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# Summary of Research Work Carried Out in Subarea I in 1960

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The present summary is based on the research reports from the following member countries: Denmark, France, Germany, Iceland, Italy, Norway, Portugal, Spain, USSR and United Kingdom.

## 1. Hydrography.

Hydrographic work has been carried out by Denmark, France, Germany and Norway chiefly in April and July. Here temperatures measured over the offshore banks were, on the whole, higher than in 1953. Probably the temperatures in July were the highest measured in the last ten years. In contrast to 1959 the ice conditions were favorable in the southern part of the Subarea as well as off the southeast Greenland coast. High air pressure over South-Greenland and low pressure over the eastern Atlantic caused strong north easterly winds which pressed the ice towards the coast and kept the banks ice free for the benefit of the fishing fleet. The highest temperatures in the sea (5, 3°) was measured in April at depths of 250 m and deeper in the western slope at the Lille Hellefiskebanke. In the Godthaabsfiord the hydrographic conditions were quite different from those found on the banks. On a station in the interior part of the Fiord near the spawning ground for cod, temperatures below zero were measured in all waterlayers from the surface to the bottom (about 200 m). This phenomenon must be ascribed to the very cold winter and spring in this region. The Greenlanders reported that dead cod were found on the spawning place in April.

## 2. Occurrence of cod eggs and larvae.

Very few cod eggs were taken in the Godthaabs Fiord and in the adjacent coastal region, compared with the numbers caught in previous years.

The April 30 fishery with plankton nets on three stations from the coast near Fylla Bank gave 4, 622 and 3, 457 cod eggs. The largest number was taken over the western slope of the Bank, while the smallest was caught over the middle of the Bank and the third was from a station between the coast and the Bank. This big catch on the westernmost station is the largest catch of cod eggs ever taken in the Davis Strait. There is a good agreement between this large catch of cod eggs and the observation of the occurrence of spawning cod west of the bank, as mentioned in the Norwegian and German research reports.

In July the number of cod larvae taken on stations in four sections over the banks were not particularly large, but were higher than in the two previous years. There is reason to consider the year-class 1960 as a medium good year-class.

## 3. Occurrence of small cod at Age-Groups I, II and III.

Only nine samples of small cod were taken in order to estimate the rich and poor year classes in the stock not taken by commercial gears. While the age groups II and III (year classes 1958 and 1957) were strongly represented in the catches with shrimp trawl and hand seine Age Group I (year class 1959) was poorly represented. In view of the rather poor occurrence of the year-class 1958 in the catches in 1953, the strong representation of this year-class in 1960 is rather surprising. There is no doubt that the year-class 1957 must be considered the richest of the year-classes of cod, which had not entered the commercial fishery.

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4. Commercial stock.

The year-class 1953 was the predominating year-class in most of the catches taken with hand-line and trawl. In the Norwegian and German catches in April, it constituted 43% and 51% respectively. The old, rich year-class 1947, however, predominated in Danish long line catches, in July. The 1950 year-class was of some importance in divisions 1C and 1F. Among the younger year-classes, 1956 seems to have been important in 1D, E, and F in spite of its small sized individuals.

There is reason to believe that the catches in 1961 and 1962 would be characterized by many rather small cod, belonging to the younger year-classes 1955, 1956, and, especially, 1957. The last year-class, which seems to be especially rich, will enter the commercial catches for the first time this year with a mean size of about 50 cm total length. The mean lengths of cod belonging to the year-class 1956 will be about 60 cm. The year-class 1953 will decrease in numbers, but will probably still be predominant in the long-line catches.

5. Observations on spawning cod.

It seems that the spawning season was earlier than in 1953. No dense concentrations of cod were found in April, over the western slopes of the banks. No cod were recorded over the lower part of the banks, with the exception of Hille Hellefiske Bank. Spawners were found, by the Norwegian investigations, west of Fylla Bank at 150-300 m in temperatures of 2-4°, while the temperature on the spawning grounds in 1959 was 4°.

Very interesting observations on spawning cod were made in March and April 1961. German trawlers operated during these months in Divisions 1C and 1D. Concentrations of spawning cod were found, by this fishery, at very great depths, about 350-550 m, and there is reason to believe that spawning schools might be found even in greater depths. It is possible that cod spawns pelagic at great depths west of Fylla and Banana bank in warm Irminger water. This phenomenon explains the large numbers of cod larvae taken in plankton nets between the Fylla Bank and Labrador in July during the last years.

No spawning was observed in 1960 on the southern part of the Subarea between Cape Farewell and Nanortalik. It is possible, however, that concentrations of spawning cod might be found far off to the west of the usual fishing grounds. Further research work is needed to solve that problem.

6. Maturity studies.

German investigations have shown that cod in the region of Cape Farewell and East Greenland reach maturity much later than cod from the northern part of Subarea 1. For instance, the percentages of immature cod taken, belonging to the year-classes 1953, 1952, and 1951 were 11, 12, and 18 percent respectively.

7. Tagging experiments.

Tagging experiments with cod have been carried out by Denmark, Germany and Norway. The Danish taggings included the offshore banks (2,882 cod) as well as the inshore waters (1,693 cod) of all Divisions except 1A. Germany has tagged 1728 cod in 1F and off south east Greenland. Recaptures of tagged cod from taggins in 1960 and previous years have shown migrations of West and East Greenland cod to Iceland. Furthermore, it has been shown that migrations between West and East Greenland take place in both directions. Two recaptures in Subarea 2 of cod tagged in Subarea 1 are of special interest, showing that a mixing between the stocks in these two subareas is possible. In previous years recaptures of cod tagged in Subarea 1 were reported from the Newfoundland area.

8. Halibut.

Fishery experiments with halibut has been carried out by Norway in April, with rather poor results. It was shown that the mature halibut migrate from

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the colder, shallower water down to the deeper and warmer water. This verifies the observation made by Ad. S. Jensen in 1908-09. The immature halibut probably stay on the upper slopes of the banks throughout the year. Fifty-six halibut were tagged.

9. Redfish.

The Danish studies of small redfish in Godthaabs Fjord were continued and tagging experiments with big redfish were carried out in the same fjord. Material for racial and age studies of redfish were collected by Germany.

Fishing experiments carried out by USSR showed good occurrence of redfish, especially in Division 1C and 1D. Fifteen to 18 year old redfish occurred in the catches. Only immature redfish were observed. This fact, in connection with previous similar results, together with the southern distribution of redfish fry in the Davis Strait, indicates that the West Greenland redfish stock must be recruited from spawning areas east of Cape Farewell.

10. Changes in the West Greenland marine fauna.

In previous reports it has been mentioned that changes in the marine fauna in Subarea 1 have been observed in recent years. This interesting fact will only be mentioned briefly in this short survey.

Since the middle of the fifties, the small cod, Gadus ogac, which is of no commercial value, has increased considerably in numbers. It was a very common fish before the change in the climatic conditions which set in during the seventies and was a rather rare fish in the warm period. The arctic species, the Greenland halibut, (Reinhardtius hippoglossoides), has increased greatly in numbers in recent years, and is now abundant in many fjords where it was scarce before. On the traditional fishing grounds off Jakobshavn in Disko Bay the stock of Greenland halibut is increasing year by year. Some years ago the stock was very small and the fishery was very poor. Also, in the Amanak Fjord the Greenland halibut, in the last years, has become much more common than it was some few years ago. In the same period the cod has disappeared from this fjord.

11. East Greenland.

German and Faeroese research work has been carried out in South East Greenland from Cape Farewell to Angmagssalik and on the Anton Dohrn Bank. Spawning was observed off Rap Tordenskjold from the middle of March until early May, with a maximum in the first part of April.

The two strongest year-classes of cod, in the German catches, were 1953 and 1950, however, the year class 1947 was also of importance in some of the catches; while in some it was nearly absent. The year-class 1954 was the predominating year-class in a sample off Angmagssalik in May.

In the Faeroese samples which were taken in August, on Dohrn Bank, the year-class 1947 and 1950 predominated. In samples taken off Angmagssalik and in the Angmagssalik Fjord, the year-classes older than 1950 were nearly absent. The year classes 1954, 1955, and 1956, together with 1950 were the most important year-classes in these samples.

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