

ANNUAL MEETING - JUNE 1954SURVEY OF RESEARCH WORK IN 1953 BY SUBAREAS

Compiled from Reports Received from Member Countries.

Summaries of researches in 1953 have been received from the following countries: Canada, Denmark, France, Iceland, Norway, Portugal, Spain, United Kingdom, and U.S.A.

These reports are distributed as documents for the 1954 Annual Meeting. The table below shows the distribution of research by countries and by subareas. The document numbers of the separate reports are given in brackets.

Subarea	1	2	3	4	5
Canada (14)		xx	xx	xx	
Denmark (16)	xx				
France (24)	x	x	x		
Iceland (25)	x				
Norway (10)	x				
Portugal (12)	x	x	x		
Spain (8)			x	x	
United Kingdom (13)	x				
U.S.A. (20)			x	xx	xx

xx indicates researches from special research vessels.

This survey is not intended to be a summary of research reports, but rather a compilation of them with comparisons of results for subareas where several countries have worked on the same subjects. Therefore such subareas (1 and 3) are treated more comprehensively than others, where the researches were made entirely or almost entirely by one country (4 and 5)

It is to be noted that in 1953 Portugal started researches in subareas 1, 2, and 3, Spain in subareas 3 and 4.

This survey does not deal with the researches on conversion factors. This work is reported on in documents No. 3, 4, 6 (Portugal), 7 (Spain), 11 (Norway), and 17 (France). A survey of the reports is found in document 21.

Subarea 1

Research vessel "Dana" (Denmark), 3 July - 11 August
 Research cutter "Adolf Jensen" (Denmark), May-December
 Research cutter "Immanuel" (Denmark), June-December
 Frigate "l'Aventure" (France)
 Commercial trawler "Pétur Halldórsson" (Iceland),
 July-December
 Commercial long liner (Norway), July-August
 Dory Vessel "Capitão João Vilarinho" (Portugal),
 June-July
 Commercial trawlers, samplings of cod measurements
 (United Kingdom).

1. Hydrography

Six sections from the coast and westward between Cape Farewell and Egedesminde, hydrographic stations between sections (Denmark).

Three sections across Lille Hellefiske Bank and Fylla Bank, observations of temperatures in connection with line fishing for cod (Norway).

Two sections Newfoundland-Greenland (France).

Compared with 1952, 1953 must be considered a warm season. The polar current was weak; on the banks the temperature in July-August was about 2°C. higher than in 1952 and 1 - 3°C. higher than in 1949 and 1950.

A comparison of the Danish sections from the middle of July and the Norwegian ones in the same areas about 3 weeks later show nearly the same main features in both periods, f.i. the Fylla Bank was overlaid with water of just below 2°C. The surface temperature was, however, a little higher in August than in July. Also on the slope of the Bank the temperature was higher, the isotherms for 3 and 4°C being found at depths of 200 and 450 m. in July, against at 170 and 200 m. in August.

2. Fishes

a. Spawning of cod and larval distribution.

The Danish investigations show an early spawning in 1953. Larvae were found between 64 and 69°N. Contrary to 1952 no larvae were found off the S.W. coast.

The number of larvae found between 64 and 70°N. per haul with the ring trawl was twice as large in 1953 as in 1952.

b. Age- and size-composition of samples of cod.

Researches were carried out by Denmark, Iceland, Norway and Portugal, partly in the same areas.

The percentic age-distribution of the cod sampled from the whole bank area by the four countries separately is shown in figure 1. The results agree very closely with peaks for the year-classes 1934, 1936, 1942, 1945, and 1947. Figure 2 shows the same comparison but for the Fylla Bank alone, which was sampled by all four countries. Also here there is a general agreement of results. However, one outstanding difference is found in that the predominance of the year-classes 1945 and 1947 is stronger in the Danish and Icelandic samples than in the Norwegian and Portuguese samples.

A pooling of the results by all four countries (fig. 3) shows on the northern banks (St. and Ll. Hellefiske Banks and Banana Bank) that the younger year-classes from 1947 are dominating. In the Holsteinsborg Deep and on the southern banks (Fylla, Fiskenes, and Dana Bank), the older year-classes, and especially the 1942, play a considerable rôle.

Length measurements were carried out by Denmark, Iceland, Norway, and Portugal. Figure 4 gives a comparison of the length distribution in samples from the same areas by the separate countries. On the whole the length distribution found by the various

countries is very much the same, cfr. St. Hellefiske Bank and Fiskenes Bank. The curves show, however, in cases a somewhat lower size for cod caught by Denmark and Iceland than for cod caught by Norway and Portugal, consistent with the lower age of the cod caught by Denmark and Iceland.

Growth or size by age-groups or year-classes is reported by Denmark, Iceland, Norway, and Portugal. Figure 5 shows for same areas the mean lengths of the year-classes 1942-48 as reported by the countries. Apart from Holsteinsborg Deep where the Norwegians - perhaps owing to a different mode of fishing - do not catch in comparable numbers the smaller individuals of the younger year-classes, there is a very close agreement in growth figures found by the various countries. This is especially the case for the rich year-classes (1942, 1945, and 1947) yielding a sufficiently large material. For these year-classes the differences found do not amount to more than 1-3 cm. This indicates that samples from the various countries are equally reliable and mutually comparable.

Compiling the results for the four countries the following mean length (cm.) of the dominating year-classes are found for the three main fishing areas (see also figure 6):

Year-class	1936	1942	1945	1947
St. and Ll. Hellefiske Banks	83.8	81.2	72.9	59.3
Holsteinsborg Deep	77.0	77.2	68.5	57.9
Fylla, Fiskenes, and Dana Banks	85.4	77.7	71.7	61.6

For all four year-classes the Holsteinsborg cod are somewhat smaller, up to 7 cm., than the cod from the other areas. Otherwise the growth picture is much the same for the three regions. It should be noted that this picture does not apply to Greenland bank cod in general, but to cod of the rich year-classes only, i.e. cod for which a comparatively low growth rate may be expected.

c. Taggings.

Denmark, Norway, and Portugal report taggings and tagging results.

United Kingdom has sampled length measurements of cod from the southern part of Subarea 1, a region not sampled by the other countries. This material has not yet been worked up. When the results are made available, they will, as they comprise an area south of that sampled by the other countries, furnish valuable material to complete the picture of regional size variations of the Greenland cod.

Samples of surface plankton and measurements of cod were taken by the frigate "l'Aventure". Results are not reported.

A summary of German researches in West Greenland waters giving i.a. length- and size-distribution of cod of the S.W. coast in June 1952 - May 1953 was circulated on 22 December 1953.

Subarea 2

Research vessel "Investigator II" (Canada), 7-18 Sept.
Hydrographic observations (Canada), 31 July - 1 August
Frigate "l'Aventure" (France)
Conversion factor studies, commercial fishing vessels
(Portugal)

1. Hydrography

A section across the Labrador Current off Domino Point
and south of Hamilton Inlet Bank (Canada).
Two sections Newfoundland - Greenland (France).

2. Fishes

Excellent catches of cod were made (Canada) in depths of
183-208 m. with temperatures between -0.5° and ca. 2°C . In
deeper water, more than 300 m., cod were scarce and redfish more
abundant. The cod caught were of medium, but mostly commercial,
size, in autumn in good condition. It can here be noted that
France in 1953 carried out extensive cod fishery in Subarea 2
(see document No. 28).

American plaice (*Hippoglossoides platessoides*) were plenti-
ful in a restricted area around $54^{\circ}22'N$ and $54^{\circ}48'W$ (ca. 180 m.)

Measurements of cod and sampling of surface plankton were
carried out (France).

The Portuguese experiments on Conversion factor for cod are
reported on in document No. 6. They were carried out mainly in
the Hamilton Inlet Bank and the Belle Isle areas.

Subarea 3

Research vessel "Investigator II" (Canada), through the year
Research vessel "Marinus" (Canada), through the year
Researches from various commercial fishing vessels (Canada)
Researches from frigate "l'Aventure" (France)
Conversion factor studies, commercial fishing vessels
(Portugal)
Commercial fishing vessel "Vendaval" (Spain), Febr.-April
Samplings of redfish (U.S.A.).

1. Hydrography

Three sections across the south part of the Grand Bank
(Canada), April and July-August

A section across the Labrador Current off Bonavista (Canada),
July-August

A section St. John's - beyond Flemish Cap (Canada), July-Aug.

Two sections Newfoundland-Greenland (France)

Observations in connection with fishery along the south and
southwest part of the Grand Bank (Spain), February-March

The Spanish Research Report states temperatures and salinities
found to be normal for the area and season. Values of phosphates
were below 10 $\mu\text{g}/\text{m}^3$

2. Fishes

a. Cod

In May cod were found most plentifully in the northern part of the area investigated (southern half of the Grand Bank) in water between ca. 1 and 2°C, at depths between 60-80 m. The study of number of vertebrae and finrays was continued (Canada).

The Spanish experimental fishing yielded the largest catches in day-time - this indicates a movement of cod away from the bottom during night. The cod were rather small sized, the peak of the size curve being between 41-45 cm. These small cod were immature. Mature cod were generally of a length from 60 cm. and upwards. Investigations on food were carried out.

Both the Canadian and the Spanish researches show the alternating abundance of cod and haddock in relation to temperature.

Experiments on Conversion factors were carried out by Portugal and Spain (documents 3 and 7).

Length measurements were carried out by France (together with samplings of surface plankton).

b. Haddock

Experimental fishery by Canada in May showed large concentrations of haddock on the southernmost part of the Grand Bank at temperatures from 2° to 7 1/2°C. The results indicated a movement toward shallower water during spring. The year-class 1949 with a length peak around 34-37 cm. dominated on the Grand Bank and the St. Pierre Bank.

In the samples from the Grand Bank another peak was also found around 50-51 cm. (mainly the year-class 1946, but including also a fair number of the year-class 1942. The 1949 year-class (in 1953 still below marketable size) is very rich and expected to yield good catches for a series of future years.

These results are in complete agreement with those reported by Spain, showing peaks in length distribution at 36-40 and 51-55 cm. for the Grand Bank haddock. For St. Pierre Bank the peaks are a little higher on the length scale, at 36-45 cm. and 61-70 cm.

The Spanish report includes measurements of pollock and white hake, together with investigations on sex and maturity of the four species of the genus cod.

c. Redfish

Based on exploratory work by Canada a considerable development of the fishery for redfish has taken place during later years in various parts of Subarea 3 (as well as of Subarea 4). An overexploitation of stocks has already been observed for the area off Ramea. This calls for a thorough and extensive study of the biology of the redfish in the near future.

The experimental fishery shows a general increase in size of both sexes with increasing depth. At depths below 360-400 m.

the catch decreased, in cases, however, successful drags were made down to 600 m.

This indicates the possibility of extending the fishery beyond depths now exploited. On the other hand the results bear evidence to the fact that fishery is now carried out within the main area of distribution, and not along the fringe of a stock having its main distribution in still deeper water.

Subarea 4

Various research vessels (Canada), through the year
Commercial fishing vessel "Vendaval" (Spain), March
Observers on commercial vessels (U.S.A.), through the year
Research vessel "Albatross III" (U.S.A.), spring months.

1. Hydrography

Seasonal cruises, Scotian Shelf, Bay of Fundy, and Gulf of St. Lawrence (Canada), September and November.
Daily observations of surface temperatures in selected places (Canada), through the year.
Observations in connection with fishing (Spain), March.

The Canadian researches show bottom temperatures to be up to 2°C higher in later years than in prewar years. A general warming of surface water during the last years is observed with peaks in 1951 and early 1953.

The displacement of water masses has been especially studied, and incursions of slope water have been found to cause great changes on the banks.

2. Fishes

a. Cod

The results of vertebral counts in the years 1933-41 have been worked up (Canada). The conclusions as to discreteness of stocks agree with those achieved through taggings.

Taggings were continued in Nova Scotian waters. During the period May-December around 25% were recovered. Disk-marks yielded the highest percent of recoveries.

Experiments on mesh selection were carried out for cod (and haddock) by Canada. Effective release of smaller fish was shown agreeing with earlier catches. Heavy catches decrease the selective effect.

Commercial catches from Browns Bank were sampled by U.S.A.

b. Haddock

The results of Canadian taggings in 1935-40 have been worked up. Migrations were found to be controlled by channels, temperature, spawning, and feeding. Several discrete populations were recognized.

Taggings were carried out in Nova Scotian waters (Canada). From May to December about 6% were recaptured. As for the cod the disk-marks yielded the best results.

Mesh selection studies, see under c.c.

U.S.A. sampled catches from commercial vessels of retained as well as discarded haddock. The drift of egg and larvae were studied.

c. Redfish

Canadian investigations on the distribution and movements of redfish along the upper Laurentian Channel (Gulf of St. Lawrence) were carried out in May and October. The distribution of small redfish indicates a transport of larvae from the Gulf toward the Cabot Strait. Observations on growth, maturity, and feeding habits are reported.

Sampling of commercial catches were undertaken by U.S.A.

Subarea 5

Extensive researches, especially on haddock and redfish were carried out by U.S.A. No other country worked in Subarea 5, and therefore compilation or comparisons are not called for.

- THE END -

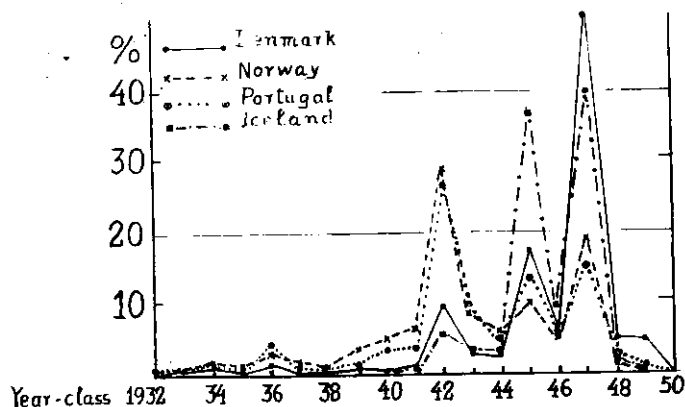


Figure 1. Cod. Percentic age-distribution. Comparison of Danish, Norwegian, and Portuguese samples from the W.- Greenland Banks in the summer of 1953.

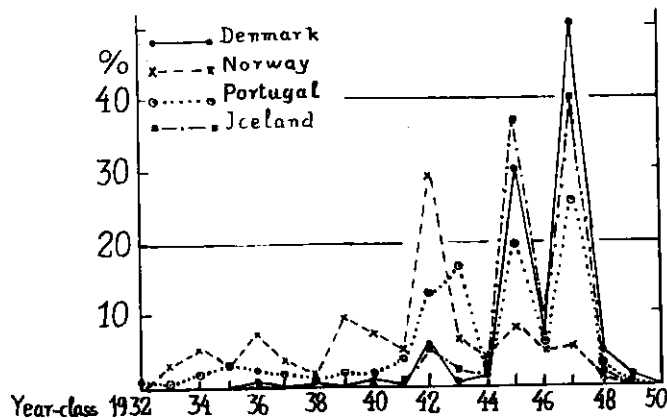


Figure 2. Cod. Percentic age-distribution. Comparison of Danish, Icelandic, Norwegian, and Portuguese samples from Fylla Bank. July-August 1953.

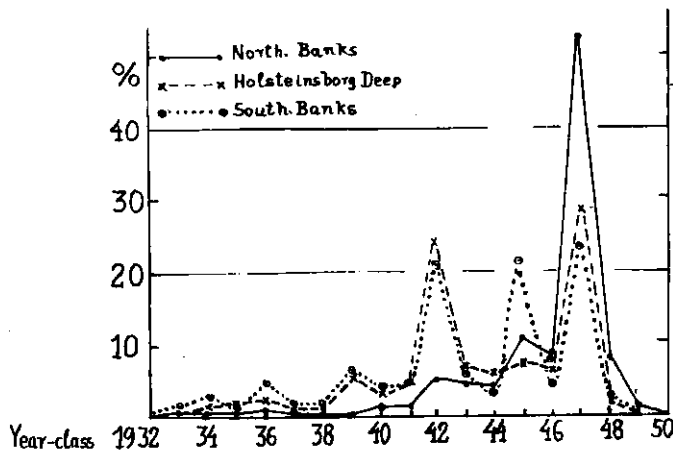


Figure 3. Cod. Percentic age-distribution. Summaries of Danish, Norwegian, and Portuguese samples. Northern Banks = St. and Ll. Hellefiske Bank + Banana Bank. Southern Banks = Fylla, Fiskenes and Dana Banks.

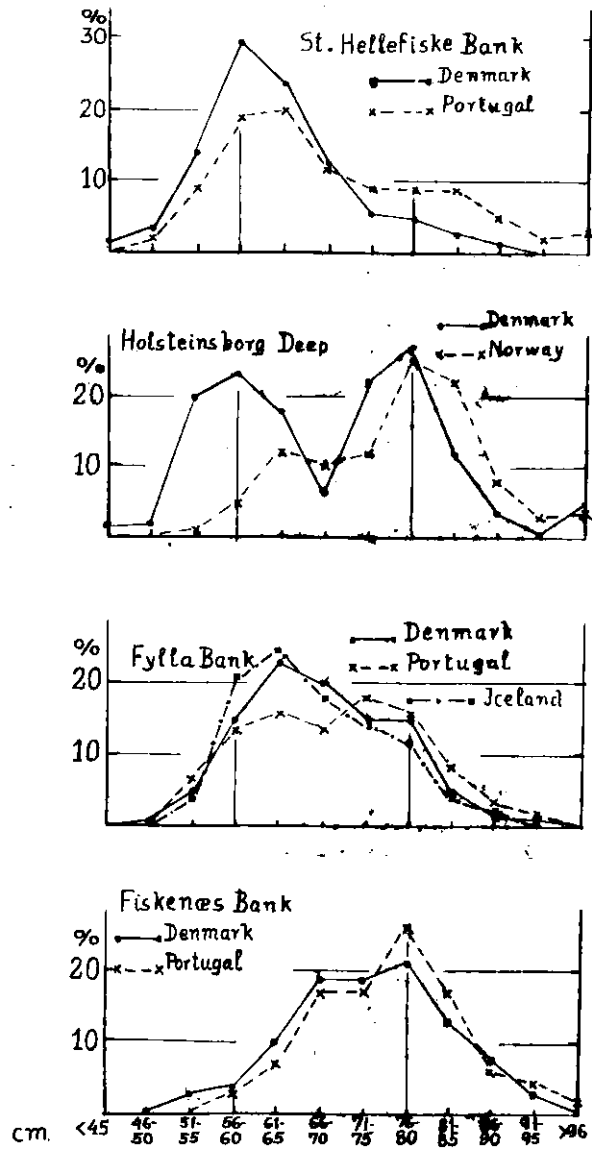


Figure 4. Cod. Length-distribution. Comparison of Danish, Norwegian, and Portuguese samples from the same areas.

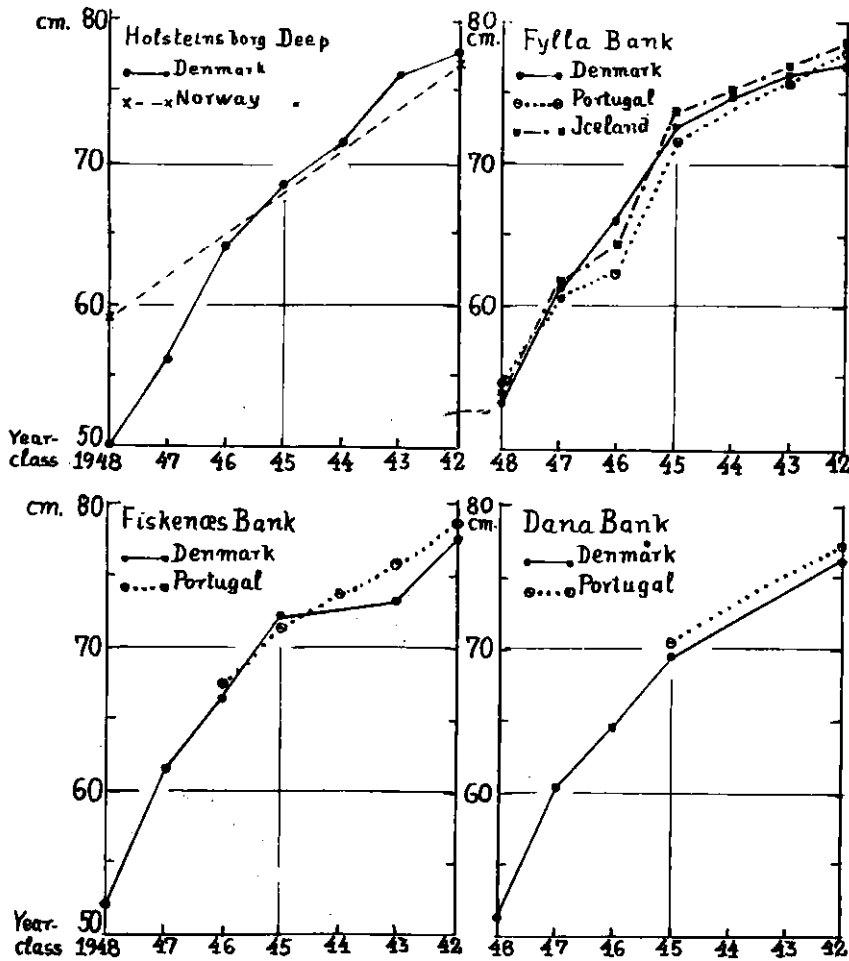


Figure 5. Mean lengths of year-classes by areas and by countries.

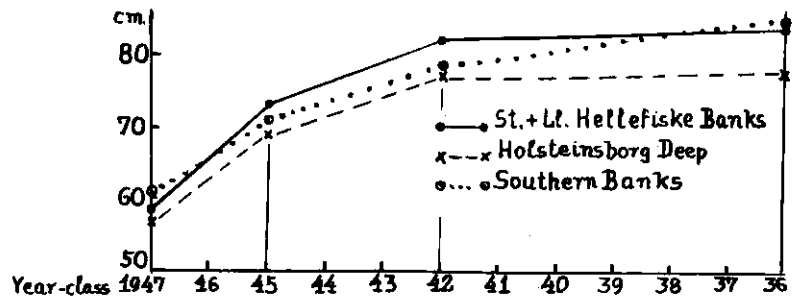


Figure 6. Mean length of the rich year-classes in various areas in 1953. Compilation of material from Denmark, Iceland, Norway, and Portugal.