

The Fluctuations in Cod (*Gadus morhua*) Fisheries off West Greenland in the Twentieth Century

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Abstract

Cod (*Gadus morhua*) off West Greenland has undergone extensive variations in abundance during the twentieth century. Prior to 1920 cod were scarcely landed in the fisheries and was rarely observed outside coastal areas. During the 1920s abundance increased and large quantities were found offshore. Annual catches rose from less than 1 000 tons in 1920 to a level between 50 000 and 100 000 tons in the 1930s (Fig. 1). After the second World War catches increased further, to a level of about 300 000 tons per year during the 1950–68 period. More than 90% of this catch was taken on the offshore banks by the international trawl and longline fleets.

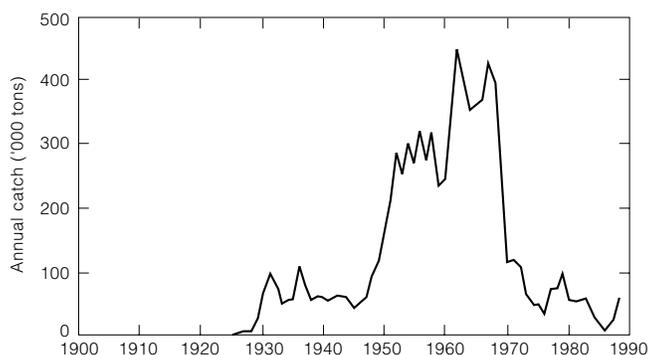


Fig. 1. Annual catches of cod off West Greenland, 1900–88.

In 1968, catches started to decline and within a few years annual catches fell below 100 000 tons. The decline was most prominently seen by the total collapse of the fishery in the northerly offshore areas (Store Hellefiske Bank, Div. 1B), which had previously supplied a third of the total cod catches in Greenland. In the last two decades the stock has yielded between 10 000 and 100 000 tons per year with high catches associated with recruitment of good year-classes, particularly those of 1973 and 1984 (Fig. 2). In years of good recruitment a high proportion of catches was taken offshore, whereas the reverse was seen when year-classes were poor. Offshore catches north of Div. 1D have been small since the stock decline.

It is possible to follow the stock development since 1956 by a Virtual Population Analysis. Within the decade 1956–66 fishing mortality increased from about 0.2 to 0.6. This was paralleled by a significant reduction in spawning stock biomass from 1 600 000 tons to less than 400 000 tons. In spite of this, recruitment of age 3 cod remained in the range 100 to 500 million during this period (Fig. 2). However, since the 1963 year-class, poor recruitment has been the rule, with only the 1973 and 1984 year-classes exceeding 200 million recruits.

In the assessments, these cod have been treated as a unit stock. However, the cod stock in West Greenland is composed of several stock components which have been differently affected over the period of decline.

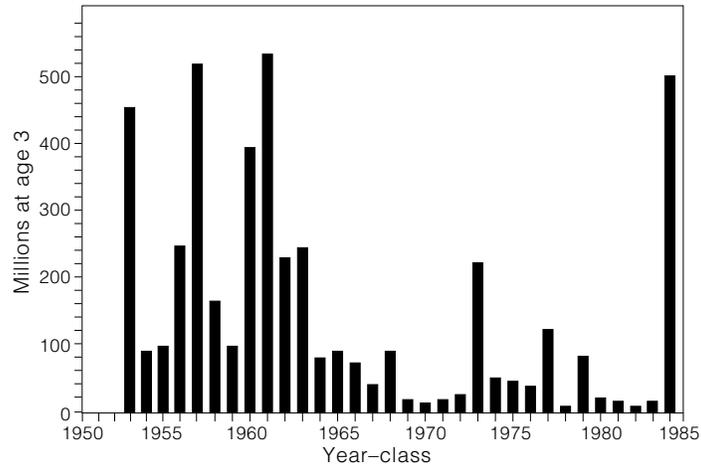


Fig. 2. Year-class sizes of cod off West Greenland, 1953-84. Size measured by number of age 3 cod as derived by Virtual Population Analysis.

Several inshore populations are found between latitudes 64° and 67° N with spawning taking place in shallow water fjord branches. Tagging experiments have indicated that these cod were rather stationary. Although reductions in inshore landings suggested that the size of these stock components may have been somewhat reduced, surveys showed a continuous successful inshore recruitment.

Offshore spawning occurs on the slopes of the coastal banks in a wide area stretching from the Dohrn Bank off East Greenland (66° N) to Cape Farewell (60° N) and further north to Banana Bank at West Greenland (64.5° N). Larval and hydrographic surveys indicate that these cod mainly settle in the Store Hellefiske Bank area of West Greenland. As noted the fishery has been insignificant in this area since the late-1960s and present stock size and recruitment are estimated to be very low.

A third stock component is derived from cod larvae carried by currents from the spawning areas off southwestern Iceland towards Greenland. These cod settle in the southeastern and southwestern areas of Greenland. Tagging experiments have shown that a high proportion of the cod tagged in these areas are later caught off Iceland (Fig. 3), thus linking the larval drift with a later migration back to their area of origin. Annual 0-group surveys (1971-90) have shown that the magnitude of this larval drift in most years has been small but in 1973 and 1984 the drift was very significant. These two year-classes were the only large ones seen on West Greenland after 1963.

Since the stock decline in the late-1960s, the cod fishery off Greenland has therefore been dominated by local inshore cod, as well as cod of Icelandic origin. The inshore stock component gives rise to steady but low catches in coastal areas whereas the inflow from Iceland give rise to infrequent but high catches in the southern offshore area. As far as can be deduced, the same stock pattern prevailed in the period before 1920. The development of the large West Greenland fishery between 1920 and 1970 seems therefore to be coupled with the development of the offshore bank stock.

The stock increase in the 1920s has been related to an increase in water temperature, and the subsequent decline in the 1960s has similarly been attributed to a deterioration of cod habitats due to climatic conditions. However, the fishing mortality generated by the expanding fisheries in the 1950s and 1960s may well have added to the problems of the stock by reducing its reproductive potential.

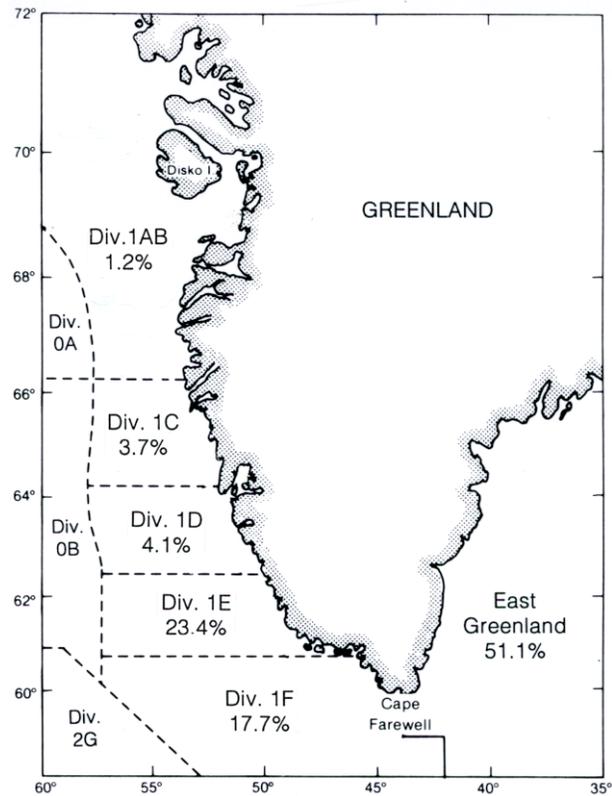


Fig. 3. The percent of tag returns taken in Icelandic waters in relation to the area of tagging.

Key words: Cod, *Gadus morhua*, Greenland, stock components, stock size changes

