vessels in this region in 1976.

B. SPECIAL RESEARCH STUDIES

No special research to report for this area for 1976.

SUBAREA 1

A. STATUS OF THE FISHERIES

1. General trends

The nominal catches by Denmark(G) in 1976 are given in Table 1 (provisional figures, but not likely to be changed to any noteworthy extent).

Total nominal catch decreased by about 6% from 1975 to 1976, primarily due to a continued decrease in catches of cod and wolffish. Catches of Greenland cod (fished mainly inshore) and of Greenland halibut increased slightly, and catches of redfish nearly doubled.

The important fishery for shrimp resulted in a catch similar to that in 1975. However, the catch level was maintained only due to the participation of 1-2 trawlers in the offshore fishery. These trawlers fished about 1450 kg of shrimp so that a corresponding decrease of catches occurred in the inshore shrimp fishery, mainly in the Disko Bay.

Catch of salmon remained stable at the level set by the quota regulation.

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Table 1. Nominal catches by Denmark(G) in Subarea 1, 1976 (provisional figures).

Species	Nominal catch 1976 (metric tons)	Increase or decrease from 1975(%)
Cod	16 200	- 16
Greenland cod	4 777	+ 2
Redfish	2 681	+ 91
Wolffish	4 945	- 13
Roundnose grenadier	1	- 83
Greenland halibut	3 538	+ 3
Halibut	139	- 21
American plaice	0	-100
Capelin	474	- 54
Atlantic salmon	1 175	0
Arctic char	134	- 3
Lumpsucker (roe only, not converted to round, fresh fish)	81	- 15
Herring	6	- 40
Industrial fish and fish not specified	107	- 54
Shrimp	9 771	0
TOTAL (excl.lumpsucker roe)	44 029	- 6

Further details of the major fisheries are given below.

2. Cod

a) The fisheries. Nominal catch was 16% below that of 1975 and was the lowest in the last 30 years. The decrease was most pronounced in the inshore fisheries (from 6600 tons in 1975 to 5100 tons in 1976 or a decrease by about 23%) while the large offshore trawlers had a decrease of about 13% to 11 100 tons. The trawlers accounted for about 68% of the total Greenland catch of cod, the highest relative share so far. The decrease for the trawlers is mainly due to the fact that part of their effort was spent in the fishery for shrimp. For those trawlers where a comparison between 1975 and 1976 is possible, the catch of cod was about the same for the two years although variation occurred between divisions. For further details, see Table 3 of Res.Doc. 77/VI/8.

Cod made up about 55% of the total landings by trawlers (65% in 1975).

As shown in Res.Doc. 77/VI/8 the best fishing in 1976 was found in Divs. 1C-1E, whereas practically no offshore cod fishing occurred in Div.1B. This movement seems to be connected with a southward migration of the 1968 year class by its maturation, and with the recruitment of the 1973 year class in the last half of 1976, the latter year class mainly occurring in Divs. 1D-1F.

b) Forecast for 1977-78. It could be taken for certain that the 1973 year class will be completely dominating in the catches by trawls and pound nets in 1977 and most likely also in 1978, at any rate in catches taken by trawls. The individuals of this year class will, however, be rather small fish (40-50 cm) in 1977. In spite of this, catch rate is expected to improve somewhat compared to 1976, but the quota regulation will, of course, limit the total catch. The improvement in catch rate could be expected to continue in 1978. The major part of the catch is supposed to be taken in the area between Kap Farvel and Godthåb (Divs. 1D-1F).

In spite of the likely improvement in the cod stock by 1977-78 the situation is still critical. If no new good year class occur rather shortly after the 1973 year class then the improvement is only a short-term phenomenon (see Res.Doc. 76/VI/8 and Summ.Doc. 76/VI/16).

3. Shrimp (Pandalus borealis)

a) The fisheries. The fishery by Greenlanders was at the same level (close to 10 000 tons) as in 1975, whereas catches by non-Greenlandic vessels rose sharply to a total of about 40 000 tons in the offshore area, so that the total catch of shrimp in the Subarea is now higher than the total cod catch.

Although the Greenland catch was stable some remarkable trends occurred in the fishery. The fishery on the important grounds in the Disko Bay (Div. 1A) thus decreased from about 7000 tons in 1975 to about 6000 tons in 1976, and the overall catch level by Greenland was only maintained by the participation of one or two large trawlers in the offshore fishery.

b) Forecast for 1977-78. Forecast for the shrimp fishery is at present very difficult to give since not much is known about abundance of forthcoming recruits. The quota regulation now in force will limit offshore catches in 1977. Inshore catches depends much on physical environmental factors such as ice coverage. The first quarter of the year 1977 seems to have offered better conditions than did the first quarter of 1976. By the end of April 1976 the Greenland catch of shrimp is 3-4 times the catch by the corresponding time of 1976, but part of the increase is due to increased effort in the offshore fishery.

4. Other fish

The catch of Greenland cod, which increased rapidly in 1974 and 1975, seems to have stabilized at a level close to 5000 tons. The fish is caught mainly inshore, to a great extent substituting cod in the traditional inshore fisheries by lines and pound nets.

In the offshore fisheries by trawlers more trips than formerly seems to have been for "mixed species", resulting in an increase in catches of redfish. In some trips wolffish is reported as the species sought, but the total catch of this important species declined by 13%.

The fishery for roundnose grenadier and American plaice has been negligible.

B. SPECIAL RESEARCH STUDIES

1. Environmental studies

a) Hydrography. Work has been carried out on the standard hydrographic sections off West Greenland. Figs. 1-3 illustrate the situation in 1976. The position of the stations are the same as those given in Fig. 4.

Whereas 1975 showed an improvement in the cold-water situation which has occurred generally since 1968 the year 1976 again showed rather low temperatures due to a strong winter. On the shallow part of Fylla Bank the March temperature was so low (-1.8°C) that ice was formed (Fig. 1).

In June the temperature over Fylla Bank had increased to a mean of 1.4°C for the upper 40 m, which is somewhat below the corresponding temperature in 1975 (1.9°C). The 1976 temperature indicates that the cod year-class 1976 will be a poor one.

Also in July the temperatures over Fylla Bank were relatively low, and at the station west of the bank the mean temperature in the upper 500 m was 1.1°C lower than the mean for the warm period 1950-66, and 0.75°C lower than in 1975.

On the northern banks (Store Hellefiske Bank in Div. 1B, Lille Hellefiske Bank in Div. 1C) the July temperatures were rather normal as in 1975 (Figs. 2 and 3).

In the last quarter of the year warmer water masses of the Irminger current occurred in the deeper water west of the banks and temperatures by the end of the year was rather normal also in the Fylla Bank region. The first part of the winter 1976/77 has been exceptionally warm in southern Greenland and the cooling of the water masses seems to have been relatively low. Whether this initial improvement will lead to favourable environmental conditions at the 1977 spawning and hatching period of the cod still remains to be observed.

b) Plankton. Oblique hauls with 2 m stramin net (each haul 30 minutes, 225-0 m wire) were taken in July at the hydrographic standard sections off Godthåb, Sukkertoppen and Holsteinsborg, and at a standard station at Godthåb throughout the year (position of stations given in Fig. 4).

On the Fylla Bank (Godthåb) section the mean volume of plankton per 30 min. haul was 304 ml against 613 ml in 1975, thus confirming the general correlation between water temperature and plankton abundance.

c) Benthic studies. Studies of the benthic fauna initiated in 1975 in areas where drilling for oil can be expected continued in 1976. In Div. 1B at Holsteinsborg the fauna in the tidal and shallow-water coastal zone was sampled. Offshore sampling concentrated on the central and southern part of Store Hellefiske Bank (Div. 1B).

In the Umanak Fjord studies of the marine environment at the lead and zinc mine at Mârmorilik continued with samples taken in March (from the ice) and in September.

d) Observations on ice. Regular aerial observations on the ice round Greenland is carried out by the Danish Meteorological Institute. Observations in 1976 have been routine observations on local winter ice and arctic drift ice as part of the regular service by the institute. Besides this both governmental and offshore oil industry environmental programs have had observations on movement of ice bergs as one of their main items.

e) Other environmental studies. In connection with the increasing offshore industrial activity (search for oil) a great number of observations on the biological and physical environment have been carried out throughout 1976, both by the industry and by the government through various research institutes. Observations other than those reported under b) and c) above concentrate mainly on currents, waves, winds and other physical factors.

2. Biological studies

a) Cod

Eggs and larvae. The number of cod larvae found in the plankton is shown in Fig. 4. The number was very small, the mean per 30 min.haul being only 0.7 in 1976 as compared to 3 in 1975, when the water was warmer. The low number in 1976 seems to be caused by the lower temperature but probably also influenced by the depleted spawning stock. The prospect for the 1976 year class are, therefore, that the year class will be a poor one.

Occurrence of pre-recruit cod. Cod of age-groups 2 and 1 (year-classes 1974-75) have virtually not been observed, but it should be pointed out that gears suitable for catching age-group 1 have not been used, and the 1975 year class may, therefore, still be expected to be relatively better than the 1974 year class.

Cod of age-group 3 (year class 1973) were rather abundant in hauls by fine-meshed otter trawls (research vessel) at the standard station Godthåb Dybet (Table 2) and Frederikshåb Isblink (Table 3 and Fig. 5) the latter station operated only since 1975. Hauls taken regularly on these stations seem to offer the possibility of forecasting recruitment of cod to the fishery with a reasonable degree of confidence although correlation analyses still need to be carried out between the pre-recruit observation and the subsequent harvest of each year class.

Age-group 3 started to recruit to the commercial fishery in the last half of 1976.

Cod in commercial landings. The most important material has been sampled from the trawlers' landing and from some pound-net catches. Details of samples are given in Table 4 of Res.Doc. 77/VI/8. Some of the samples are illustrated in Figs. 6 and 7.

The hitherto important year-class 1968 was still of some significance for the fishery in 1976, especially for the fishery by gill-nets and long-lines, but its occurrence in pound-nets and trawls has decreased much. It is, however, still this year class which is contributing most to the spawning.

There is a long span of relatively poor year classes between the 1968 year class and the next relatively good one, viz. year-class 1973. This year class recruited partly to the trawl and pound-net fisheries in 1976 (Fig. 7). About half the year's total catch (by number) is due to this new year class (Table 7 of Res.Doc. 77/VI/8), but the individuals are still so small that they accounted only for 1/4 of the total catch by weight. The year class is likely to form the major part of the catch in 1977 and 1978.

Tagging experiments. 704 cod were tagged in 1976, the majority being small cod (discards from pound-net catches) tagged inshore in Div. 1D.

b) Atlantic salmon. Off Southwest Greenland the R/V ADOLF JENSEN fished by drift nets in the first half of August in order to get samples of scales and blood for further analyses of the ratio between the European and North American component of the stock. 371 salmon were sampled. The analyses will be carried out by Canadian colleagues at St.John's, Newfoundland.

c) Capelin. Routine sampling have been limited to the Godthåb area (Div. 1D). Both the spawning schools as well as the non-spawning stock have been sampled, the latter by means of pelagic trawl.

d) Shrimp. Research on shrimp has had a very high priority in the 1976 research program. However, since major parts of the research were presented in research documents to the December 1976 Meeting of the Commission only a list of the activities is given here including reference to the proper research documents.

i) Bottom photography in the Disko Bay to assess the density of shrimp (Res.Doc. 76/XII/152). The apparatus failed when offshore grounds were to be covered, but the plans for 1977 include offshore grounds.

ii) A survey with the commercial trawler SISIMIUT in the offshore area between 66°N and 69°N. A stratification of this area was made, and 44 hauls were taken (Res.Doc. 76/XII/150).

iii) Investigation of diurnal variation of catch rate due to the vertical migration of shrimp (Res.Doc. 76/XII/149, 150).

iv) Two hauls by midwater trawl on dense echo scatterers, which supposedly could be pelagic schools of shrimp but which gave catches of redfish and euphausids only (Res.Doc. 76/XII/153).

v) Interview with fishermen in the Disko Bay on the long-term trends of their fishery (Res.Doc. 76/XII/151).

vi) Sampling of commercial and research catches, the latter from the survey mentioned in ii) above and from a number of standard stations in the offshore area of Divs. 1A-1E and in the Disko Bay. Besides the 44 survey hauls 115 research hauls and samples have been taken at the various standard stations. Furthermore several samples from the commercial Disko Bay fishery have been taken. No specific report is available on these samples, but a general description of the biology of the shrimp is given in Res.Doc. 76/XII/154.

vii) Tagging experiments. 6001 shrimp were tagged in the Disko Bay (Div. 1A) and 196 were tagged offshore in Div. 1B. Results of these experiments have not yet been reported. About 2% of the tags applied in the Disko Bay have been recaptured (or rather reported), but further analyses are necessary if the material is to be used for assessment purposes.

viii) As a possible indirect way of measuring fishing efficiency in the Disko Bay 311 eelpout (Lycodes spp) were tagged there. So far only 1 has been returned.

e) Queen crab (Chionoecetes opilio). Trap fishing experiments were continued in the Godthåb area (Div. 1D, inshore) and in the Disko Bay (Div. 1A) with 55 and 8 trap-days in the two areas, respectively. The results do not point towards any great possibility of establishing a commercial fishery, but possibly small-scale local fishing could be established.

f) Other fish. Age and/or length samples of commercial species other than those already mentioned above have been taken from research vessels' catches. Especially samples of redfish, Greenland halibut, American plaice, and Greenland cod are of considerable size. 311 eelpout (Lycodes spp.) were tagged in the Disko Bay (see d) viii) above).

g) Seals. The activity in 1976 was directed mainly towards studies of the ringed seal population(s) in the Upernavik district. Field observations and sampling in this program are now completed, and the material is being worked up. Altogether 7-8000 seals have been sampled for age determination in this program.

22 ringed seals were tagged in the Upernavik district.

Sampling of harp seals from the Greenlanders' catch has been continued in Northwest Greenland, and of hooded seals in Northwest as well as in South Greenland. In co-operation with the University of Guelph, Canada, a

material (tissue samples) of harp seal was sampled in the Upernavik district in August-September in conjunction with the ringed seal program. Extremely bad weather unfortunately limited the material to only 9 samples. The material will be compared to corresponding material sampled at Newfoundland.

h) Whales. Sighting of whales is recorded on a routine basis from research vessels. A program for sampling the Greenlanders' catch of minke whale is now being initiated.

3. Gear and selectivity studies. Nothing special to report.

4. Practical fishing experiments. A ten days cruise by the commercial trawler NUK was initiated in co-operation with the Royal Greenland Trade Department to the offshore shrimp grounds previously recorded in Divs. 1E and 1F. 12 hauls were made in Div. 1E and 19 in Div. 1F, and samples were taken. Mean catch was only 60 kg shrimp per hour, ranging from few specimens to a maximum of 133 kg per hour.

EAST GREENLAND

A. STATUS OF THE FISHERIES

Besides the local fishing at Angmagssalik, which resulted in landings of 264 tons of cod also some of the Greenland trawlers have conducted fishing off East Greenland in June 1976. The nominal catch by trawlers was 109 tons of cod, 129 tons of redfish and 3 tons of wolffish.

B. SPECIAL RESEARCH STUDIES

Cod. An age/length sample of the commercial landings by trawlers was taken in June, showing age-group 4 (year-class 1972) to be the predominant one by 38% by number, followed by age-group 5 with 22% and age-group 6 by 20% by number. Age-group 8 (year-class 1968) accounted for 10% by number. See Table 4 of Res.Doc. 77/VI/8.

SUBAREAS 2-5 and STAT AREA 6

No fishing and no research in these areas by Denmark(G) in 1976.

TABLE 2. Number of cod per hour trawled on the Standard station GODTHÅB DYBET, 63°48'N-52°14'W, depth app. 300m. Otter trawl, 36-40mm cod end mesh size. + indicates less than one cod per hour but not total absence.

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
1974	8 +21 Jan.	4876/7	3	180	0	35	15	2	5	0	1
	10 Jun.	4913	3	180	0	1	2	1	4	1	2
1975	9.-16 Jan.	5016	3	165							
	23.-24 Apr.	5031	3	180	12	1	0	0	0	0	0
	18.-19 Jun.	5043	3	180	1	1	4	2	1	2	2
	19.-20 Aug.	5110	3	157							
	7 Oct.	5134	1	30							
	10.-11 Nov.	5158	2	120							
1976	20.-21 Jan.	5176	3	165	+	49	3	0	0	0	+
	29 Apr.	5186	3	180	+	52	5	2	0	0	+
	2+8+9 Jun.	5206/9/14	4	203	+	40	5	1	0	+	1
	20 Sept.	5321	1	60							
	25 Oct.	5327	3	150	0	8	1	1	0	0	0
	1 Dec.	5336	3	5	0	+	1	1	0	0	0

TABLE 3. Number of cod per hour trawled on the Standard station FREDERIKSHÅB ISBLINK, 62°27'N-52°14'W, depth app. 200-240m. Otter trawl, 36-40mm cod end mesh size. + indicates less than one cod per hour but not total absence.

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+
1975	29 Apr.	5032	3	180	48	9	+	0	0	0	0
	6 May.	5033	3	150	59	11	+	0	0	0	+
	26 Jun.	5049	3	180	44	2	1	+	0	2	0
	26 Aug.	5117	3	180	23	14	8	8	3	20	2
	20 Nov.	5161	3	150	38	32	6	2	+	1	0
1976	17+18 Feb.	5177	2	157	5	74	+	0	0	0	0
	4 May.	5188	3	167	0	5	+	0	0	0	0
	1 Jun.	5205	3	180	+	36	0	0	0	0	0
	21 Sept.	5322	3	150	0	33	5	3	+	+	2
	19 Nov.	5335	3	160	0	66	11	1	+	+	1

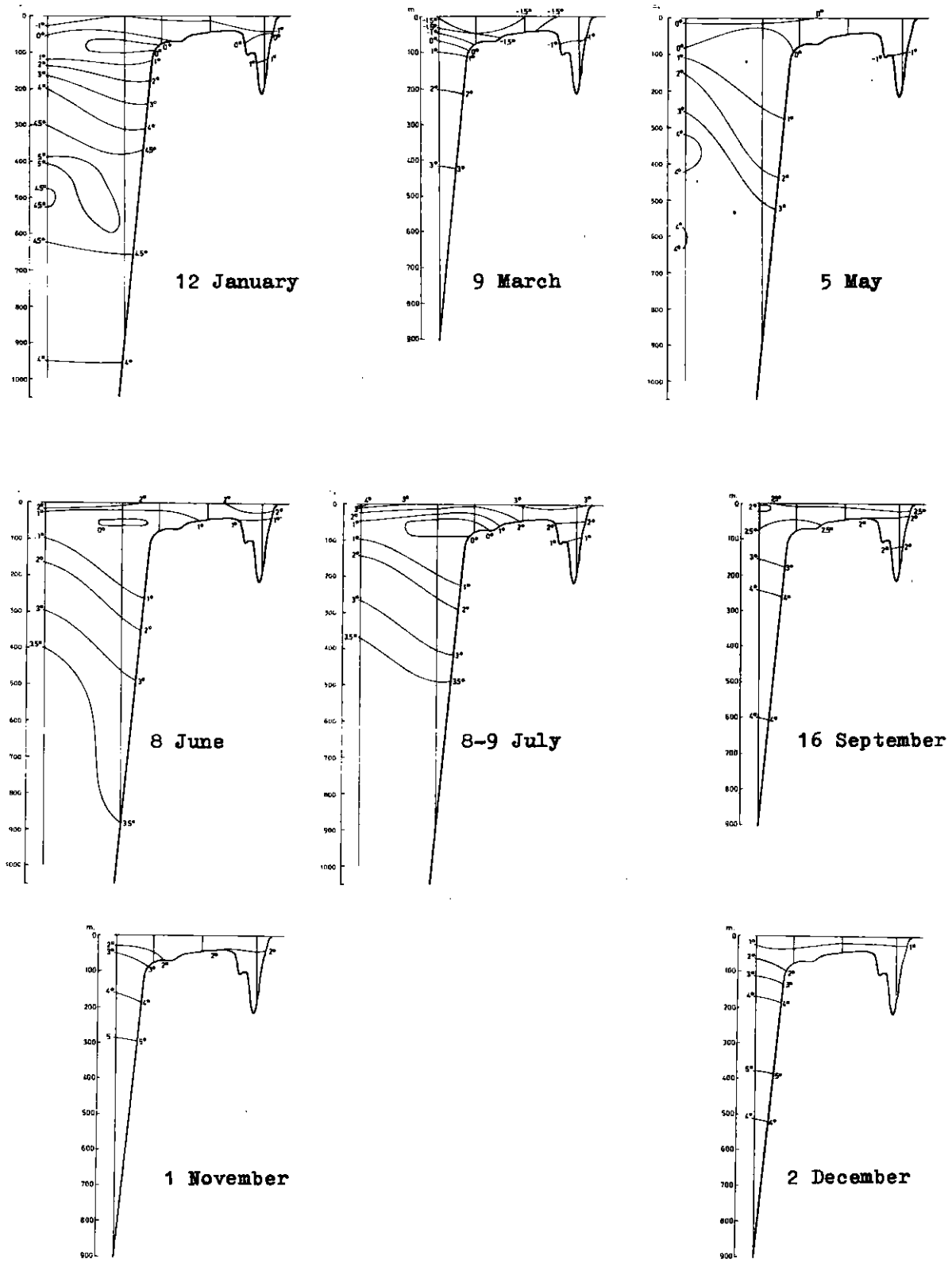

Fig.1. Temperature sections across Fylla Bank, ICNAF Div.1 D, 1976.

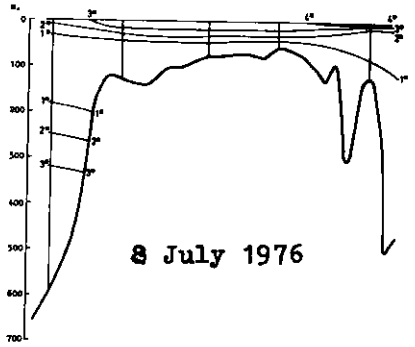

Fig.2. Temperature section across Lille Hellefiskebank off Sukkertoppen (Div. 1 C), July 1976.

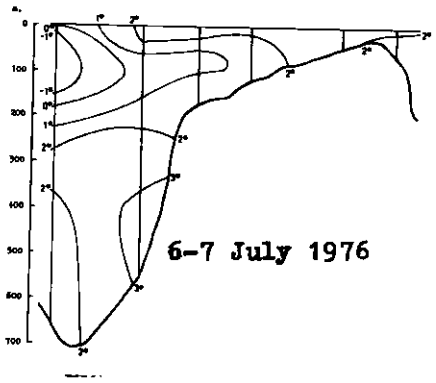

Fig.3. Temperature section across Store Hellefiskebank off Holsteinsborg (Div. 1 B), July 1976.

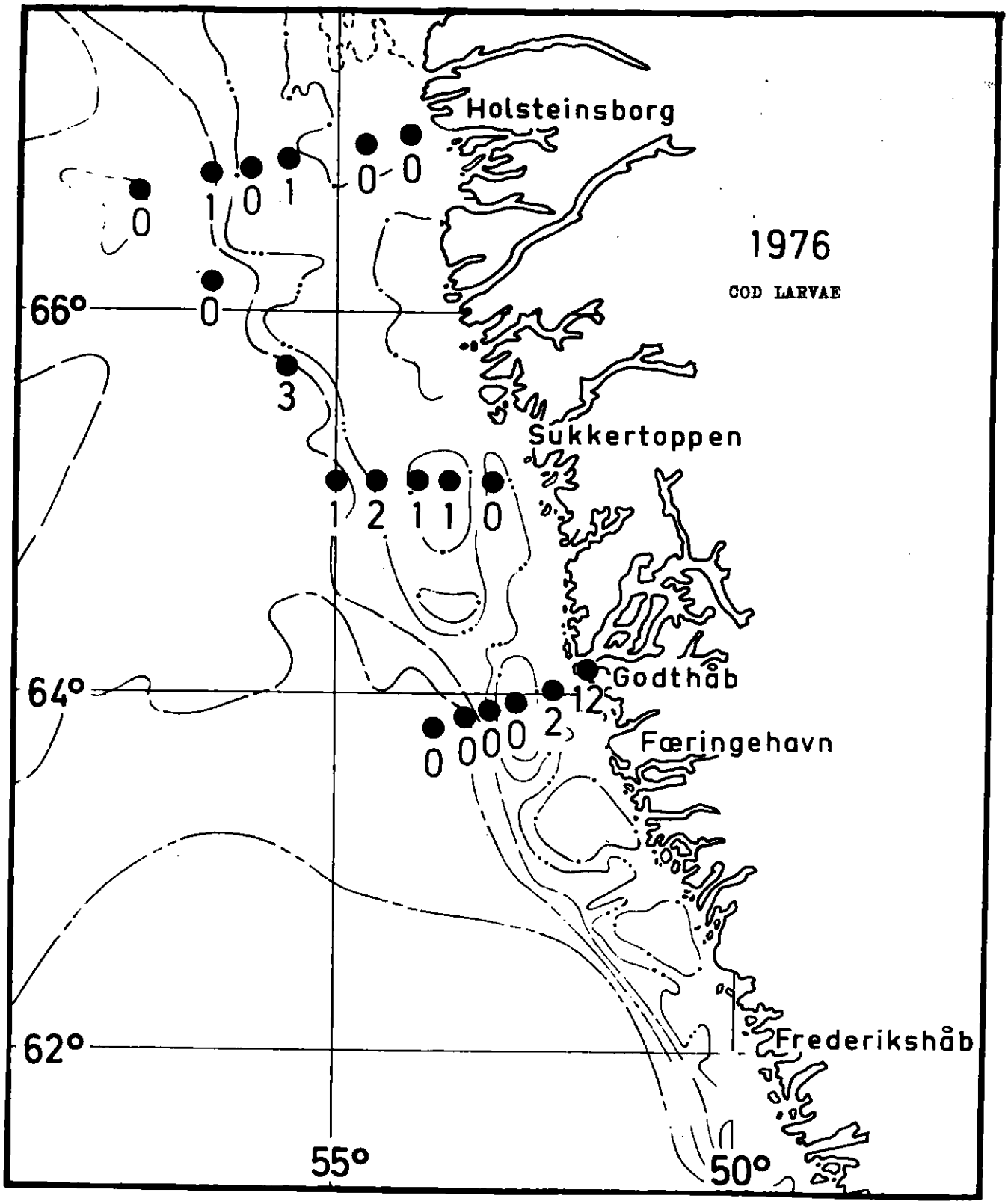

Figure 4. Cod larvae (number per 30 min.) taken by 2 m stramin net in the upper water layers (max.depth 50 m) in July 1976.

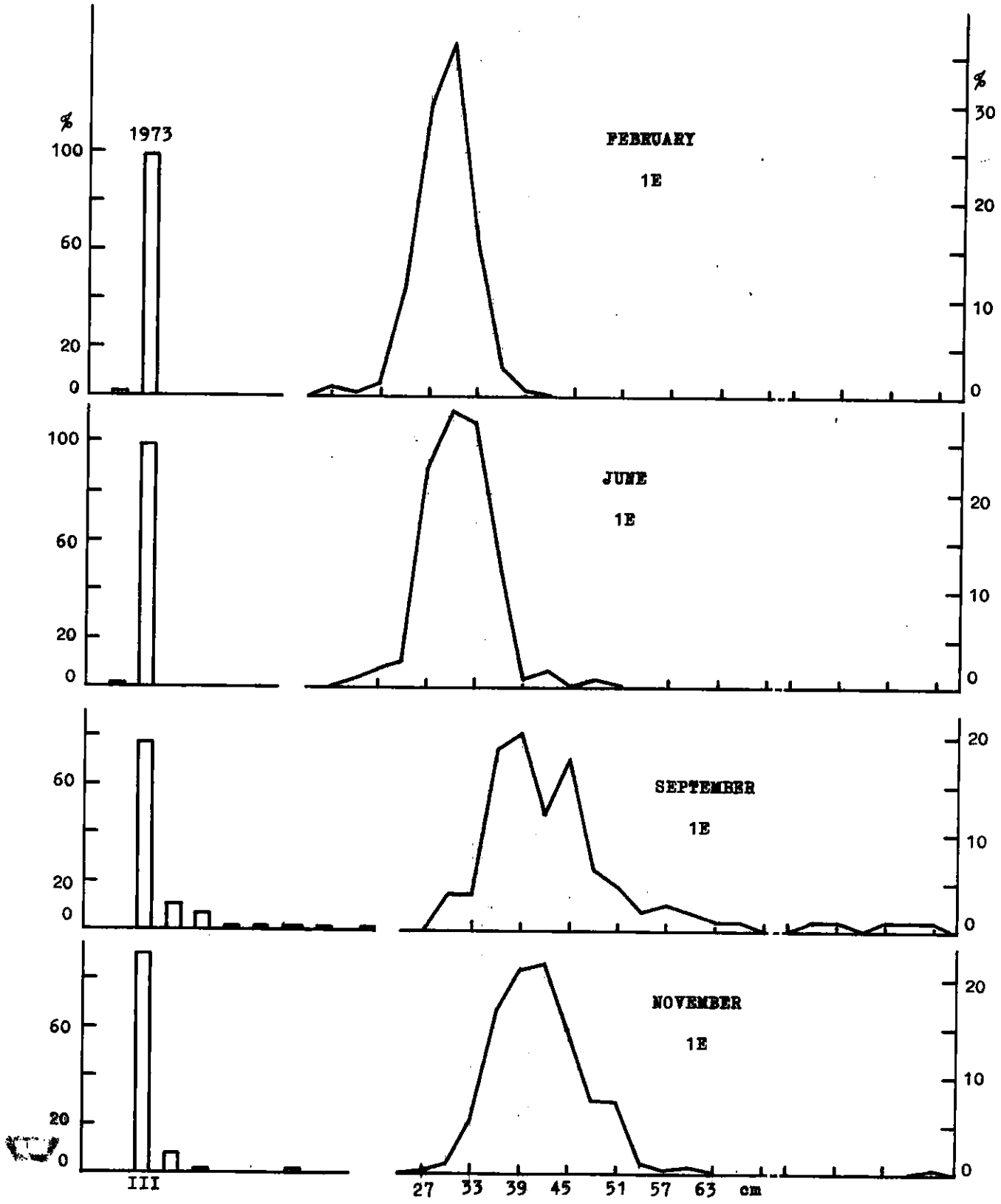

Figure 5. Age and length distribution of cod in research catches by fine meshed otter trawl (40 mm mesh size) at the standard station FREDERIKSHÅB ISBLINK, Div. 1E, see also Table 3.

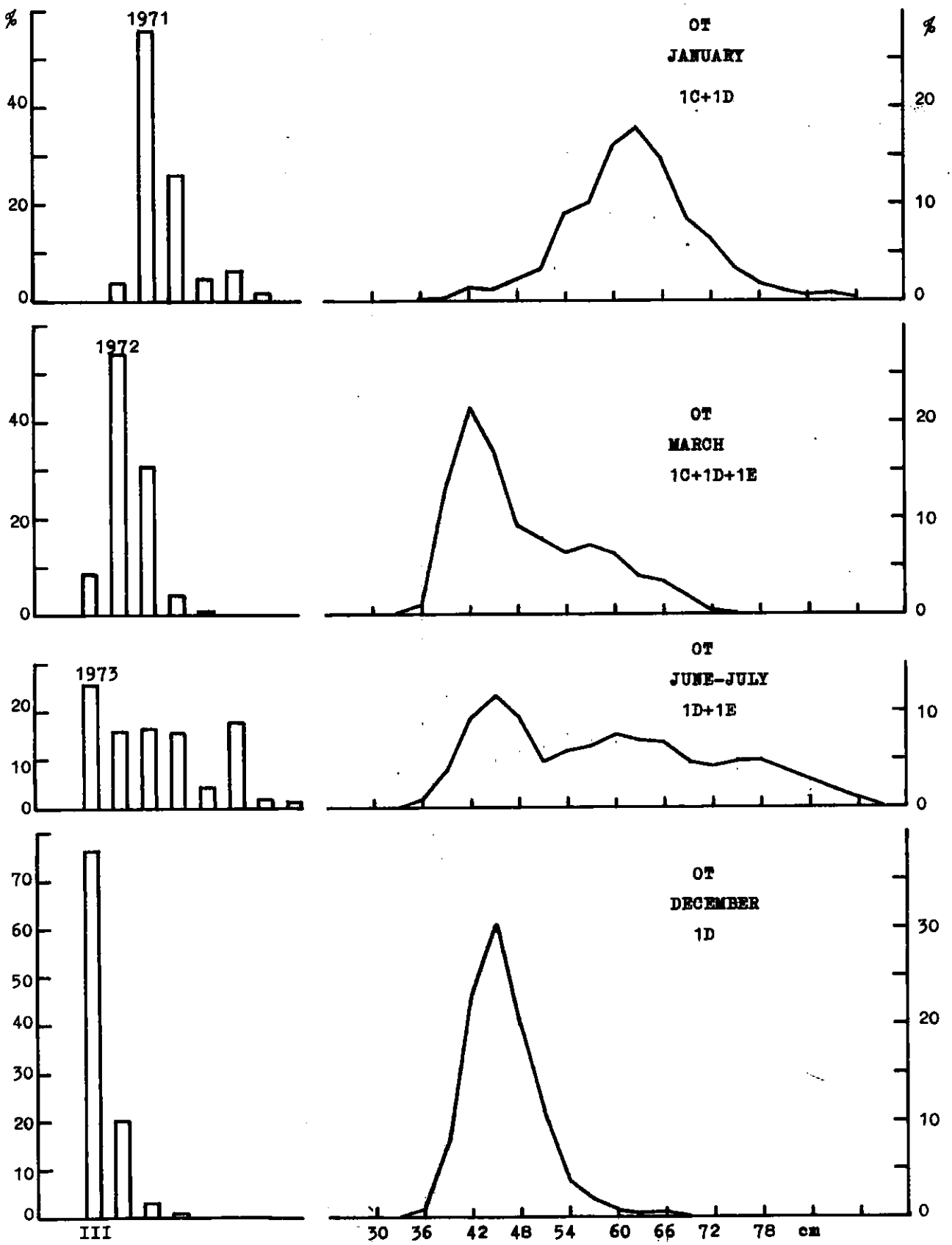

Figure 6. Age and length distribution of cod in landings by commercial otter trawlers. Only some of the samples are shown here. For details and other samples see Table 4 of Res.Doc. 77/VI/8.

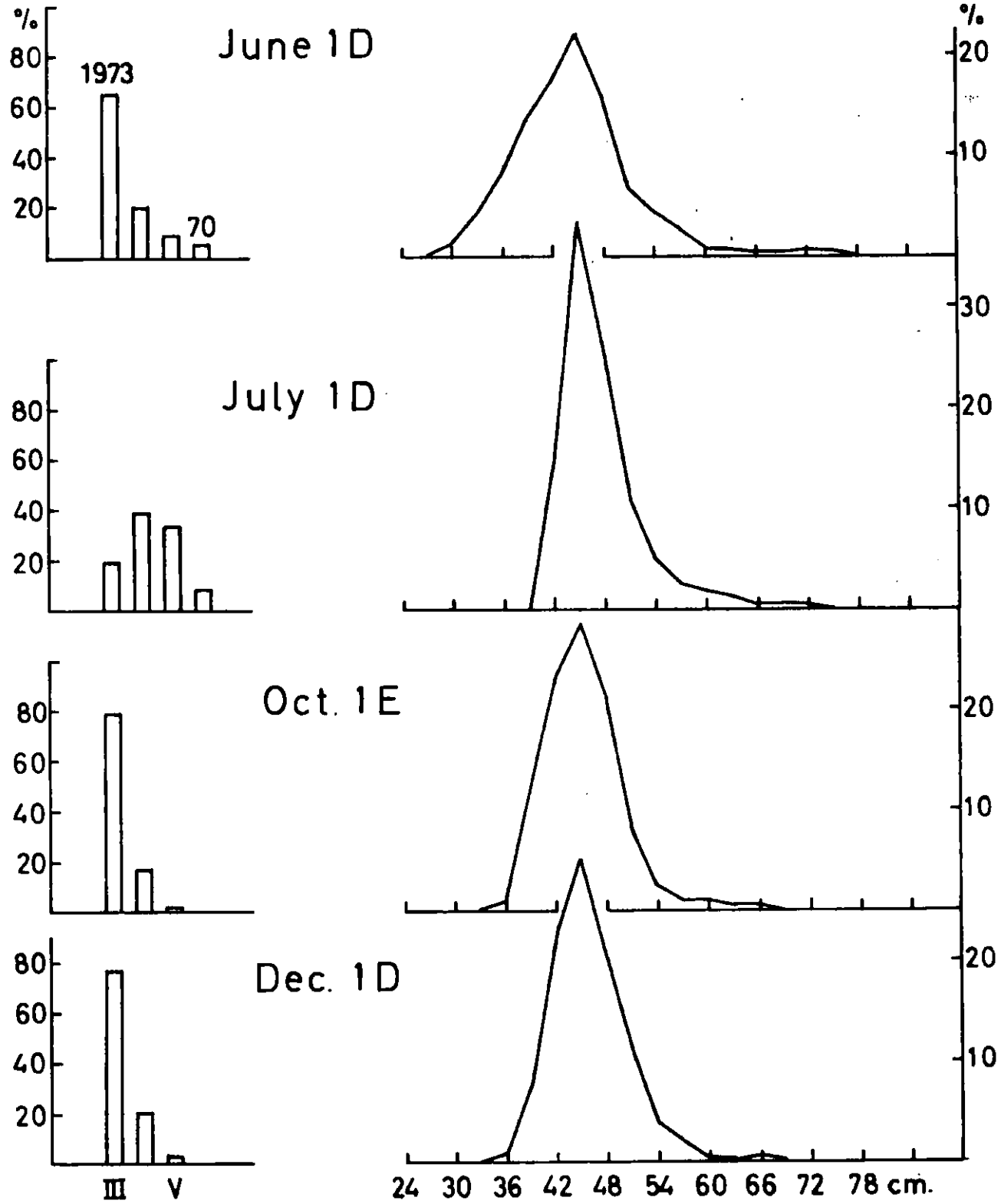

Figure 7. Age and length distribution of a pound-net catch (June, Div.1D), a landing from pound net after small fish have been released (July, Div. 1D) and from commercial otter-trawl landings (October and December).