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Fishery Investigations in Greenland Waters 1956

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During the fishing season 1956 71 Norwegian vessels participated in the West Greenland fishery. This is a little reduction in the participation compared to the preceding year. Of these vessels 8 were fishing exclusively for halibut, while 63 were engaged in the cod fishery. Only 2 Norwegian trawlers visited the area in 1956. The total catch amounted to 14.046 tons of salted cod compared with 14.325 tons in 1955. In addition 691 tons of halibut were landed as compared with 881 tons the preceding year.

One of the vessels tried purse-seining for cod in the area in 1956, an experiment which is more fully described in the present report. Two long-liners went to the Newfoundland Banks from West Greenland during the first week of August. This is the first time that Norwegian long-liners fish the Grand Banks. They set their long-lines in deep water along the slope of the bank off St.John's, Newfoundland. In the course of three weeks they caught 100 tons of salted cod each. The fish was very large and of excellent quality. The result obtained by these vessels will probably induce more vessels to visit the Grand Banks in 1957.

Off West Greenland the long-liners started their fishery in early May on the Julianehaabs-, Danas- and Fiskenes Banks. During the first part of the season there was much fish present on the banks, but the fishery was partly slowed down by bad weather. The quality of the cod must be characterized as very good and better than in the last two years . In July most of the vessels finished their first trip. They went to Norway for unloading, and returned again early in August. The long-line fishery was then very poor on all the banks. The cod had seemingly left the bottom and was swarming pelagically in scattered schools. The usual fishery with floating long-lines did not give satisfactory catches, and most ships resorted to the modern form for hand-lining which met with better success.

The halibut vessels fished only in the Davis Strait outside the West Greenland Banks. None of the vessels sailed to the Labrador coast on account of difficult ice conditions in that area.

As in earlier years the Norwegian Institute of Marine Research collected material for the study of the age- and size composition of the commercial cod catches, and for the study of the temperature conditions along the banks. The research ship "G.O.Sars" undertook a cruise to this area during the month of July. The research ship fished the different banks with the usual fishing gears employed by commercial fishermen. About 2000 measurements of cod and otolith samples were taken. Tagging of cod was likewise carried out as usual.

Later in the season an observer from the Institute also sampled the purse seine catches during the experimental fishing. A third vessel was engaged in tagging of halibut.

In 1956 Denmark and Norway had agreed to a plan of cooperation in the hydrographic Work. Both the Danish research ship "Dana" and the "G.O.Sars" had a relatively short time at their disposal for the work at West Greenland, and by dividing the hydrographic sections between the ships more work could be done in other fields. As her share the "G.O.Sars"

took four sections, viz. westwards from Danas Bank, Fiskenes Bank, Banan Bank and northern part of Lille Hellefiske Bank. The details of these sections are given in tabular form as an appendix to this report.

The four sections taken show no exceptional features compared to earlier years. As usual a core of cold Arctic water was lying along the western slopes of the banks in July. In the particular depths where the long-lines usually are set, 150-200m., the temperature both on Danas and Fiskenes Bank were above 2ºC, while on the banks further north, the Banan Bank and Lille Hellefiske Bank, the temperatures were somewhat below 2ºC. In more shallow water on the banks the temperatures were between 1 and 1.5º C. In the Davis Strait proper, some distance from the banks, a considerably colder core of water was present. The temperature conditions in 1956 were not more unfavourable for the fishery than those found in 1955, but rather somewhat better.

An area of relatively great importance for the Norwegian fishery is the Holstenborg Deep where the cod assemble in pelagic swarms in early August. In previous years investigations have shown that in this area a rather sharp thermocline is formed, with relatively warm surface water of varying thickness, and a cold layer below. The fish usually concentrate against the ceiling of warm water. In order to study the conditions in 1956 a section of 5 stations was taken on July 24th with a bathythermograph from the northern edge of Lille Hellefisk Bank across the deep to the southern edge of Store Hellefisk Bank. In the southern part of the deep cold water of 1.2-1.5ºC was clinging to the bank slope, probably being carried in from the outside. This cold layer was present in depths between 80 and 300m. Above the cold water the temperature rose rapidly to 3ºC at the surface. In the northern part of the Deep the warm surface water penetrated somewhat deeper. The general picture was that the temperatures were higher in the northern part of the Deep, with little stratification. Echo soundings and Asdic sweeps carried out all over the Deep showed only single scattered fish in the northern part of the deep, while in the southern part a more dense, although scattered, occurrence of fish was found between 75 and 200m. There was as yet no heavy concentration of cod found pelagically. On the shallow northern edge of Lille Hellefiske Bank bordering on the Deep schools of cod were, however, found in dense masses close to the bottom, and pelagic concentrations had started to form in the cold water below 2ºC stretching out from the bank slope. A week later the temperature conditions had changed completely. The surface water had then become warmer with a thermocline at 25-50m. depth. Dense pelagic schools of cod were then feeding on sandeels, fish young and plankton organisms in the Holstenborg Deep.

The Cod Population

On board the research ship samples of cod were collected. The fish were caught by the ordinary types of commercial gear used by the Norwegian fishermen, such as bottom long-line, floating long-line and hand-line. Samples were also obtained from purse seine catches of cod.

The Bottom Long-Line Fishery

Bottom long-lines were fished from the research ship on the western slopes of Frederikshaabs Bank, Danas Bank, Fiskenes Bank, Fyllas Bank and the Banan Bank. Samples were obtained in all these localities from catches taken in depths varying between 120 and 240 meters. The age and size distribution of the cod from the bottom long-lines are shown in Table 1 and 2. On all these banks it is the nine year old fish belonging to the year class 1947 which is dominating. The strength of this year class varies, however, from 22.8 per cent on the southern banks to 37.4 per cent on the northern banks. Another strong year class is the 1942-class which has been prominent in the Norwegian long line catches for a number of years already. Also this year-class shows a tendency of increasing strength from the southern banks (7.4%) to the northern banks (17.2%).

A new year-class coming into the fishery is the one born in 1950. This group of 6 year old fish was in 1956 most prominent on the southern banks where it constituted between 13.5 and 15.3 per cent of the catch. Further north, on the Fyllas and Banan Bank the 1956 year-class decreased to respectively 8.6 and 4.0 per cent. This year-class seems to be exceptionally rich, and it will in the coming years probably be the most important component of the Norwegian long-line fishery.

The size distribution of the cod in the different localities show some variation. The largest cod is caught on Fyllas Bank and Danas Bank, where the mean size was respectively 77.07 and 76.85 cm. On the other banks the mean size varies between 73.06 and 74.07 cm. The total mean size of all long-line caught cod is 74.81 cm. with a mean age of 10.1 years.

The Pelagic Long-Line Fishery

On July 24th a floating long-line of 2000 hooks was set by the research vessel from the northern edge of Lille Hellefisk Bank northwards partly across the Holsteinsborg Deep. At every 400 hooks the line was kept floating by 7 fathom vertical ropes fastened to buoys. The age and size composition of the catch is shown in Table 3 and 4. The cod caught on the pelagic long-line was on an average somewhat younger than those caught on bottom lines. The dominating year-class was that born in 1947. Next in importance come the 6 year old cod born in 1950 and 8 year old cod born in 1948. The mean age of the cod on pelagic long-line was 9.4 years compared to 10.1 years for the bottom long-lines. The mean size is respectively 71.98 and 74.81 cm.

As mentioned before, the pelagic long-line fishery was no success for the commercial fleet in 1956. Instead they resorted largely to hand-lines which proved more efficient.

The Hand-Line Fishery

In recent years hand-lining for cod on the West Greenland Banks has become quite an important feature in the Norwegian fishery. In 1956 the hand-lining for a great deal substituted the pelagic long-lines. This is again due to the recent modernization of the hand-line gear. The hand-line is used only when the cod is found pelagically during August. In 1956 the hand-line proved both equally efficient as well as less expensive in use compared to the pelagic long-line. The average daily catch on a ship was 3-4,000 cod on handline, with top catches around 6-7000 cod.

The hand-line used is made of monofilament nylon of 1 mm diameter. At the lower end of the line is fastened a socalled "Swedish Jigger" weighing about one pound. From the jigger upwards along the line is strung 6-10 artificial rubber worms threaded on a hook. The colour of the artificial bait is usually red, white, green or yellow. The hand-line is wound on a hand-reel fastened to the gunwhale of the ship, one reel being operated by each man.

During the first days of August the temperature conditions in the Holsteinsborg Deep had improved considerably. On July 24th the temperature in the southern part of the Deep had been 3.3ºC at the surface decreasing to 1.8ºC at the bottom (125 m). On August 7th-10th the temperatures in the same locality were between 4.5 and 5.7ºC at the surface and between 2.9 and 4.6ºC at the bottom. A decided thermocline was present at 20-25 meters depth. The echo sounder registered pelagic concentrations of cod between 5 and 50 meters, while the handline catches indicated the greatest fish density at 20-30m. Similar concentrations of cod were also found in the Cape Farewell region in the latter half of August where the fish was standing in 10-50m depth. However, here the temperature was lower, being 2.5-3.0ºC at the surface decreasing to as low as to 1.1°C at 90m depth with a sharp thermocline between 20 and 50m. In both localities the temperature could vary somewhat from day to day. At Holsteinsborg the pelagic cod was feeding on sand-eels, while off Cape Farewell they were feeding heavily on capelin.

As shown in Table 3 and 4 the cod at the Holsteinsborg Deep caught with hand-lines were small sized, having a mean length of only 66.53 cm, and a mean age of 7.5 years. The hand-line catches were dominated by the 6 year old fish belonging to the year-class 1950. Next in importance comes the 9 year old fish of the 1947-class. We have no sample from the hand-line catches at Cape Farewell, but according to the observer the hand-line cod here had the same size composition as found in the purse seine catches in the same area.

Purse-Seining for Cod

During the summer 1956 an experiment was carried out with purse seine for cod in Greenland waters by the commercial long-liner "Longva". The Institute of Marine Research had an observer on board the vessel during this experimental fishery.

The purse seine used was an ordinary cod purse-seine of the type used in the Lofoten fishery in Norway. It was 225 fathoms long and 32 fathoms deep, with a mesh size of 10 cm stretched mesh.

The M/s "Longva" arrived at the Holsteinsborg Deep on August 6th, and started immediately to search the area with echo sounder for concentrations of cod. On August 7th, two sets were made in the southern part of the Deep where fish were detected at 10-20 fathoms, while the depth to the bottom was 30-35 fathoms. The surface temperature was 4.5ºC. A thermocline was present at about 25 meters depth where the temperature suddenly dropped to 3.7ºC. The bottom temperature was 3.2ºC. The first set gave no catch, but the net was torn. The second set made in the afternoon gave only 50-60 cod and the net was again torn. On August 9th a third set was made. Dense schools of cod were registered from surface down to 15-20 fathoms. This day the surface temperature was 5.2ºC with a thermocline at about 25m where the temperature dropped suddenly to 4.2ºC. Bottom temperature at 70m was 4.1ºC. In spite of ideal conditions for setting, the catch was only 35 cod. The reason for this failure was surmised to be that the fish were scared by the seine in the clear daylight. At 6 p.m. the net was set again in the same locality. This time the catch was 1,000 cod. At 9 p.m. the net was set again on good schools of cod, but the catch was only 15 rather small fish, but the net was again torn.

During the succeeding days the weather changed to the worse, with fog, wind and a fairly heavy sea which prevented the use of purse seine. On August 12th it was decided to leave the Holsteinsborg Deep and rather try in the Julianehaab - Cape Farewell region, where surface concentrations of cod had been reported by other vessels. The new area was reached on August 18th. Echo soundings were started immediately in order to locate cod concentrations. Promising schools of cod were located some distances off Cape Farewell on August 20th. The fish had a ceiling height at about 7 fathoms. Due to a strong current it was not found feasible to set the purse seine, but by hand-line 2700 cod were caught during the day. The conditions improved the next day, and the seine was set. The catch was 700 cod. The surface temperature was 2.6ºC with a thermocline at about 60 meters where the temperature dropped to 2.0ºC. The bottom temperature at 140 m was 3.0ºC. In the afternoon another set was made in the same locality with a catch of 500 cod, all large fish. In the following days bad weather prevented the use of the purse seine. Good weather conditions existed again on August 25th. The net was set, but the current was so strong that it turned the seine inside out, and no catch was made. Large schools of cod were present and hand-lining during the day gave 2-3000 cod.

A total of 8 sets were made with the purse seine, viz. 5 sets at the Holsteinsborg Deep and 3 sets off Cape Farewell. The first 5 sets caught 0 - 60 - 35 - 1000 - 15, a total of 1110 cod. The other 3 sets gave 700 - 500 - 0, a total of 1200 cod. It cannot be said that the purse seine experiments were successful. The use of the purse-seine is largely dependent on good weather conditions and not too strong a current, conditions which are not easily fulfilled off West Greenland. It is not expected that the cod purse seine will come into ordinary use in the Norwegian Greenland fishery on the basis of the 1956 experiments.

The pelagic cod in the Holsteinsborg Deep were feeding heavily on sandeels (Ammodytes), while the cod in the Cape Farewell region were feeding on capelin 9-13 cm. in length. In both localities were also found small squid, fish larvae, schizopods, and other organisms.

From the cod caught with purse-seine at Holsteinsborg we have at disposal only a small sample of 33 specimens. The cod is relatively young and small-sized, with a size- and age-composition similar to that found in the hand-line catches (see Table 3 and 4). At the Holsteinsborg Deep it is the 6 year old fish of year-class 1950 which dominate the purse seine cod, constituting more than 30 per cent of the catch. Next in importance comes the 9 year old fish (1947 year-class) with 24 per cent and 5 year old fish (1951 year-class) with 21 per cent. Altogether these three yaar-classes make up 76 per cent of the catch. The mean size of the cod is 64.09 cm, a rather unsatisfactory size for salt fish production. Although the sample taken is rather small it is believed that the figures give a quite correct picture of the catch.

From the purse-seine cod taken off Cape Farewell we have a sample of 124 specimens. The size- and age-composition of this fish is completely different from that found at the Holsteinsborg Deep. First and foremost, the fish is very large with a mean length of 75.81 cm, i.e. 11.72 cm above the length of the Holsteinsborg cod. The Cape Farewell cod compete favourably with cod caught on long-lines in deep water in this respect. In regard to age, the Cape Farewell purse-seine cod is completely dominated by 11 year old fish belonging to the 1945 year-class which makes up 34.7 per cent of the catch. Next in importance is the 1947 year-class with 20.2 per cent. The mean age of the purse-seine caught cod at the Holsteinsborg Deep is 7.0 years, while at the Cape Farewell it is 10.3 years.

The total age distribution of cod in the Norwegian commercial catches from 1948 to 1956 is shown in Fig.1. The experimental catches made with purse-seine in 1956 has been omitted.

During the period 1950-53 the Norwegian catches were dominated by the year-class 1942. In the years 1954-56 it is the year-class 1947 which has been carrying the fishery. This year-class is still quite strong in 1956 when it constitutes 26.9 per cent of the catch. In the same year a new and strong year-class enters the fishery for the first time. This is the year-class 1950 which in 1956 made up 14.4 per cent of the catch. The Danish investigations have shown that the 1950 year-class apparently is very rich, and that it constituted 47.5 per cent of the Danish catch in 1955 on the northern part of Store Hellefiske Bank. The year-class 1950 will probably be the dominating one in the Norwegian fishery in 1957. The mean size of the 6 year old fish belonging to this year-class is in 1956 61.52 cm., i.e. it shows approximately the same growth rate as the year-class 1947 which at the same age measured 59.9 cm.

The 9 year old fish belonging to year-class 1947 had in 1956 a mean size of 72.76 cm., a size which should give a good salt-fish product also during the next fishing season.

Summarily the age and size of the cod taken on the different commercial gears in 1956 may be tabulated as follows:

	Age, years	Size, cm.
Bottom, long-line	10.1	74.81
Floating, long-line	9.4	71.98
Hand-line	7.5	66.53
Total Mean	9.9	73.62

Tagging of Cod

The tagging of cod was continued in 1956. On July 23rd-24th 1956 491 cod were tagged in the Holsteinsborg Deep. Of these fish 14 individuals were recaptured within the same season. 9 recaptures were made in the same area where tagged, and 4 cod had migrated northward to Store Hellefisk Bank where they were recaptured in August. One individual was recaptured on December 12th south of the locality of tagging. The general pattern of the autumn migration of the cod from the Holsteinsborg Deep is

the same as indicated by the 1954 taggings (see Norwegian ICNAF report 1954).

From the 1955 taggings we have received altogether 30 recaptures which confirm the migration pattern indicated in the 1954 report. During the 1955 season a total of 275 cod were tagged. The recaptures from this experiment are shown in Fig.2. The recaptures made during the first months after tagging show a decided northward migration to Store Hellefisk Bank in July-August. In winter the cod apparently undertake a southward spawning migration to Danas- Fiskenaes- and Fyllas Bank. On these southern banks we have many recaptures during May and June. Later in the season, in June and July, recaptures are made further north on Store Hellefisk Bank, and in July-September still further north on Store Hellefisk Bank. The number of recaptures in the various localities will appear from Fig.2.

The recaptures from the 1955 taggings confirm the picture of seasonal movement of the cod which was indicated by the 1953 tagging experiments earlier reported upon, viz. a southward spawning migration to about 62 N. Lat. in winter, and a northward feeding migration in summer to 68 or 70 N. Lat. If this circulatory seasonal movement of the west Greenland cod may be proved to be correct it is natural to think that the area north of 62 N. Lat. is dominated by a separate population of cod with a more or less "closed" migration pattern, and that the cod population further south, i.e. between 62 N. Lat. and Cape Farewell, may have a different pattern of migration and possibly also form a separate population. That this might be the case is indicated by several factors. In his "Studies on the biology of the cod in Greenland waters" (1949) Paul M. Hansen mentions that the great spawning migrations of cod to Iceland take place mainly from the southern zones south of 62°30'N. Lat. Over 70 per cent of the recaptures from this area are taken at Iceland, while the Icelandic recaptures from the northern zones are very low. Another indication of a possible division of the West Greenland cod stock we have in the respective age compositions. In 1956 a purse seine sample from the Cape Farewell region was dominated by the 1945 year class, a year class which in recent years has dominated in the Danish samples from Subdivision 1F. This year class has not been particularly noticeable on the northern banks. Furthermore, Danish taggings in Subdivision 1F in later years seem to indicate a strong emigration from this area to Iceland. An enlarged tagging program on the southern banks will probably give interesting results which may throw more light on the cod population problem.

It may be of interest to note that we have received 1 recapture from the Grand Bank SE of Newfoundland. This cod was tagged on Danas Bank in June 1955 and recaught April 1956.

Tagging of Halibut

A program of halibut tagging in the Davis Strait was instituted in 1955, when we succeeded in tagging 100 individuals off West Greenland and Labrador. These tagging operations were continued in 1956. The halibut taggings were carried out by a captain on a commercial long-liner according to instructions received from the Institute of Marine Research. In 1956 a total of 138 halibut were tagged in Subdivision 1C, 1E, 1F (see Table 5). Hitherto no recaptures of the 1956 taggings have been reported.

From the 1955 we have received 9 recaptures, one recapture in 1955 and 8 in 1956. Most of these recaptures are made in the same area where the halibut have been marked. Only in 2 cases has the halibut undertaken longer migrations. One individual tagged off the Labrador Coast (Subdivision 2G) in August 1955 was recaptured in September 1956 on Store Hellefisk Bank (Subdivision 1B). During the 370 days of liberty this halibut had migrated 540 n. miles eastwards across the Davis Strait. Another individual tagged a little north of Store Hellefisk Bank (Subdivision 1B) in August 1955 was recaptured on Fyllas Bank (Subdivision 1D) in June 1956. This fish had migrated 330 n. miles southwards in 331 days.

Table 1. Age Composition of Cod on Bottom Long-Lines 1956.

Age years	Frederiks-haabsbank %	Danas Bank %	Fiskenaes Bank %	Fyllas Bank %	Banan Bank %	Total Mean %
4	1.9	2.1	0.9	1.0	1.0	1.3
5	6.8	3.5	4.8	2.0	1.0	3.5
6	14.2	15.3	13.5	8.6	4.0	10.8
7	9.9	8.3	6.1	2.0	2.5	5.5
8	9.9	8.3	8.3	4.5	8.6	7.8
9	22.8	22.9	21.8	24.8	37.4	26.1
10	6.8	9.7	8.3	11.6	6.6	8.6
11	8.0	2.8	8.3	9.1	7.1	7.3
12	1.9	3.5	3.1	4.0	3.0	3.1
13	3.1	4.2	7.4	5.0	8.6	5.9
14	7.4	9.0	10.5	17.2	16.3	12.4
15	1.2	2.1	1.7	4.0	1.5	2.1
16	3.1	-	1.7	0.5	0.5	1.2
17	0.6	0.7	1.7	2.5	0.5	1.3
18	0.6	0.7	-	-	-	0.2
19	-	-	-	-	-	-
20	0.2	0.7	1.3	1.5	0.5	1.0
21	-	3.5	-	1.0	-	0.8
22	1.2	2.8	-	-	1.0	0.9
23	-	-	-	0.5	-	0.1
24	-	-	0.4	-	-	0.1
Total No.	162	144	229	198	198	931
	M=9.3 years	M=10.0 years	M=9.9 years	M=10.8 years	M=10.4 years	M=10.1 years

Table 2. Size Composition of Cod on Bottom Long-Lines 1956.

Length cm	Frederiks-haabsbank %	Danas Bank %	Fiskenaes Bank %	Fyllas Bank %	Banan Bank %	Total Mean %
45	1.9	0.7	1.7	1.0	0.5	1.2
50	3.7	2.1	2.6	-	1.0	1.8
55	5.6	3.5	4.4	2.5	2.0	3.6
60	9.9	9.0	8.7	3.0	4.0	6.8
65	10.5	10.4	11.8	10.6	13.1	11.4
70	13.0	18.0	18.3	15.7	25.2	18.3
75	17.9	18.7	16.6	20.7	29.3	20.4
80	13.0	10.4	15.3	19.7	17.2	15.5
85	8.7	9.7	8.3	12.6	4.5	8.7
90	8.0	2.1	6.1	5.1	1.5	4.6
95	3.1	2.1	2.2	4.0	-	2.3
100	2.5	5.6	1.7	3.0	0.5	2.5
105	1.2	2.1	1.7	2.0	0.5	1.5
110	0.6	2.8	0.4	-	-	0.6
115	-	1.4	-	-	-	0.2
120	-	0.7	-	-	0.5	0.2
125	0.6	-	-	-	-	0.1
130	-	-	-	-	-	-
135	-	-	-	-	-	-
140	-	-	-	-	-	0.1
145	-	0.7	-	-	-	0.1
Total No.	162	144	229	198	198	931
	M=74.07 cm	M=76.85 cm	M=73.60 cm	M=77.07 cm	M=73.06 cm	M=74.81 cm

Table 3. Age Composition of Cod on Different Fishing Gears

Age Years	Bottom Long-line Total %	Floating Long-Line Holsteins-borg Deep %	Hand-line Holsteins-borg Deep, shallow %	Purse-seine Holsteins-borg Deep %	Purse seine Cape Farewell %	Total All Gears and Localities %
4	1.3	-	3.6	9.1	-	1.6
5	3.5	2.5	10.9	21.2	-	4.7
6	10.8	18.2	34.3	30.3	4.0	15.5
7	5.5	0.5	4.0	3.0	7.3	4.7
8	7.8	12.3	10.9	3.0	6.5	8.7
9	26.1	31.4	24.6	24.2	20.2	26.0
10	8.6	6.9	2.8	3.0	8.9	7.3
11	7.3	6.9	3.2	-	34.7	8.6
12	3.1	3.0	0.4	-	5.6	2.8
13	5.9	5.9	2.8	-	2.4	5.0
14	12.4	8.4	1.6	6.1	7.3	9.6
15	2.1	2.5	0.8	-	0.8	1.8
16	1.2	0.5	-	-	0.8	0.8
17	1.3	0.5	-	-	0.8	0.9
18	0.2	-	-	-	-	0.1
19	-	0.5	-	-	-	0.1
20	1.0	-	-	-	0.8	0.7
21	0.8	-	-	-	-	0.5
22	0.9	-	-	-	-	0.5
23	0.1	-	-	-	-	0.1
24	0.1	-	-	-	-	0.1
Total No.	931	203	248	33	124	1539
	M=10.1 years	M=9.4 years	M=7.5 years	M=7.0 years	M=10.3 years	M=9.6 years

Table 4. Size Composition of Cod on different Fishing Gears.

Length cm	Bottom Long-line Total %	Floating Long-Line Holsteins-borg Deep %	Hand-Line Holsteins-borg Deep %	Purse-seine Holsteins-borg Deep %	Purse-seine Cape Farewell %	Total All Gears and Localities %
45	1.2	-	1.6	6.0	-	1.1
50	1.8	-	3.6	6.0	-	1.8
55	3.6	4.4	10.9	24.2	-	5.0
60	3.8	9.4	22.6	9.1	4.8	9.6
65	11.4	14.8	17.3	15.3	16.1	13.2
70	18.3	21.7	17.3	9.1	17.7	18.3
75	20.4	24.6	13.3	21.2	16.9	19.8
80	15.5	15.3	8.5	6.0	18.5	14.3
85	8.7	8.4	3.2	3.0	17.7	8.4
90	4.6	1.5	0.8	-	5.6	3.6
95	2.3	-	-	-	2.4	1.6
100	2.5	-	0.8	-	-	1.6
105	1.5	-	-	-	-	0.9
110	0.6	-	-	-	-	0.4
115	0.2	-	-	-	-	0.1
120	0.2	-	-	-	-	0.1
125	0.1	-	-	-	-	0.1
130	-	-	-	-	-	-
135	-	-	-	-	-	-
140	-	-	-	-	-	0.1
145	0.1	-	-	-	-	
Total No.	931	203	248	33	124	1539
	M=74.81 cm	M=71.98 cm	M=66.53 cm	M=64.09 cm	M=75.81 cm	M=72.92 cm

Table 5. Cod and Halibut Taggings 1956 by Norway in Subarea 1

Halibut Taggings 1956

Yellow plastic discs fastened in gill cover with silver wire. Serial No. "N 4401-4538".

Tag No.	Date	No.Ind.	Tagging Locality
4401-4441	30/5-30/6	41	Banan Bank (1C)
4442-4476	5/7-9/8	35	Off Julianehaab (1F)
4477-4488	20/8-23/8	12	Frederikshaabsbank (1E)
4489-4506	24/8-25/8	18	Off Julianehaab (1F)
4507-4508	27/8	2	Frederikshaabsbank (1E)
4509-4538	28/9-4/10	30	Off Julianehaab (1F)
4401-4538	30/5-4/10	138	Subdivision 1C, 1E, 1F

Cod Taggings 1956

Yellow plastic discs fastened in gill cover with silver wire. Serial No. "N 4608-5099".

Tag No.	Date	No.Ind.	Tagging Locality
4608-5099	23/7-24/7	491	Holsteinsborg Deep (1B)

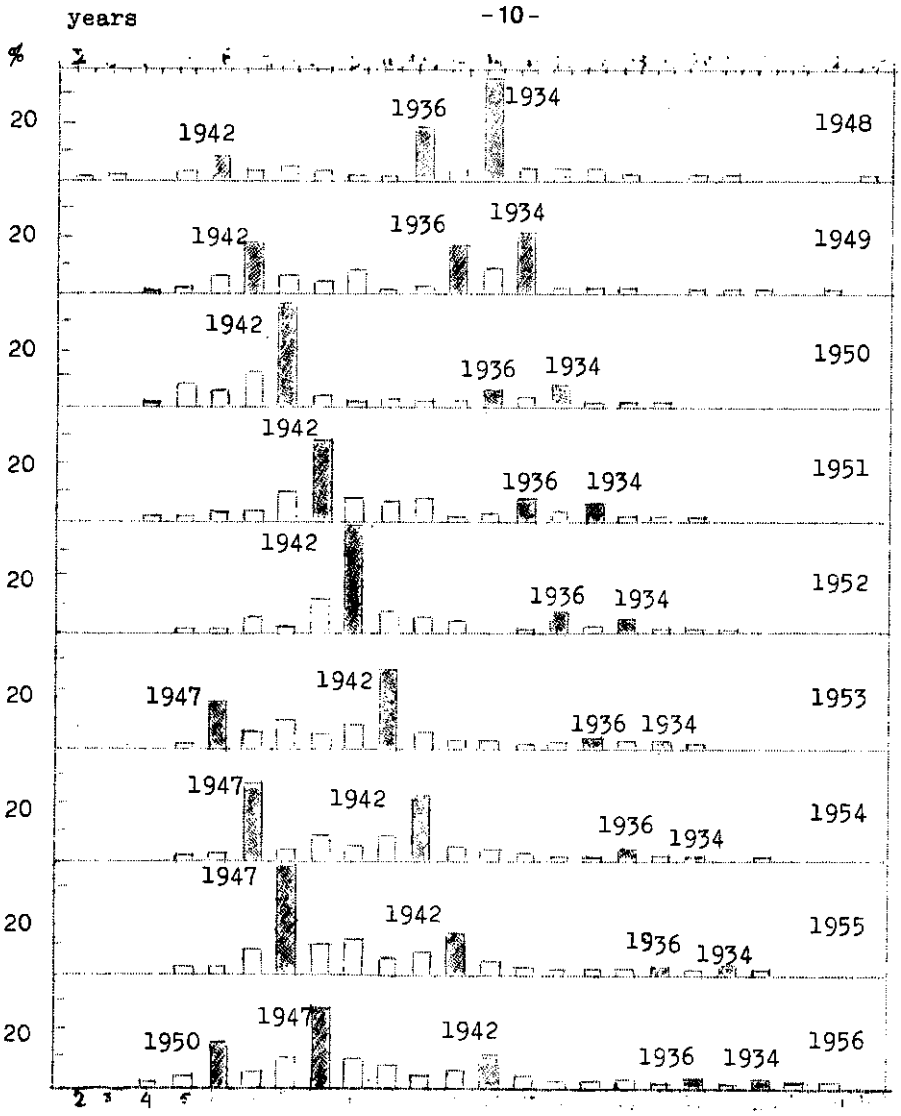


Fig. 1. Age distribution of cod in Norwegian long-line catches in the different years from 1948 to 1956.

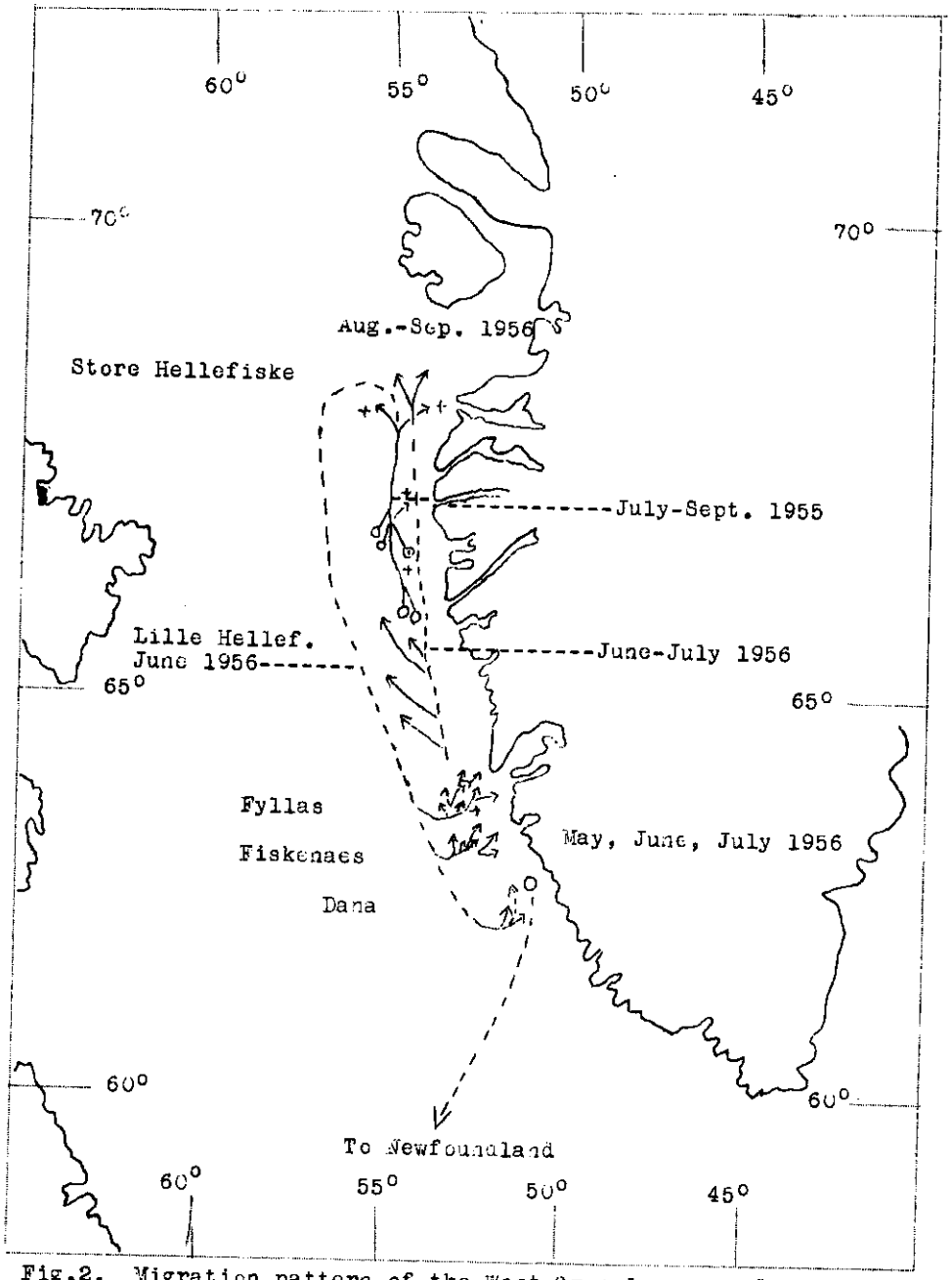
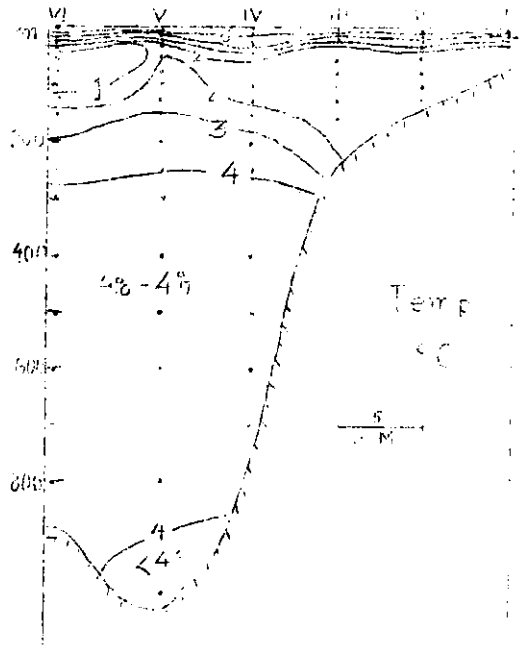
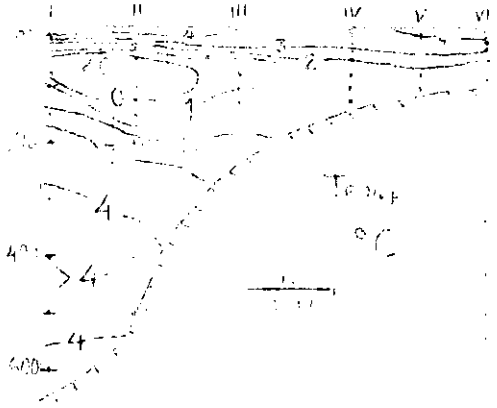
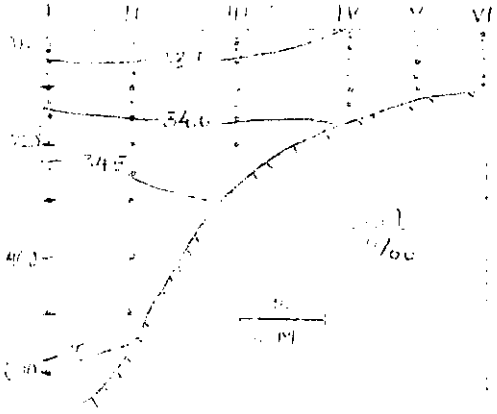


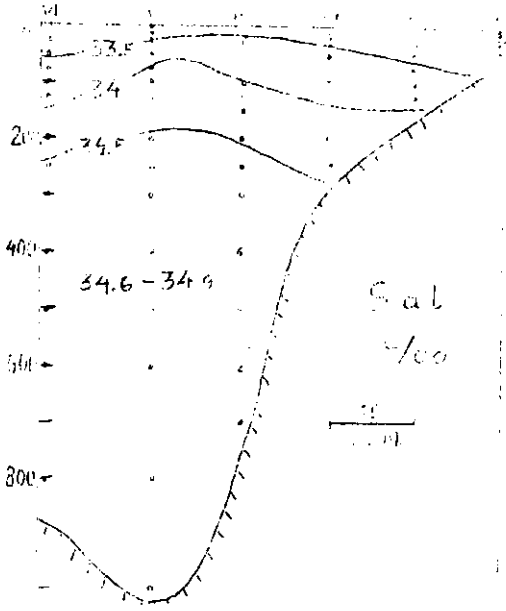
Fig.2. Migration pattern of the West Greenland cod from the banks north of 62 N. Lat. as indicated by the 1955 marking experiments.



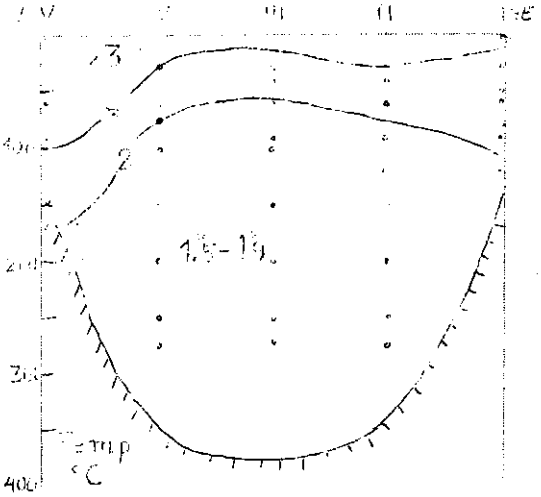




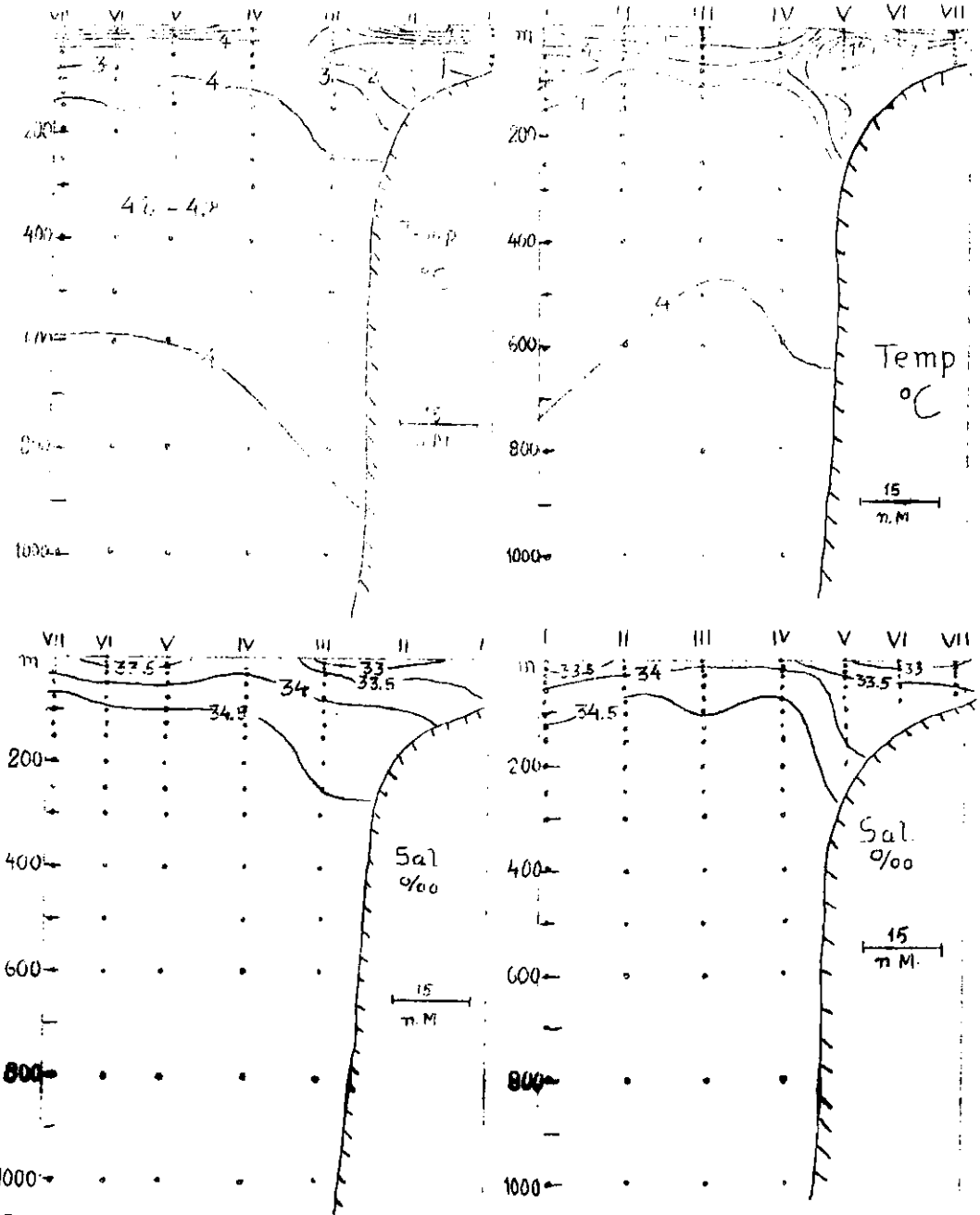
Northern Part of Lille Hellefiske Bank. 22 July 1956.



Banana Bank and Westwards, 21 July 1956.



Across Holsteinsborg Deep
24 July 1956



Section across and off Dana Bank. 16 July 1956.

Section across and off Fiskenaes Bank. 17 July 1956.