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German Research Report, 1959

A. Cod Investigations

by Arno Meyer

Subarea 1

a. West Greenland

The stock of spawning cod on the western slope of Fylla Bank has become considerably younger, compared to 1958, due to the new rich year-class 1953 appearing for the first time in large quantities in the spawning shoals. This year-class contributed in March and April 72% of the German trawl catches.

The average length of the 1953 cod was 62 cm; therefore, the average length of the total catch decreased from 76 cm in Feb.-May 1958 to 63 cm. Seventy-five of the caught cod were ripe, 26% still unripe. Of the 1953 year-class 75% were ripe. By mid-March all cod were still just ready for spawning; by mid-April the older year-classes were for the greatest part either spawned or spawning; the 1953 cod, however, were mostly only preparing for spawning.

Considerably larger cod, average length 72 cm, were caught in June in the region of Dana Bank, where they stood quite deep, obviously due to the hydrographic situation (exceptionally much ice). But also here (Figure 1B) the 1953 year-class was the strongest with 31% followed by 1950, 23%, and 1947, 15%. The mean lengths were for 6 years old - 65 cm, 9 years old - 77 cm, and 12 years old - 79 cm.

During a search-trip by the end of December 1959 only few cod were met on the usual fishing grounds on the western slopes of Noname and Fylla Banks. Noteworthy is a good catch (Figure 1C) on the inner slope of Fylla Bank, which confirms further the view held by Rasmussen as to the cod migrations in fall and winter. 50% of this catch was made up of the 1953 year-class, which by the end of the seventh feeding period had reached a length of 72 cm. A somewhat bigger catch off Sermersut, south of Noname Bank, showed again (A. Meyer, German Res. Rept. 1958) that the 1956 year-class is well represented off the southern part of W. Greenland as well as off S. Greenland.

In the region Sermersut-Dana Bank 221 cod were tagged with a yellow, elongated plastic tag carrying the letters DHB (Germany - Hamburg) and an additional yellow plastic flap.

b. South Greenland

Also off S. Greenland (Subdivision 1F) the stock of cod has become younger since 1958. In the catches in late fall by German trawlers off Nanortalik Bank, the 1953 year-class predominated with 52% (Figure 2A).

The search trips in fall and winter, however, showed bigger and older cod occurred farther eastward, off Cape Farewell (Figure 2B), with also the 1956 year-class being richer in the catches from the Bay of Julianehaab west of Nanortalik (Figure 2C). Already in 1957 the 1953 year-class, at an age of 4 years, occurred in large quantities in

the "Anton Dohrn" from that bay. As now, in its turn, the 1956 year-class was stronger (26%) in the catches in Julianehaab Bay, and strong also off Sermersut (Figure 1D), it is to be expected that this year-class 1956, which does not appear to be important off West Greenland, will become of importance for the S. Greenland fishery as from 1962. The average lengths of the three important year-classes by the end of 1959 were: 1956 - 45 cm, 1953 - 63 cm, and 1950 - 78 cm.

The two search trips offered an opportunity to tag cod off S. Greenland. The tagging included 215 cod, partly with yellow DHB tags with yellow plastic flaps, partly with blue plastic tags only with numbers and with red plastic flaps. These taggings off S. Greenland are intended to increase our knowledge of the E. Greenland cod stock, whose feeding areas obviously are to be found off S. Greenland. The taggings were made during the second search trip in December; owing to exceptionally early occurrence of ice they could only be carried out to a restricted extent.

c. East Greenland

Since the German R/V "Anton Dohrn" in September 1955 found a large stock of redfish on the Anton Dohrn Bank, the German fishery off E. Greenland has yielded the following quantities in tons:

	1955		1956		1957		1958		1959	
Total	46067	%	44683	%	21804	%	14538	%	30844	%
Cod	3001	6.5	7437	16.6	5838	26.8	4553	31.3	9691	31.4
Redfish	40948	88.9	33094	74.1	13638	62.5	8883	61.1	19186	62.2

While up to now the main fishery was carried out on Dohrn Bank and off Angmagssalik, an increase in the fishery has occurred since 1959 on the difficult fishing grounds off S.E. Greenland. Since the fisheries started the same trend has been observed on all fishing grounds: In the beginning redfish alone were caught; thereafter a considerable decrease in the catch of redfish with a simultaneous increase in the proportion of cod. It is to be noted that this change only to a minor degree is the consequence of a change in fishing depth, but that the cod catches now also have increased in somewhat deeper areas, where originally only redfish were observed.

Contrary to the case with W. and S. Greenland, only a small change in the age-composition of the E. Greenland cod stock was observed since 1958. Now, as then, the 1950 year-class predominates with 52% and a mean length of 78 cm in the spring catches from Angmagssalik (Figure 3A), and with 41% and a mean length of 84 cm in fall catches from the Dohrn Bank (Figure 3B). The proportion of the rich 1949 year-class has, however, decreased.

A search trip in December 1959 showed surprisingly favourable ice conditions off S.E. Greenland, and also an increased proportion of cod on the Cape Bille Bank. Figure 3C presents the age and length distribution of catches from the Cape Bille Bank (mean length 79.4 cm), and the length-distribution of trawl catches from the Tordenskjold Bank (61 25'N) by German researches. Of the cod caught there 70% were ripe, 30% unripe. In the last decade of March 25% of the ripe cod were actually spawning or just beginning to spawn. In a sample from 5 April 1960 50% were spawners and 15% had almost finished spawning.

In mid-December 115 cod were tagged off S.E. Greenland with yellow DHB tags plus yellow plastic flaps.

Subarea 2

Figure 4A and B present the length distribution of cod from two search trips in September and November 1959 and of trawl catches from December 1959 to January 1960. Only few cod, with a mean length of 59.1 cm, were caught in the Hamilton Bank area in September 1959 (cfr. hydrographic report (B) by J. Messtorff). In November 1959 the

catch of the salt-fish trawlers was somewhat better, although the cod were very small (54 cm). More dense cod stocks were observed in Subdivision 2H, in warmer slope water (300-340 m), where the mean length was 60.9 cm.

For the first time fishery was tried in the Ungava Bay, end of October. As the Labrador cod appear here in considerable quantities during its northward migration in late fall, this area ought to be included in the ICNAF Area (Subdivision 2G). In spite of heavy seas and damage to the trawl, the catch per one hour in the Ungava Bay was 1.5 tons. The cod - taken in -0.3° water - had a mean length of 59.1 cm, i.e. about the same as in Subdivision 2H.

From December 1959 German trawlers fished successfully in the Sundall area (2J). To be noted, compared to the previous year, is that in this - once more very satisfactory fishery - the proportion of cod was increasing, reaching its maximum in March with 37%. From many of the trips cod constituted more than 50% of the landings. Cod were even more plentiful than appears from these figures, as redfish were the fish preferred. The dotted curve in Figure 4A presents the length-distribution of the cod landings from Labrador; mean length 63.6 cm. Investigations of maturity showed, that most of the cod were on their spawning migration. Only 6% of the cod caught at Sundall in the winter were immature. By mid-January the mature cod was in Stage III, by end of March in Stage IV.

Subarea 3

Two search trips in September and November 1959 showed poor conditions for cod fishing. Only in the area south of Flemish Cap, 280-350 m, an important occurrence of smaller cod was established, mean length 55.2 cm. However, in November only few cod of the same size, were caught here. In redfish catches from the N.E. slope of the Grand Bank (3L) the by-catch of cod in search and commercial trawler trips amounted to 8%. These cod were very large (mean length 87.8 cm) from depths of more than 300 m, and average-sized (69 cm) from depths of 200-300 m (Figure 4C). The catches from off Cape Bauld (3K) in September 1959 were very small, the cod measured here on an average 64.5 cm.

B. German Hydrographic Observations in the ICNAF Area (Subareas 2 and 3) in September and November 1959

by Joachim Messtorff

During the two search trips in 1959, the opportunity was given to carry out hydrographic research from 2-24 Sept. (Trawler "Thunfisch") and from 28 Oct.-21 Nov. (Trawler "Island"). The investigation area of the first trip was from Flemish Cap and the E. slope of the Grand Bank (3 M and 3L), 46°24'N to off the central Labrador (2H), 56°25'N; in the second trip the area from the slope off Cape Chidley (2G) and the Ungava Bay from 60°25'N to the S.E. edge of the Grand Bank (3N), 44°50'N, was investigated.

Figures 1 and 2 present the distribution of the hydrographic stations of the two trips; trawl stations with no hydrographic observations are not shown. As the experimental fishery was of first priority the hydrographic work had to be coordinated with the fishing experiments; therefore, hydrographic stations are mainly found in the area of fishing. For this reason the hydrographic work to a certain degree remains incomplete, and water sampling for salinity determination had to be somewhat restricted. Therefore, a graphic presentation of the distribution of salinity is not presented. It was, however, possible to place hydrographic sections across the Labrador current in various parts of the investigated area, in order to achieve information on the distribution of temperature and on the extension of the two components

of the current. These cross-sections were placed to comprise the near-coastal, less haline, polar cold-water flowing southward on the shelf - the Baffin Current - as well as the warmer W. Greenland water from the Atlantic now flowing along the slope.

As a total of the stations of the two trips, a picture of the hydrographic pattern in the area and at the time of the investigation could be given. The horizontal distribution of the surface temperature (Figure 3) shows clearly the main direction of the Labrador Current, but its composition of two different water masses does not become apparent.

The surface temperature shows a decided stratification caused by the increasing warming up from north to south due to the solar heating. The relative strength of the current appears from the more or less strong concavities of the isotherms. In the area of the main current, along the edge of the shelf, the temperatures were always lower than towards the coast and towards the open sea.

The surface temperature increased, on the whole, in September from 1°C in the North to 15°C in the South of the area investigated (Table 1). The same trend was also observed in November; however at this advanced season of the year the temperatures were considerably lower (Table 1).

As already mentioned the temperatures did not offer any information on the origin of the surface water. However, if the fresh water flow from the land is not considered, the low salinity throughout the whole area indicates that the surface water in the main belongs to the Arctic component of the Labrador Current. In September the mean salinity of the surface water was 32.4‰ (31.65-33.46) in the whole of the area investigated. All stations with salinities above 33‰ (average: 33.3) where situated to the east of the edge of the shelf in the area of mixed water. When these outlying stations are left unconsidered, the average salinity on the shelf was only 32.1‰ (31.65-32.69). In November a minute increase of the surface salinity was observed. The mean salinity of all samples from the shelf area was 32.6‰ (32.20-32.98). The stations beyond the edge of the shelf gave a mean salinity of 33.2‰ (33.06-33.54), i.e. about the same as in September.

Table 1 - Mean Surface Temperatures in the separate Subdivisions in September 1959 ("Thunfisch") and November 1959 ("Island") in t° C.

	September 1959				November 1959			
Subdivision	min.	max.	M	n	min.	max.	M	n
2G +Ungava Bay	-	-	-	-	-0.01	1.25	0.32	10
2H	0.70	2.76	1.96	6	0.20	0.95	0.54	6
2J	1.47	6.86	3.64	9	0.44	1.10	0.74	10
3K	5.98	9.72	7.97	6	0.90	2.51	1.61	5
3L	7.57	12.60	10.75	11	2.88	2.96	2.92	2
3M,N+	12.98	15.29	14.56	6	7.13	9.26	8.11	4

+Subdiv. 3N only in Nov.59

The isotherms at 100 m depth, which were running nearly parallel to the direction of the current, showed the complete change of the temperature conditions compared to the surface water (Figure 4). Here, where the surface warming-up is no longer of importance, the distribution of the temperature offers better information on the origin of the water masses. The 0° isotherm at 100 m depth conforms fairly well with the position of the edge of the shelf; in certain areas it is even pressed further eastward over the slope. Thus at this depth region the total shelf area is overflowed by Arctic water, the core of which in September 1959 showed temperatures below -1.5°C.

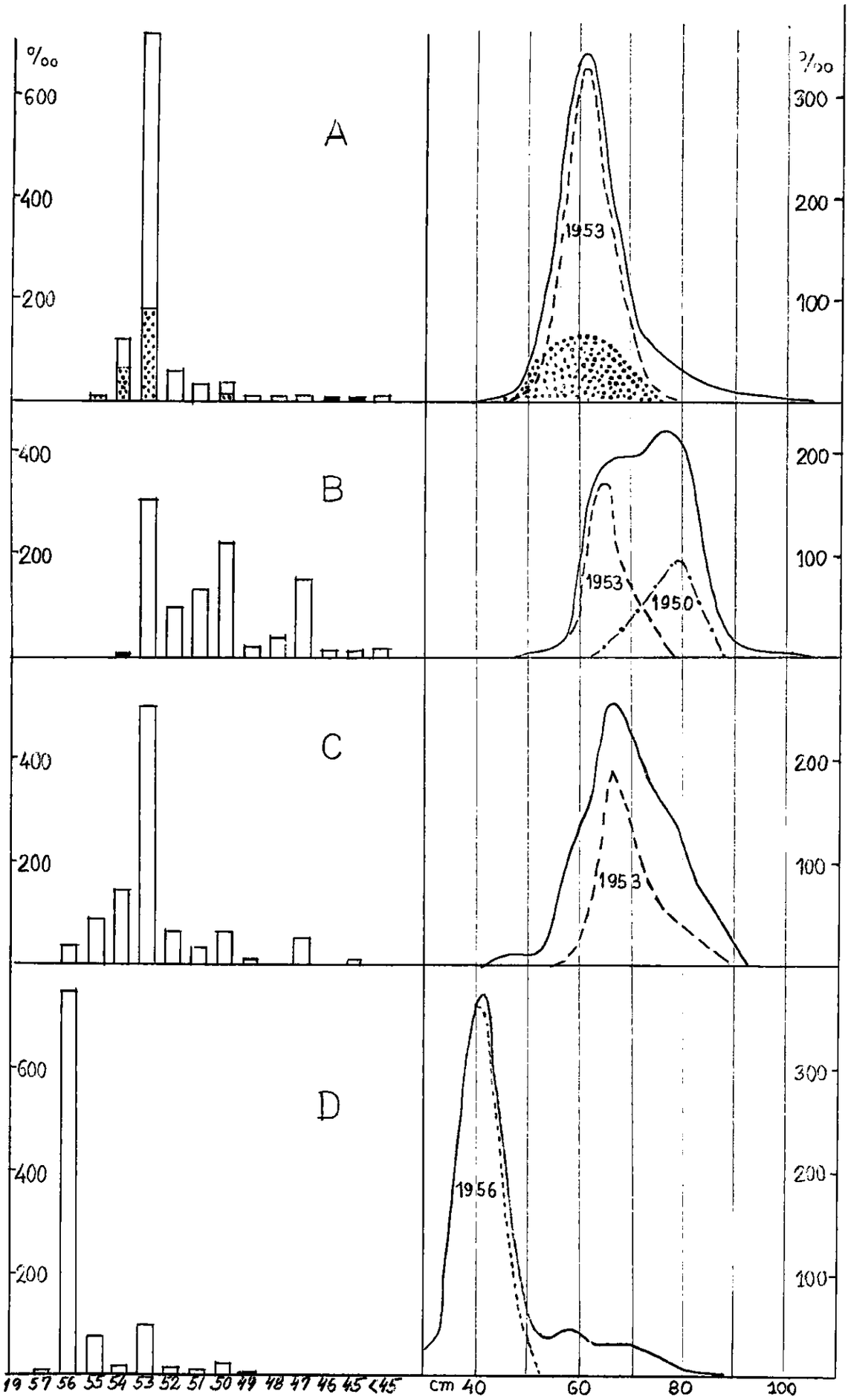


Figure 1 - Age and length distribution (‰) of cod from W. Greenland
A. from Fylla Bank (1D) landed by trawlers in March and April 1959, dotted=immature fish
B. from Dana Bank (1D) landed by trawlers in June and July 1959
C. from the Eastern side of Fylla Bank (1D) fished by scouting trawler on 22.12.1959.
D. Off Sermersut (1E) fished by scouting trawler on 18/12/59.

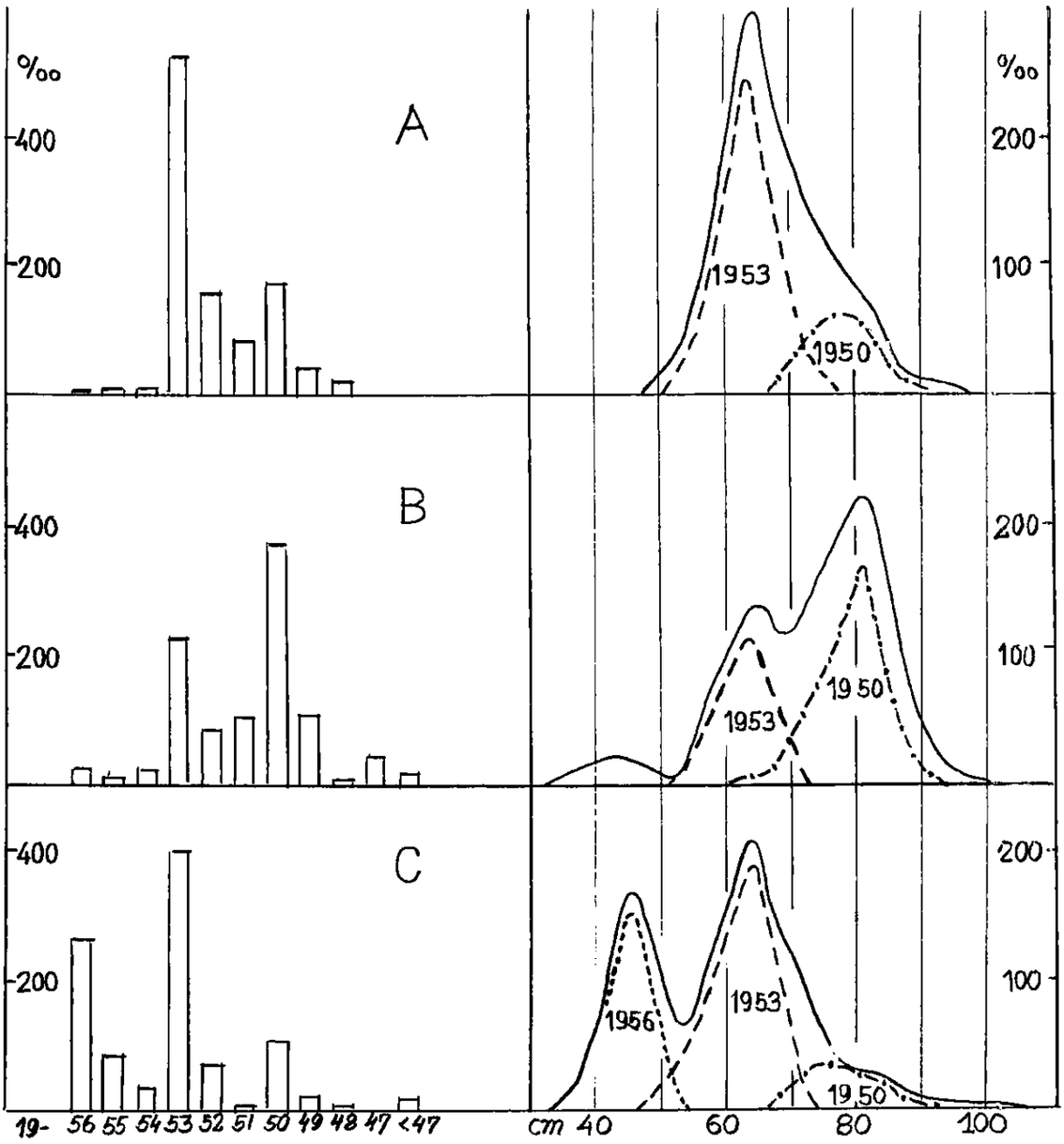


Figure 2 - Age and length distribution (‰) of cod from S.Greenland (1F)
A. from Nanortalik Bank landed by trawlers from September to December 1959.
B. off Cape Farewell fished by scouting trawler on 25/10/59.
C. off Julianehaab fished by scouting trawler on 17/12/59.

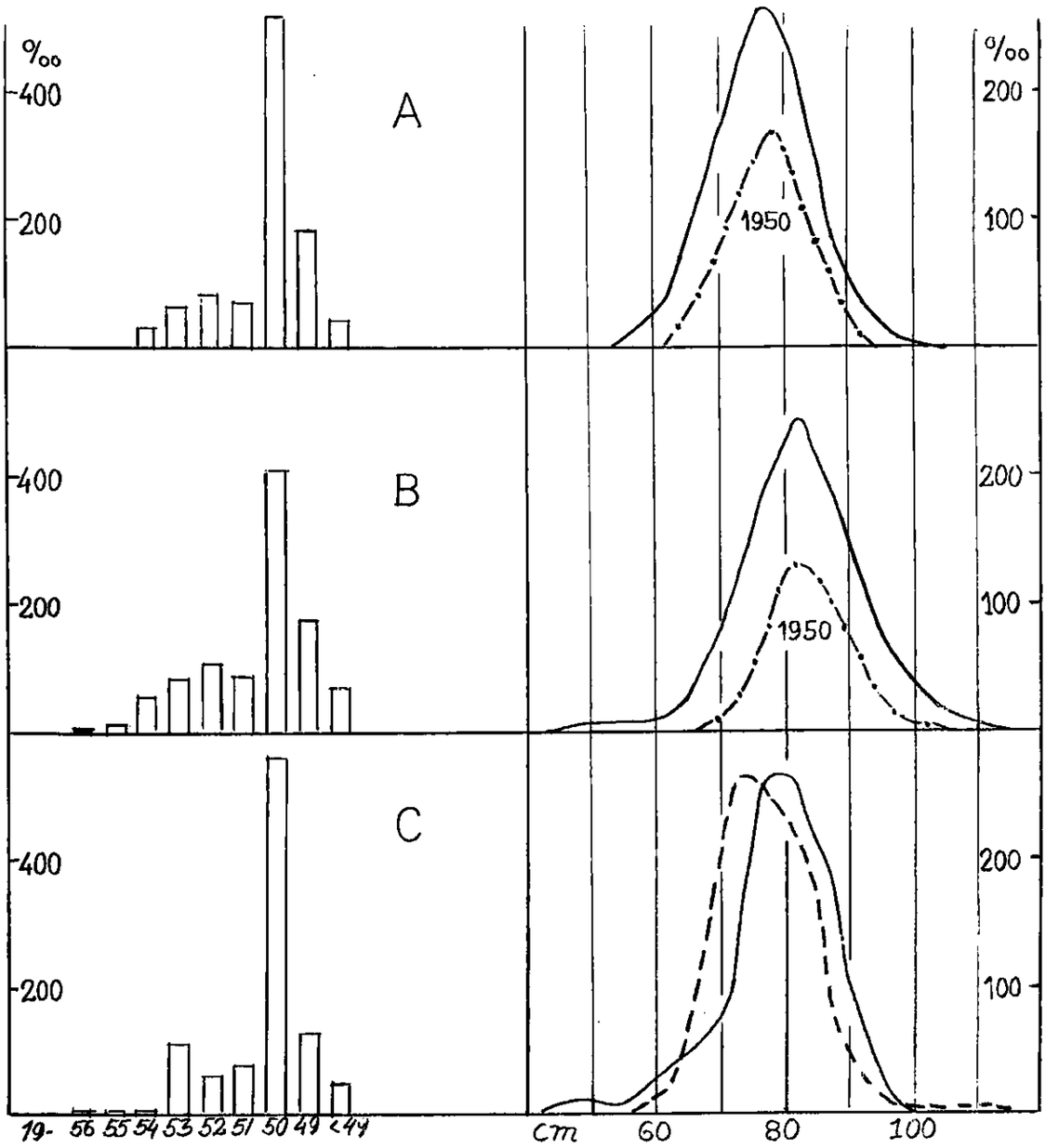


Figure 3 - Age and length distribution (‰) of cod from E. Greenland.
A. off Angmagssalik landed by trawlers in March and April 1959.
B. from Dohrn Bank landed by trawlers from August to December 1959.
C. from Cape Bille Bank fished by scouting trawler on 13/12/59 (full line) and from Cape Tordenskjold Bank (striated line) landed by trawlers in March and April 1960.

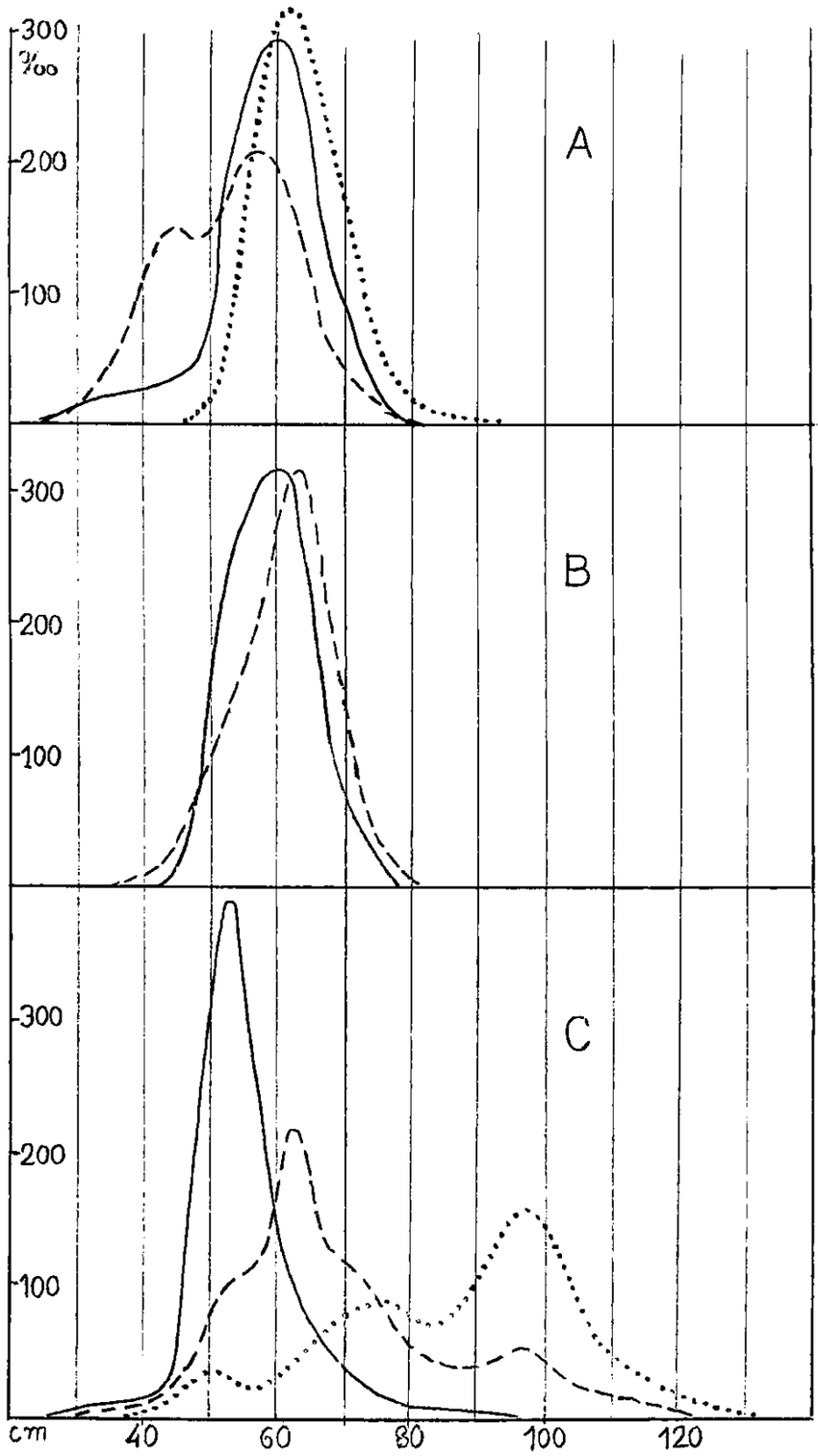


Figure 4 - Length distribution (%) of cod from Subareas 2 and 3.
A. from Hamilton Bank (2J) fished by scouting trawlers in September (full line) and November (striated line) and landed by trawlers from Sundall (2J) in December 1959 and January 1960 (dotted line).
B. from Ungava Bay (2G) on 29/10/59 (full line) and from Subdivision 2H on 2/11/59 (striated line) fished by scouting trawler.
C. from Flemish Cap (3M) on 3/9/59 (full line) and from northeastern slope of Grand Bank of Newfoundland (3L) on 7/9/59 in 200-300m (striated line) and in more than 300 m (dotted line), all fished by scouting trawler.

Figure 5 illustrates the temperature conditions of the near-bottom water in September 1959. The isotherms follow a similar parallel pattern as at the depth of 100 m. However, a certain displacement can be observed. The 0°C isotherms which at 100 m were situated east of the edge of the shelf, are displaced considerably farther westwards, toward the coast. Thus the cold water masses of the Baffin Current at this season of the year only reached the bottom in the shelf area until 200 m depth. At greater depths the exterior parts of the cold water body is resting on warmer and more haline Atlantic water; this appears from the position of the 3° isotherm (Figure 5). The coastal turned convexities of the isotherms in the area off Belle Isle Strait illustrate the displacement of the warmer Atlantic water into a deeper incision of the shelf; this causes a partial "under-run" of the cold-water body. A confirmation of this fact is presented by the relatively high salinity (34.4‰) of the deep water in this up to 300 m deep underwater channel. At the same place the salinity of the surface water was only 32.4‰. Obviously we have here the case of topographic-dependent under-current similar to those observed in the Hudson Strait, the Laurentian Channel and the Fundian Channel (ICNAF Annual Proceedings Vol.4, p.85).

From the hydrographic sections I and II (Figure 6 and 7) it is obvious that the core of the polar cold water in September, with a temperature of -1°C, was placed at a depth of 100 m. This cold water reached, in Subarea 2H (Section I), the bottom of the shallow part of the shelf. On the northern Hamilton Inlet Bank (Section II) the temperature of the bottom water was still -0.3°C at a depth of about 200 m. The warmer, salter Atlantic water of 3°C reached the slope at a depth of 350 m. The bottom temperature at 500 m was in Section I 3.67°C and in Section II as much as 3.81°C. A comparison with the somewhat more southerly Canadian routine section off Seal Island from August 1958 (ICNAF Ann. Proc. Vol.9, pp.24-25) reveals that the temperature in this area one year and one month later was about the same in the cold water region of the shelf as well as in the warmer water region of the slope. The surface temperatures, however, were, in September 1959, in conformity with the advanced season of the year and the more northern position, correspondingly lower. The salinity distribution in September 1959, estimated from the few available samples, was similar to that shown by the Canadian section in August 1958.

The very low bottom temperatures of the shallower parts of the shelf may well have been in connection with the unsuccessful search for cod in this area in September 1959. The temperatures in the core of the cold water component of the Labrador Current over the N.E. edge of the Grand Bank (Section III, Figure 8) were even below -1.5°C. To almost 200 m depth bottom temperatures of below -1°C were still observed. A very distinct change in temperature of about 10° at a depth of 20-30 m separated the relatively strongly heated thin surface layer from the cold water bulging out over the edge of the shelf. Below this bulge the 3° more saline water (34.8‰; surf. 31.7‰) of the exterior flow reached the slope at a depth of 300-350 m, without a noteworthy temperature increase as a result of the increased depth. At 500 m the bottom temperature was 3.24°C.

The Flemish Cap shelf socket presents a special case as far as hydrographic conditions are concerned (Section IV, Figure 9). The northern slope and the shelf part itself are still in the area of the exterior arm of the Labrador Current, whilst the Arctic water of the coastal arm does not touch this off-the-road region. The southern slope of the Flemish Cap, however, is influenced by the nearness of the warmer Gulf Stream water as shown by the higher bottom temperature and by the penetrating tongue of more than 4 C warm water between 100-200 m depth (in 130 m - 4.75°C).

The hydrographic sections of the second search trip at the end of October and the beginning of November 1959 in the Labrador Area (V-VII, Figures 10-12) all show a remarkable change of the hydrographic conditions, especially in the region of the Arctic component of the

current. The surface temperature had, corresponding to the advanced season of the year, decreased (Table 1), but the colder water masses below had become warmer to the effect that the temperature difference between the surface and the lower water layers down to the bottom at a depth of 150-200 m only reached 0.5°C. Only at the most northern Section V (Figure 10) a temperature of -0.1°C was observed at the bottom (150-160 m). In the Ungava Bay (Station 14, 16°16'N-65°10'W, 200 m) the bottom temperature was -0.3°C. The surface temperature was 0.24°C, and the temperatures from 50 m and deeper were just below 0°C. In the region of the southern sections VI and VII (Figures 11, 12) the core of cold water did not reach deeper than 100 m. The lowest temperature was -0.2°C. Bottom temperatures (at 150-200 m) were between 0.5° and 1.5°C. Thus the increase of the bottom temperature since September was about 1.5-2°C.

The noteworthy increase in the catches of cod at this season compared to August may well be caused by this increase of the temperature of the bottom water.

The relatively strong increase in temperature was also observed in the slope area. In September colder near surface water was observed on all stations including outer stations between the section; however in November no such cold water was observed on the corresponding stations. The higher displacement of the 3° isotherm along the edge of the shelf and within the region of Atlantic water may well be considered the cause of the warming-up of the coastal flow of water. Bottom temperatures of 3°C were in September only observed at depths of more than 300 m, in November, however, already at a depth of 250-300 m. On the whole also the more successful redfish catches were made in shallower water in November than in September.

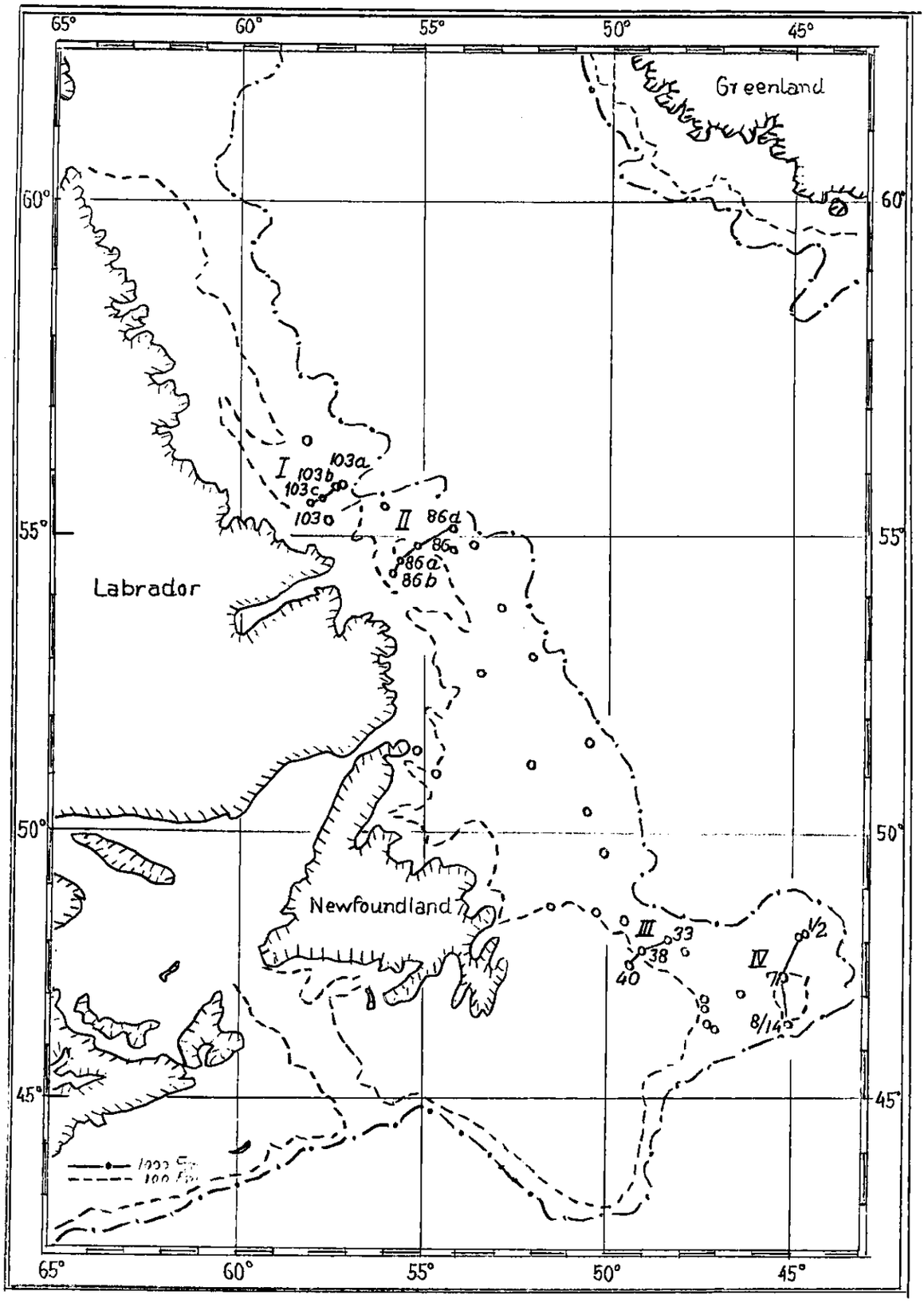
Apart from this seasonal change in the placement of the 3° isotherm, it was observed on both trips that the bottom temperatures at the same depth decreased considerably from north to south along the slope in the region of the seaward component of the current. The deep temperatures (400-500 m) off central and northern Labrador were still 3.7°-3.9°C when only 3.2° and 3.4° were observed on the N.E. and E. edge of the Grand Bank. This decrease is to be explained by the cooling of the warm water component with the increased distance from its origin (the W. Greenland current).

A further change in hydrographic conditions was observed along the southern and far westwards turning edge of the Grand Bank. The warm Labrador water hardly penetrates into this S.E. region, and the cold Arctic waters can therefore here move downwards over the steep edge of the Bank. Thus the temperature of the bottom water (300 m) was only 0.95°C on Station 73 with a low salinity of only 34.0 ‰ (surface-32.2; 280 m - 33.9). At 250 m the temperature was only 0.5°C, and until 200 m the temperatures were below zero, in the upper layers even below -1°C. It is of interest that just at these low temperatures, in 300 m depth, an exceptionally dense concentration of redfish, however mainly small fish, was found (15 tons in a 30 min. trawl haul).

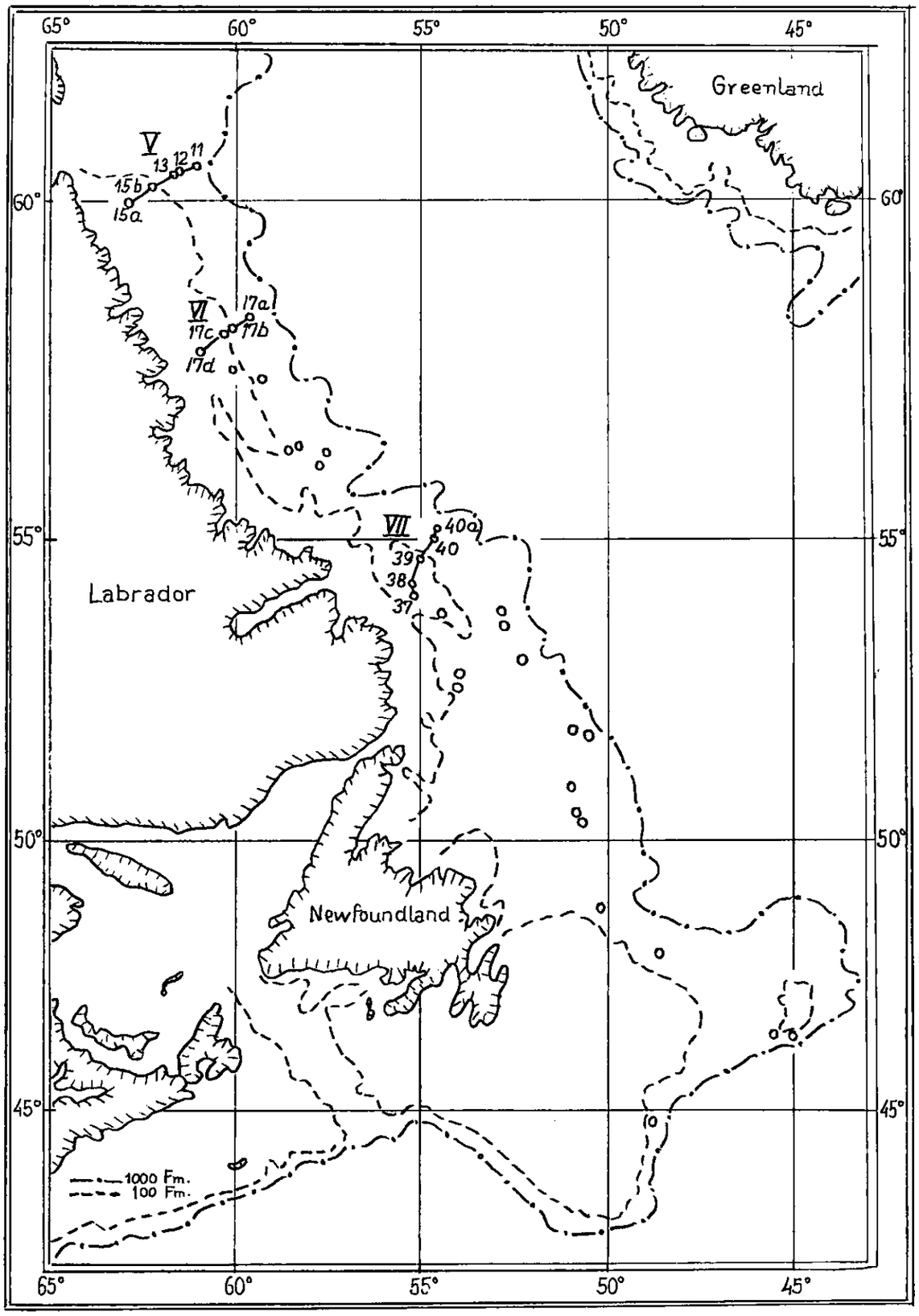
C. Amounts of Fish Caught off Labrador and Circulation of Atmosphere over the N.W. Atlantic

by Arno Meyer and Martin Rodewald

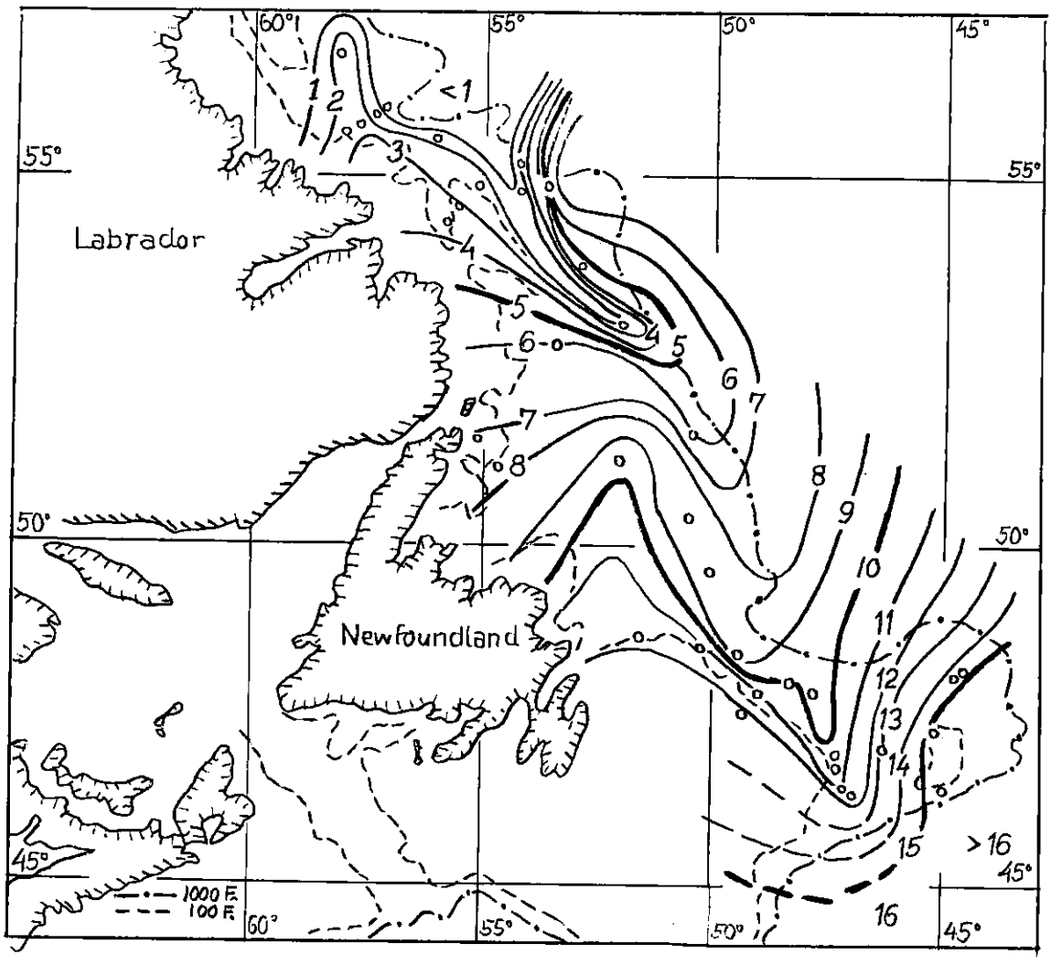
After the discovery in July 1958 and later of large concentrations of redfish at Sundall and on Ritubank, these two fishing grounds yielded for a considerable period large catches. However, by beginning of July the concentrations of redfish dissolved, for reasons unknown to us, and for several months the area gave daily catches of only 10-15 tons at the most. Two search trips by German trawlers in September and November 1959 offered opportunity for studying the reasons for this change.



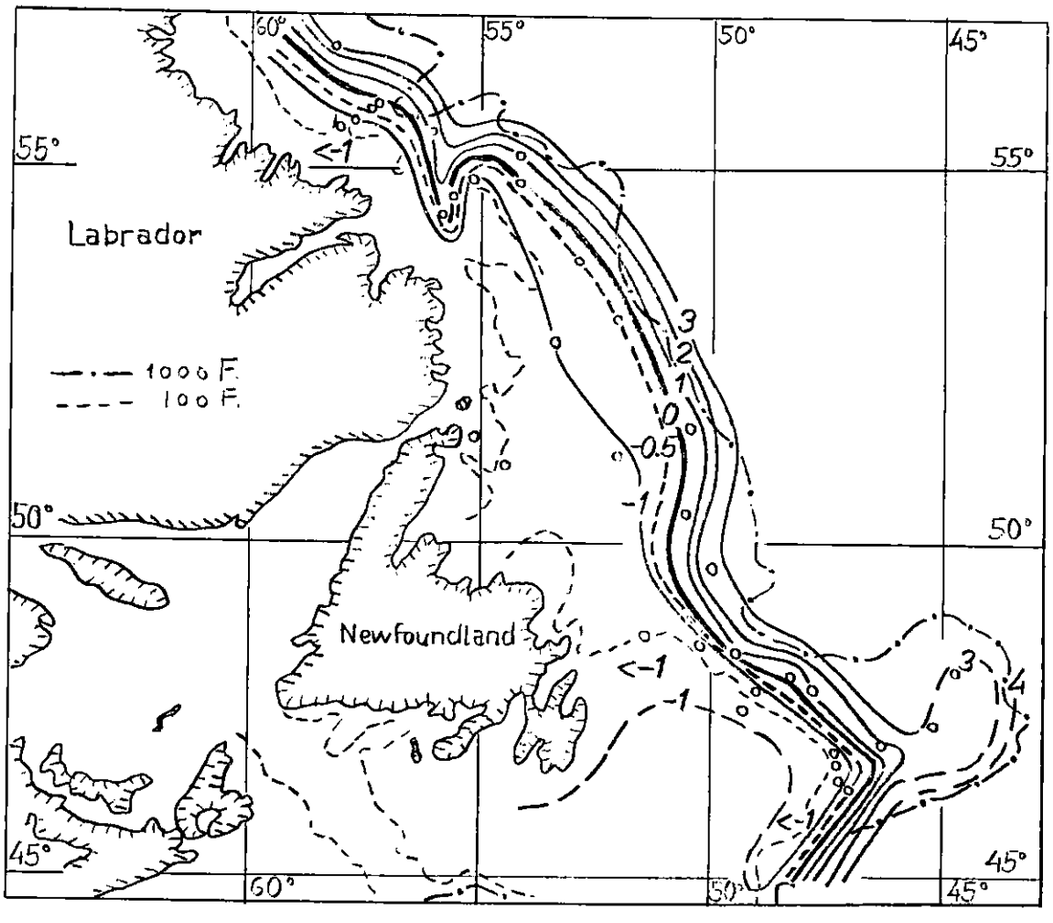
B. Figure 1 - Hydrographic stations, trawler "Thunfisch", 2-24 September 1959 (I-IV=hydrographic sections)



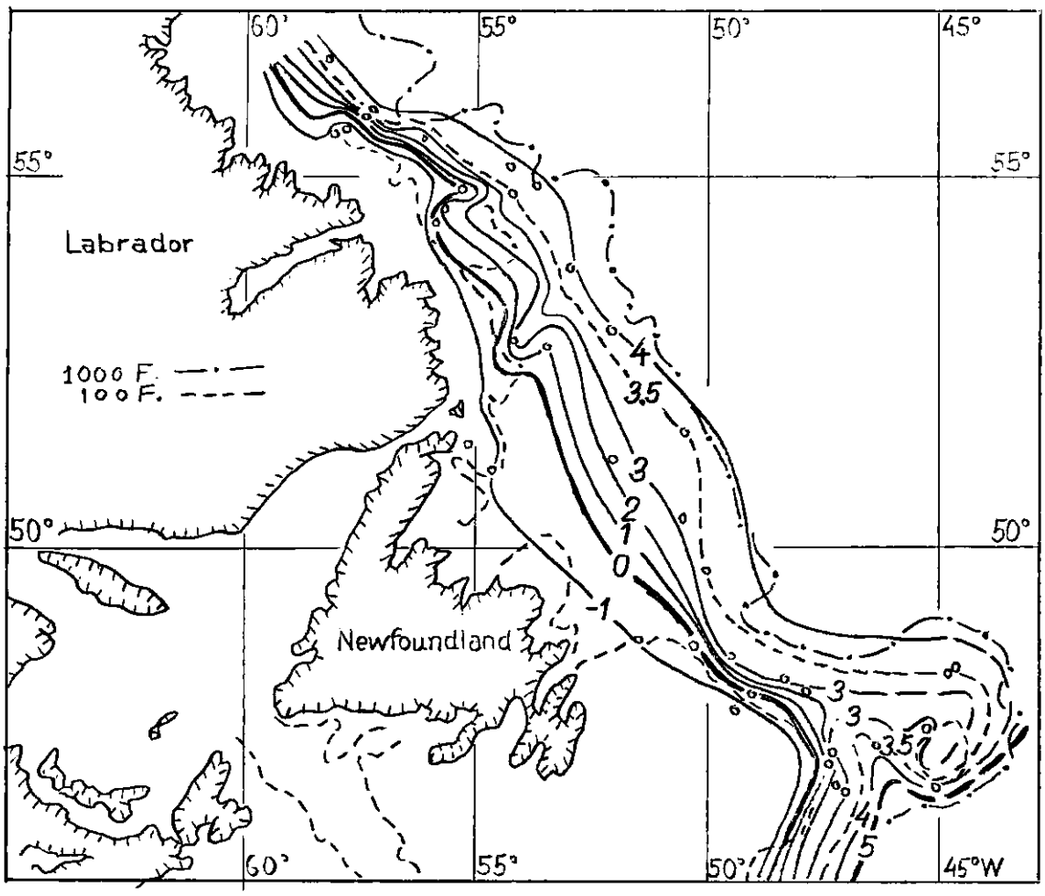
B. Figure 2 - Hydrographic stations, trawler "Island", 28 October-21 November 1959 (V-VII=hydrographic sections).



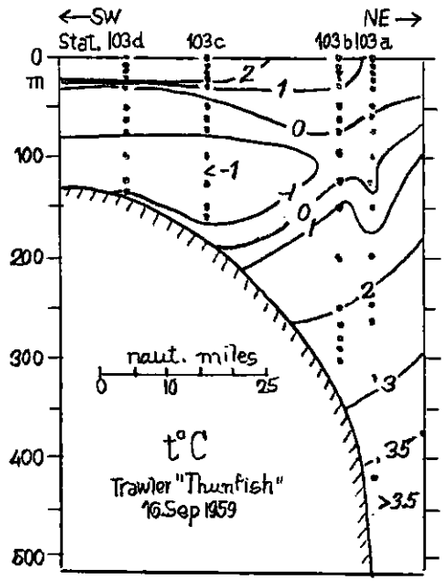
B. Figure 3 - Surface temperature distribution, September 1959



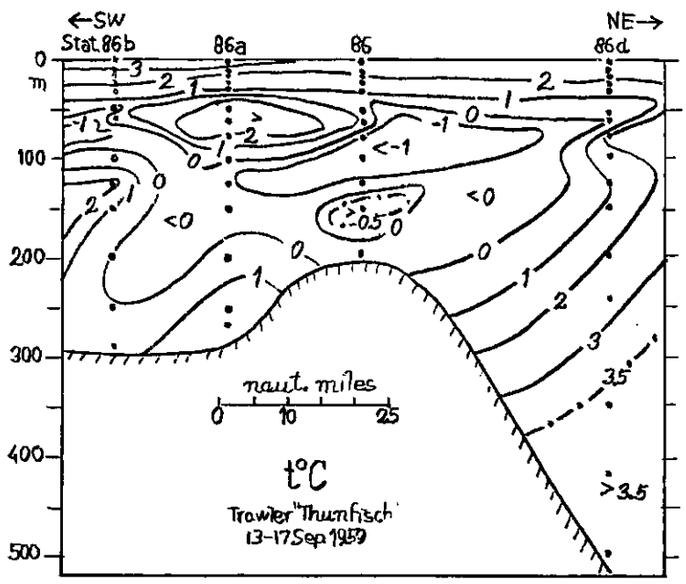
B. Figure 4 - Temperature distribution at 100 m, September 1959.



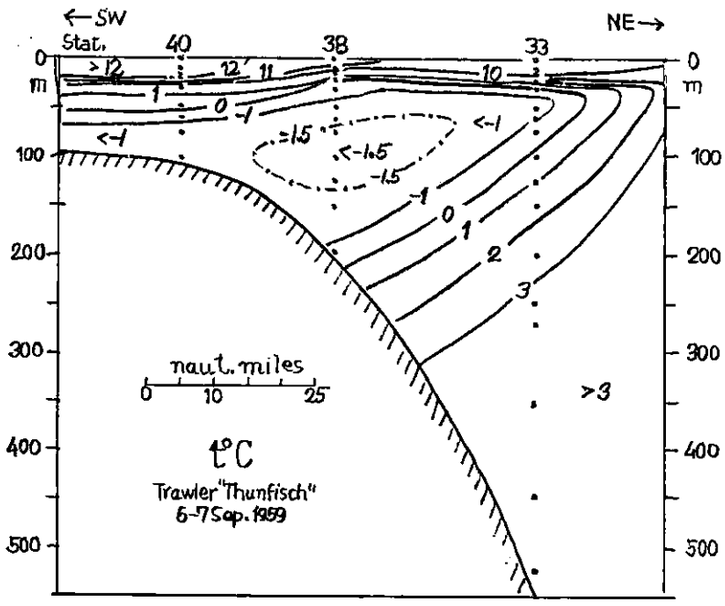
B. Figure 5 - Temperature distribution near bottom, September 1959



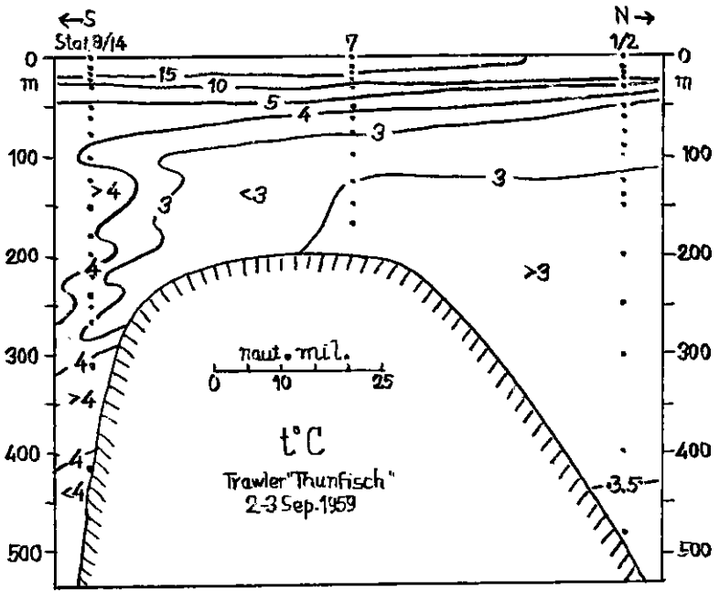
B. Figure 6 - Hydrographic section I, off Hopedale, Subdivision 2H, between 55°23'N, 58°10'W (stat.103d) and 55°46'N, 57°17'W (stat.103a). Salinity in ‰: Stat.103a 0 ms 32.52; 420 ms 34.79.



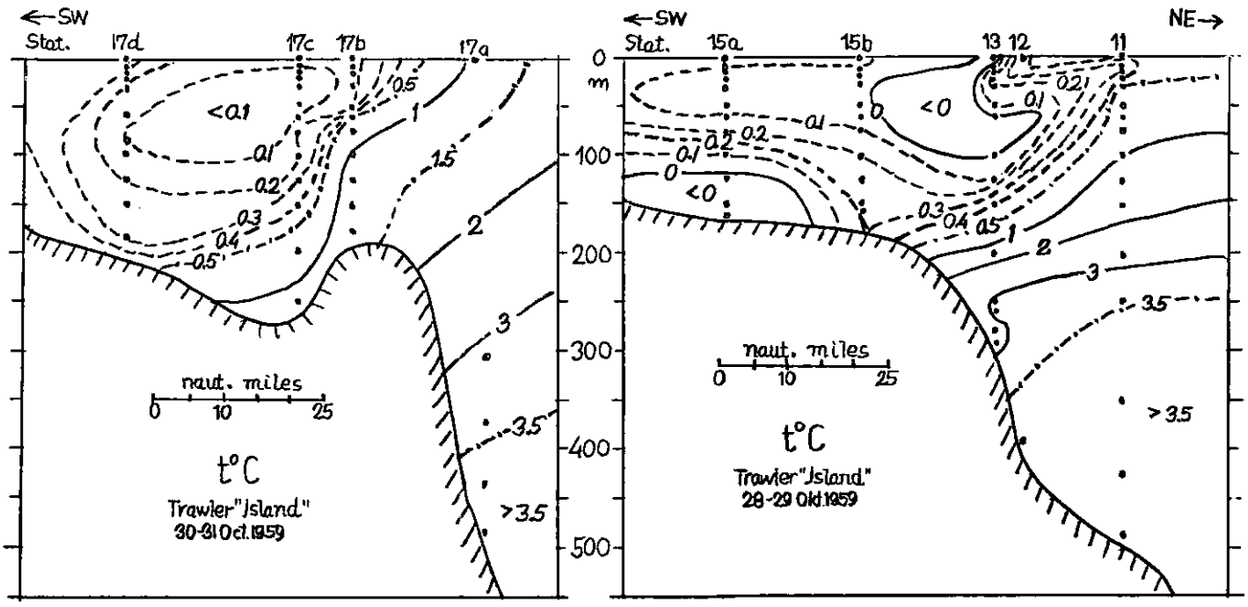
B. Figure 7 - Hydrographic section II, across the northern part of Hamilton Inlet Bank, Subdivision 2J, between 54°21'N, 55°52'W (stat.86b) and 55°05'N, 54°15'W (stat.86d) Salinity in ‰: Stat.86b - 0 ms 31.86, 290 ms 33.95; 86a - 0 ms 32.04, 290 ms - ; 86 - 0 ms 32.16, 290 ms - .



B. Figure 8 - Hydrographic section III, across the NE-edge of the Grand Bank, Subdivision 3L, between 47°34'N, 49°28'W (stat.40) and 48°06'N, 48°27'W (stat.33)
Salinity in ‰: Stat.33 0 ms 31.67; 350 ms 34.78; 450 ms 34.79.

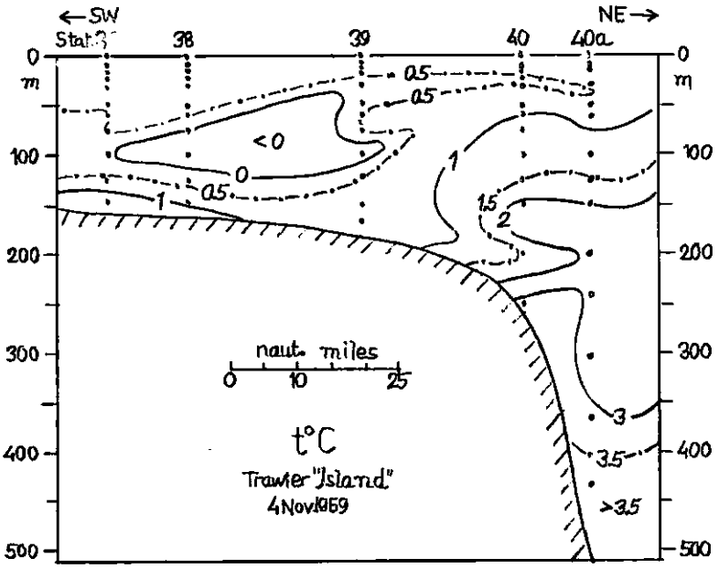


B. Figure 9 - Hydrographic section IV, across Flemish Cap, Subdivision 3M, from north to south, between 48°12'N, 44°46'W (stat.1/2) and 46°28'N, 45°04'W (stat.8/14)
Salinity in ‰: Stat.8/14 0 ms 33.36, 300 ms 34.77, 400 ms 34.86, 480 ms - , 560 ms - ;
Stat.1/2 0 ms 32.56, 300 ms 34.76, 400 ms 34.83, 480 ms 34.86, 560 ms 34.66.



B. Figure 11 - Hydrographic section VI, off Cod Island. Cape Mugford, North Labrador, Subdivision 2G, between 57°47'N, 61°03'W (stat. 17d) and 58°19'N, 59°43'W (stat. 17a).
Salinity in ‰: Stat. 17d 0 ms 32.32, 100 ms - , 200 ms 32.66, 250 ms - ; 17c 0 ms 32.47, 100 ms - , 200 ms - , 250 ms 33.54; 17b 0 ms 33.50 (locking of water bottle leaky!), 100 ms 33.52, 200 ms - , 250 ms - .

B. Figure 10 - Hydrographic section V, northeastward Seven Islands Bay, North Labrador, Subdivision 2G, between 59°38'N, 63° W (stat. 15a) and 60°25'N, 61°12'W (stat. 11)
Salinity in ‰: Stat. 13 0 ms 32.29, 280 ms 34.54.



B. Figure 12 - Hydrographic section VII, across the northern part of Hamilton Inlet Bank, Subdivision 2J, between 54°04'N, 55°16'W (stat. 37) and 55°07'N, 54°37'W (stat. 40a)
Salinity in ‰: Stat. 38 0 ms 32.40, 152 ms 33.24 (locking of water bottle leaky!) 250 ms - , 303 ms - , 364 ms - ; 40 0 ms 32.93, 152 ms - , 250 ms - 33.98, 303 ms - , 364 ms - ; 40a 0 ms 32.88, 152 ms - , 250 ms - , 303 ms 34.46, 364 ms 34.57.

All depths in Subdivisions 3K and 2J were systematically fished, however without success. Only at 51 28'-38'N very large concentrations of redfish were observed, mainly at 300-340 m, in the first half of November. The hydrographic observations did not reveal any differences compared with the previous year, when in the same season very good catches were made in 2J and 3K. Only from December 1959 the catches off Labrador improved gradually, and right to the beginning of April when the ice conditions forced the German trawlers to discontinue the fishery the same favourable catch conditions prevailed as in the previous year.

The changing atmospheric circulation over the W. Atlantic observed through the same period may offer an indication of a connection between air circulation and catch fluctuations. Figures 1-3 present the mean atmospheric pressure deviations in mb in the period July 1958 (Figure 1)-October 1959 (Figure 2) and in January 1960 (Figure 3) from the normal (1889-1939). The period of rich catches is characterized by positive atmospheric pressure anomalies in the North and negative anomalies in the South, together with a corresponding landward wind from ENE to WSW over the E. coast of Labrador and Newfoundland. The period of poor catches, however, shows a clear change in the pattern of circulation. The atmospheric pressure is deeper in the North and higher in the South, the resulting wind off the coast of Labrador is seaward from W to WNW over the ocean. The rapid improvement of the catches in winter 1959/60 in its turn is parallel with another change in circulation over the N.W. Atlantic, resulting in landward winds and a decided "blocking" over the Labrador Current.

Figure 4 presents the sum of the monthly deviations in mb of cases of pressure anomalies from the northern point of Labrador to the southern point of Newfoundland, for the period January 1958-March 1960. To compare, Figure 5 shows the daily catches, i.e. catch per day of trip, of German trawlers fishing off Labrador August 1958/March 1960. Both curves clearly follow one another. Further investigations must decide whether this agreement between changes of the atmospheric circulation and catch fluctuations is accidental or if, and to what extent, a direct connection exists between the two phenomena.

References

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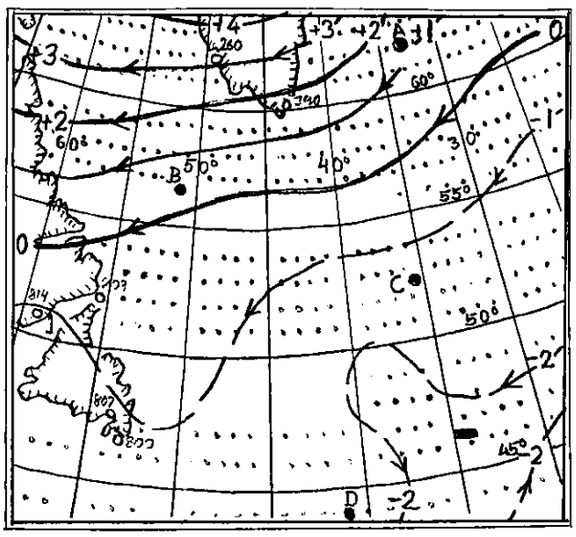
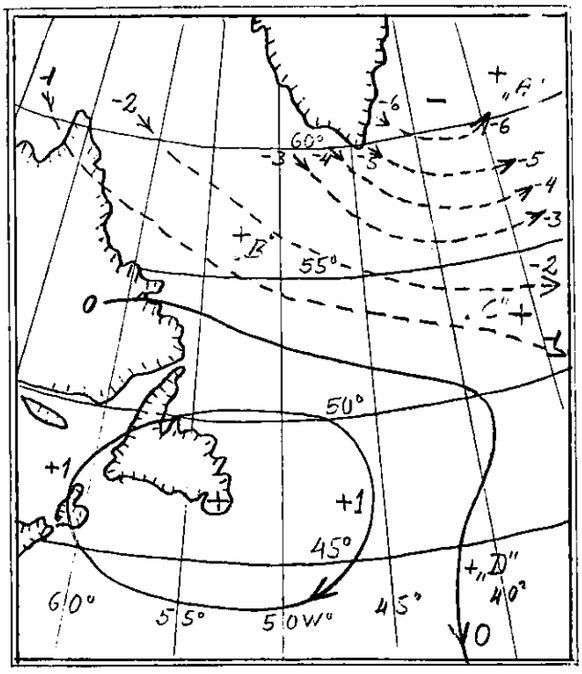
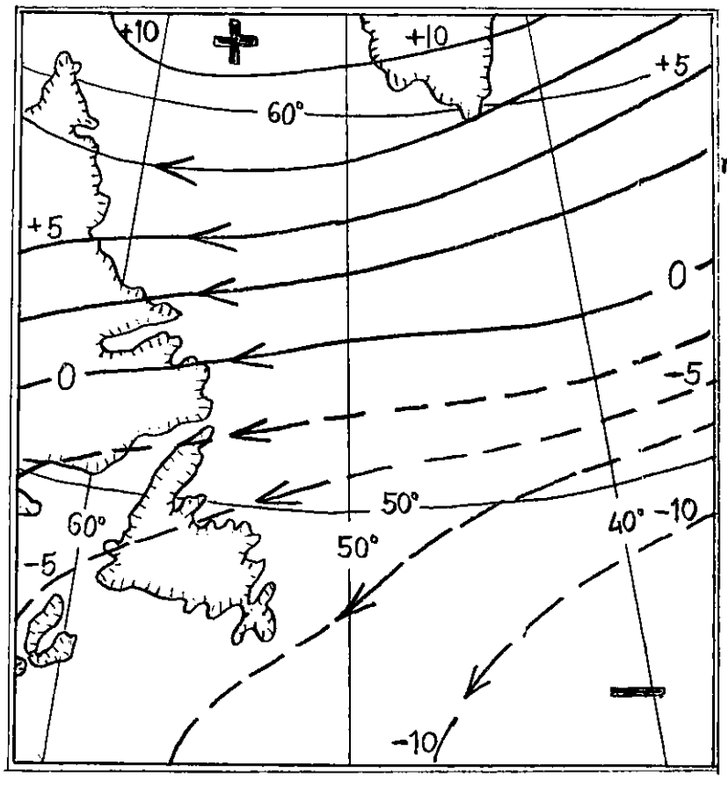


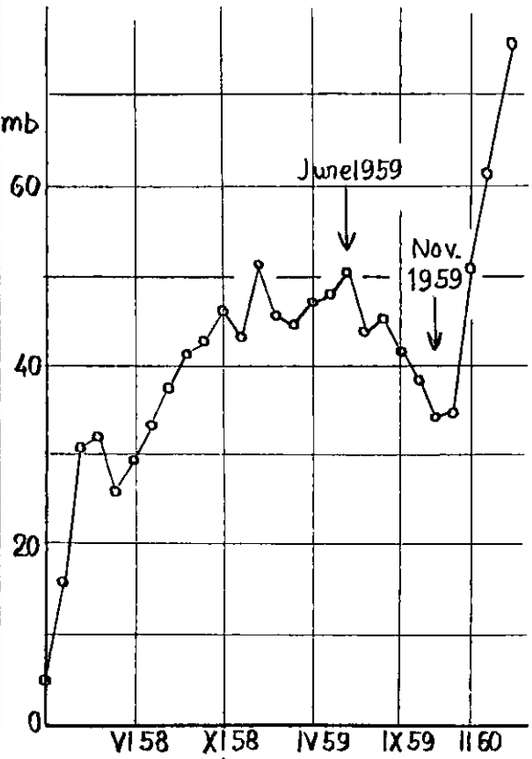
C. Figure 1 - Mean deviation of atmospheric pressure (in mb) from normal (period 1899-1939) in 1958.



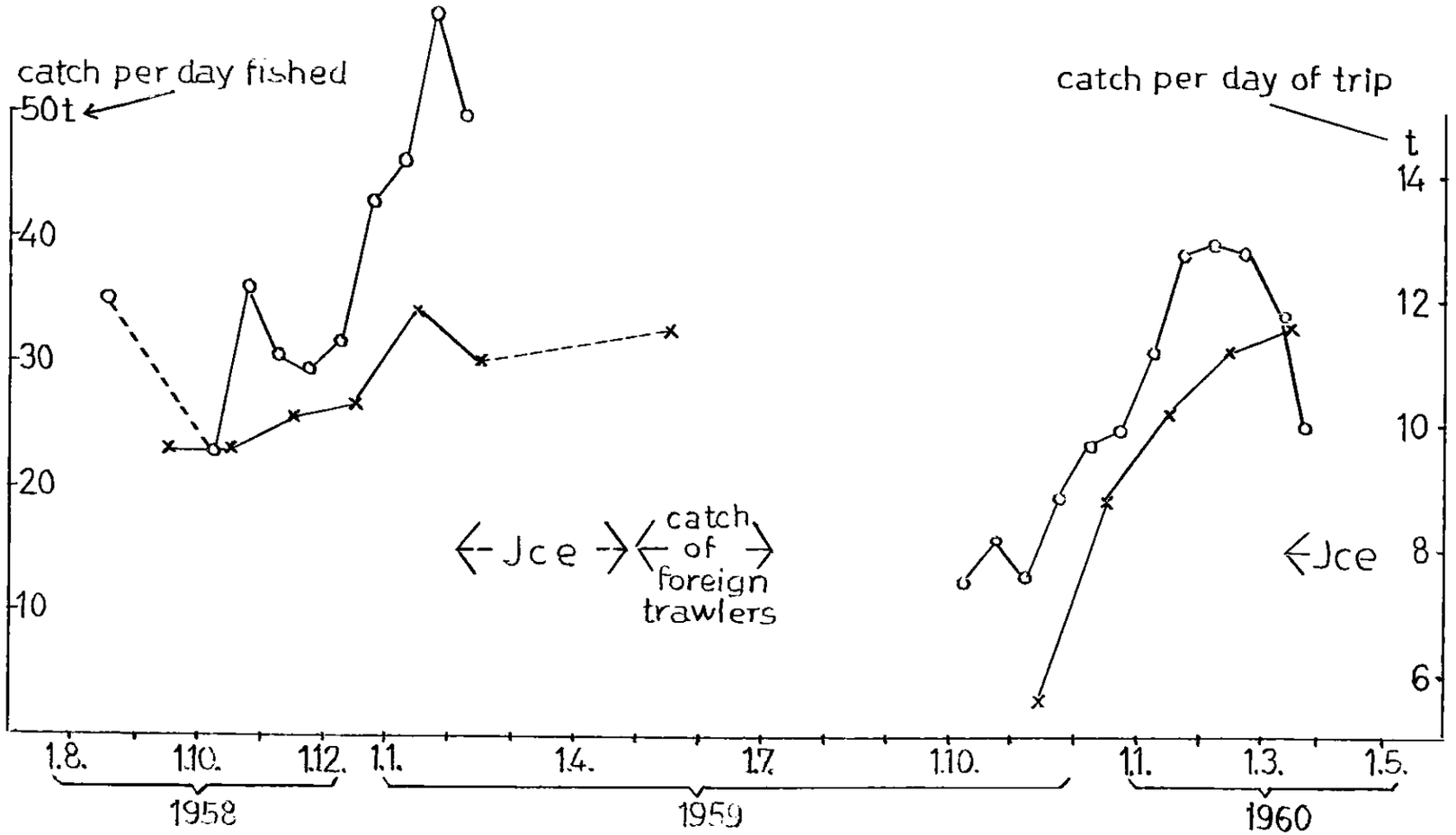
C. Figure 2 - Mean deviation of atmospheric pressure (in mb) from normal (period 1899-1939) from July to October 1959.



C. Figure 3 - Mean deviation of atmospheric pressure (in mb) from normal (period 1899-1939) in January 1960.



C. Figure 4 - The accumulation curve of pressure anomaly gradient from North Labrador to South Newfoundland for the period January 1958 to March 1960.



C. Figure 5 - Catch per day fished (circles) and catch per day of trip (crosses) of German trawlers off Labrador (Sundall) from August 1958 to March 1960.