INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

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# SUMMARY OF RESEARCH WORK CARRIED OUT IN SUBAREA 1 in 1961

The present summary is based on the research reports from the following member countries: Denmark, Germany, Iceland, Norway and U.S.S.R. and from the High Sea Fishery Institute in Rostock.

## 1. Hydrography

Hydrographic work has been carried out in the spring season, March to May, and in summer and autumn, July to October.

As early as in March, one month earlier than in 1960, the water was warming up and the temperatures in the whole area were even more favourable than in the preceding year which was considered as the warmest year in the last decade. The high temperatures gave rise to very good ice conditions favourable to the fishery especially in Subdivision 1 F which was free of ice in March.

The Arctic and the Atlantic components of the West Greenland current were well developed but the temperature of the Arctic water was higher than usual and the thickness of the layer of cold water on Little and Store Hellefiske Banks was lesser than in 1959-60. As usual Arctic water was found on the top of the southern banks, and mixed water, mostly Atlantic, occurred over the slopes of the banks. In April 0.5°C was measured over the top of Fylla Bank and in June and July the temperatures there were 3.1°C and 3.9°C. In August bottom temperature was 2°-3°C over the southern banks. In September the surface temperature was about 5°C and 7°-8°C were measured in the region from Cape Farewell to Ivigtut.

## 2. Occurrence of cod eggs and larvae

As in 1960 very few cod eggs and larvae occurred in coastal waters and in the Godthab fjord in Subdivision 1 D. In April the largest number of cod eggs were found west of Banana and Fiskenes Banks and smaller concentrations west of Fylla Bank. Over the top of Fylla Bank and east of Fylla Bank only few cod eggs were taken. In July and August the catches of cod larvae over the banks were very poor. This may possibly be ascribed to the unusual big sizes of the larvae. In July 66% of the larvae in the catches measured more than 20 mm. Previous experiences have shown that larvae of such a big size easily escape the stramin net. In August the average length of the larvae was 39 mm. The big size of the cod larvae may be partly caused by the early spawning season in 1961 and partly by favourable

nutrition owing to the high water temperatures. The westerly concentrations of cod larvae similar to observations in previous years indicates a drift of larvae with the westward branch of the West Greenland current from spawning grounds in Davis Strait towards Labrador waters.

3. Occurrence of age-groups I,II and III

Very small numbers of young cod were caught in coastal waters. The material is too poor to use for prediction of rich or poor year classes in the stock of young cod.

4. Commercial stock

The 1953 year class was predominating in the stock of old cod (average length about 80 cm). The old year class 1947, which was an important year class some years ago, had decreased very much. Owing to the large size of the individuals (average length between 85 and 90 cm) the 1947 year class played a role in some of the catches.

The predominating younger year classes in the largest number of catches were the two year classes 1956 and 1957. The former predominated heavily in the southern Subdivisions 1 E and 1 F and partly in 1 D. The latter predominated in the northern Subdivisions 1 A, 1 B, 1 C and partly in 1 D. The boundary between this two year classes appeared to be in Subdivision 1 D. The difference in the distribution between this two year classes must be explained in that the 1956 year class originates from East Greenlandic and possibly Icelandic spawning grounds, while the 1957 year class comes from the West Greenland spawning grounds over the western slopes of the offshore banks. The distribution and richness of the year classes 1956 and 1957 were predicted in the Danish research report for 1959 (ICNAF Ann. Proc. Vol. 10, p.33-34). In the report from 1958 (ICNAF Ann. Proc. Vol.9, p.33-34) the year class 1957 was characterised as an extremely rich year class.

In previous years we have seen a similar distribution of the rich year classes 1945 and 1947. The former with a southward and the latter with a northward distribution. A parallel example was the year classes 1924 and 1929 with southerly and northerly distribution respectively.

The prospects for the fishery in the nearest following years must be as follow. The old year class 1947 will nearly loose its importance and the year class 1953 will show a further decrease. The fishery will to a pronounced degree depend on the two rich young year classes 1956 (in south) and 1957 (in north). That means that six and five years old cod with average lengths about 66-70 cm and 60 cm respectively will form a large amount of the catches in 1962.

5. Observations on spawning cod

The spawning seemed to have taken place earlier than in previous years. According to the German report spawning was observed west of Banana Bank medio March in depths 350-550 m and possibly even in depths more than 550 m further out in the Davis Strait. This was impossible to prove because the trawlers could not operate in deeper water owing to bad bottom conditions.

The peak of the spawning was from the end of March to the beginning of April. Only 10% of the cod in the trawl catches in this period were immature. Among the mature cod 34% were ready to spawn, 48% were spawning, 4% nearly spent and 14% spent. The year class 1953 was predominating with 48%.

Off Fiskenas Bank April 3 spawning cod were found in 230-300 m's depth. The percentages of the different spawning stages were quite similar to those found off Dana Bank April 1.

The temperatures in the waterlayers where spawning cod were found were: 4.2°C in 320 m's depth off Dana Bank April 1, and 3.5°C in 280 m's depth off Fiskenas Bank April 3.

Almost all the cod had completed the spawning in April and their occurrence on shallow water must probably be ascribed to feeding migrations. The condition of the cod was good. Immature cod were found on some of the banks in spite of relatively low temperatures.

The observation of spawning cod far west of the offshore banks is of the greatest interest to knowledge about the recruitment of the West Greenland cod stock. The spawning of cod takes place in the warm Atlantic water and the place for spawning must be sought for farther westwards and in deeper water than it has been up to now. The drift of cod larvae towards the west by the western branch of the Greenland current towards Labrador waters, which has been observed in recent years may at least in certain years be considerable. It is possible that the variation in the occurrence of warm Atlantic water and the strength of the westward branch of the current may have an influence upon the strength of the year classes in the West Greenland cod stock.

6. Cod tagging experiments. A number of 6352 cod were tagged in Subarea 1 B-F. In all 776 cod were tagged off East Greenland.

Recaptures from tagging experiments carried out in previous years have shown migrations of cod between West and East Greenland and Iceland. It is mentioned in the German report that these tagging results in connection with studies on age and size of cod in Subdivision 1 F and on spawning places off East Greenland together with variations in the fishery in 1 F have shown that there is reason to assume that the rich winter fishery in this southern region depends

on cod on spawning migration from West Greenland towards East Greenland. When the spawning takes place here in April the fishery in 1 F is poor. In the end of April and in the beginning of May the fishery increase again and the catches consist merely of cod of a similar age and size composition as before which indicates that the cod after spawning return to the West Greenland area on a feeding migration.

Remarks on the fishery.

The early warming of the water, the high temperatures in the sea and the sparse occurrence of ice were favourable to the fishing activity in Subarea 1 in 1961.

Since 1958 Germany has carried out fishery during all seasons and Greenland is now the most important fishing area for the German trawlers

The output of the fishery amounted to 60,000 tons which is three times the 1960 landings. The good result was caused partly by stronger fishery in the subdivisions 1 B, 1 E and particularly in 1 F.

Iceland carried out trawl fishery in July and August. In spite of 61 trips against 105 in 1960 the catch increased from 4,700 tons in 1960 to 10,600 tons in 1961 owing to a stronger fishing effort.

U.S.S.R. reports that the concentrations of cod in April were ver very unstable caused by lack of sufficient food. In May the fishing improved on Fylla and Banana Banks and in late May on Lille and Store Hellefiske Bank.

The occurrence of cod was very scattered and in mid water layers through September and early October, but when the sand-eel appeared in Fylla Bank in mid October the fishery became more stable on concentration of cod.

In the Faroese report are given informations about discarding of under-sized fish. Only cod over 45 cm were used. 175 tons or 19% of the total catch was discarded. This discarded part included 118 tons cod. If we consider that the discarded cod are small-sized fish, chiefly between 35 and 47 cm, and with a low weight, the number of discarded cod have been extremely high. If the amounts of fish discarded by all other trawlers in Subarea 1 are of the same dimensions, there are reason to believe that the stock of cod must be damaged severely. Discarding of under-sized fish deserves closer investigations in Subarea 1 in the coming years.

Redfish

In Godtab fjord samples of small redfish have been taken with shrimp trawl for studies on growth and year class strength. The samples have been taken every month with exception of June.

From tagging experiments with big redfish carried out in the Godthab fjord in 1960, 11 recaptures have been taken in 1961 together with one from tagging experiments in 1956. 4 have been recaptured at the tagging locality, 6 have been taken in the fjord about 20-30 miles from the tagging locality. The redfish tagged in 1956 was recaptured at the entrance of the Godthab fjord. One recapture in 1961 together with two made in 1962 are of special interest. The first was recaptured at Fiskenas Bank (1 D) by an Icelandic trawler August 11, 1961. It was tagged in 1960. The second which was tagged in 1957 was recaptured April 12, 1962 off Nanortalik (1 F) and the third (tagged in 1960) was recaptured off Cape Walloe, South- East Greenland, between 16 and 23 February, 1962. The two last mentioned were recaptured by German trawlers. The total lengths of the redfish at recapture were 44.5, 46 and 48 cm. They were all males.

The tagging experiments in the Godthab fjord show that the stock of redfish in the fjord is not a local one. The two recaptures in the Davis Strait far south of the fjord and one recapture at East Greenland make it possible that mature redfish migrate out of the fjord and southward and then turn round Cape Farewell and then continue the journey to the South-West Icelandic breeding grounds. The very rare occurrence of redfish larvae in Greenland fjords (only on one single occasion two females extruding larvae have been caught in the Godthab fjord) and their poor occurrence also in the Davis Strait indicates that no or only occasionally spawning takes place off West Greenland, neither in the fjords nor in the Davis Strait. The larvae which occur in the southernmost part of the Davis Strait are undoubtedly transported by the current from West Iceland to West Greenland waters. This fact is in full agreement with what is found by the Russian investigations and described in the research report from U.S.S.R. Female redfish with maturing larvae and developing embryo have not been recorded in the Davis Strait. The opinion that the Greenland stock of redfish must be recruited from eastern breeding grounds was published in a paper by Adolf Jensen on the basis of observations made on the "Tjalfe" expedition in 1908-09.

In April very good catches of redfish were reported from Subdivisions 1 C, 1 D and 1 E. Up to 7 tons redfish per hour's fishing in 1 D. In August the best catch was 3 tons per hour, taken on the slope of Dana Bank.

16-18 years old fish were dominant in the Russian catches.