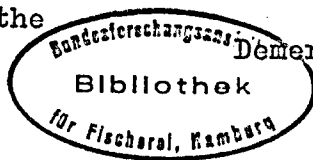


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Peculiarities of Cod Distribution in the Barent Sea in 1970

by

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Summary

The total abundance of the cod stock in 1970 was lower than in previous years. Large cod (70-85cm long) of the 1962-1964 year classes formed the basis of the catches.

The predominance of large cod in the stock affected the times and areas of the fisheries.

Due to peculiarities of feeding, high fat content, the duration of the migrations to wintering and spawning areas, the cod did not form stable fishing concentrations in summer, autumn and winter and during most of the time they remained in water columns.

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Cod of the 1962-1964 year classes, 70-85cm in length, formed the basis of the catches taken by USSR, both in the southern Barents Sea and in the Bear Island-Spitsbergen area in 1970. Younger fish (1965-1966 year classes) in catches taken in the southern part of the Barents Sea amounted to 16.2% in the Bear Island area to 8.1% (Table 1).

The total abundance of the cod stock decreased as compared with previous years. In the annual catches taken by Soviet vessels, cod made up 77% against 85-95% in some previous years. The weight of the cod caught in 1970 was two times lower than in 1969.

The presence of the mainly large specimens in the stock affected the times and areas of fisheries which differed greatly from those during the last years. The hydrometeorological conditions influenced to a lesser extent (than the length and age structure of the stock) the distribution and behaviour of cod in the Barents Sea in 1970.

The migration paths of older cod, their seasonal distribution and behaviour (vertical distribution, velocity of migrations, density of concentrations, feeding intensity, fatness, etc.) are different compared to those in young fish.

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### The Southern Barents Sea

In the southern part of the Barents Sea the cod wintered in the central and western areas (Figure 1). Spawning migration routes of mature cod to the north-west coast of Norway passed through the areas mentioned above (Figure 2).

The feeding of cod on capelin started in February on the slopes of the Murmansk and Finmark Banks. The highest average index of stomach fullness was registered in February and March (Figure 3).

During the last three years capelin were the most important food object for cod. In the period of intensive feeding (February-April) an average frequency of occurrence of capelin in cod stomachs in 1970 was 81.0%, in 1969 it was 69.0% and in 1968 47.5% (Figure 4).

In spring, well fed cod (fatness in May was 8.5%) (Table 2) migrated eastwards (on the Goose Bank and Novaya Zemlya Shallows). In summer, cod continued to feed on fish (capelin and Polar cod). During the summer feeding period, krill were less important than usually, though their stocks in 1970 were in good condition as shown by investigations.

In the period when cod usually feed on krill (June-August), the frequency of occurrence of krill in cod stomachs decreased to 16.0% compared to that in previous years; in 1969 49.0%, in 1968 30.0%, which is due to the fact that the cod stock mainly consisted of large specimens which feed primarily on fish. In summer, when cod feed on pelagic fish (capelin, Polar cod), they remain above the bottom most of the time and do not form the dense concentrations which are convenient for catching with bottom trawl. Due to the lack of clearly expressed temperature gradients in autumn, the great distribution of warm waters and the availability of food in all areas of the southern Barents Sea did not result in a simultaneous retreat of cod to wintering and spawning areas. They migrated to the west in small schools and continued to feed on their way. Due to this, in autumn and winter no fishing concentrations were found either along the main, nor the coastal branches of the Murmansk current.

The thermal conditions in the central and western areas of the Barents Sea were favourable to cod wintering. The temperature in the 150 to 200m layer on the Kola and Kharlov sections was similar to the long-term mean value. Nevertheless, a main bulk of cod migrated to the west to the Norwegian Deep area and to the Sörö, Fugloy and Malangen Banks. A small number of young, immature cod wintered on the slopes of the Murmansk Bank and in the central areas of the Barents Sea.

### The Bear Island-Spitsbergen Area

Cod wintered above depths of 300-700 m on slopes of the Bear Island Bank. Fat content (6.9%) in cod which was well fed in autumn 1969 was observed till March 1970. Intensive feeding of cod on capelin was found in April; by the end of the month, the fat content in cod made up 7.1%. In May, the spawned-out lean cod began to move on the slopes of the Bear Island Bank from the south and the average fat content in cod decreased on the whole to 6.5%. Cod migrations from the south continued until August and due to this fact, the average fat content in cod was low (in spite of intensive feeding); in June it amounted to 5.2% and in July to 5.9%.

In summer and autumn, the main food object for cod in the Bear Island-Spitsbergen area were capelin and blue whiting. Following their food organisms, cod were very active, they distributed over a wide range of depths, from 250 to 700 m and no stable fishing concentrations were registered in any area. At the beginning of September, larger specimens (70-90 cm long) amounting to 40% of the stock had a high fat content (9.8%). The fat content in some fish in the West Spitsbergen area and near the Hopen Island amounted to 12-16%. Fish with a high fat content and developing gonads started their spawning migrations to the south as early as at around the end of September. Such "active" fish with empty stomachs and high fat content were found by the R/V "Turnets" on the western slope of the Bear Island within the last five days of September and early in October.

Immature cod continued feeding until December in the West Spitsbergen and South Cape Deep areas. Fat fish gradually moved to the south and wintered on the slopes of the Bear Island Bank and in the Kopytov area. In the areas indicated, the fishing vessels caught cod in small quantities together with halibut and redfish.

During previous years, (when individuals at an age of 4 - 6 years prevailed in the stock) fish wintered at smaller depths (180-250m), their concentrations were denser and in November-December the fishing fleet obtained good yields, both on the western and southern slopes of the Bear Island Bank.

Table 1 Age composition of cod catches taken in the Barents Sea in 1970 (in %)

Year classes	1966	1965	1964	1963	1962	1961	1960	1959	%
Southern Barents Sea	4.8	11.4	36.6	42.5	11.3	2.8	0.5	0.1	100
Bear Island-Spitsbergen Area	2.0	6.1	40.4	36.1	12.3	2.1	0.5	0.5	100

Table 2 Average fat content in cod in different months of 1970 (in % from catches)

Areas		Jan.	Feb.	Mar.	Apr.	May	June	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
I	%	5.5	7.7	8.6	8.3	8.5	-	7.8	7.6	-	8.4	8.5	
	No. of fish	480	140	297	389	437	-	484	462	-	384	159	
Div. 2b	%	-	6.9	-	7.1	6.5	5.2	5.9	7.3	9.8	11.1	10.9	8.5
	No. of fish	-	87	-	100	298	255	194	84	348	149	63	61

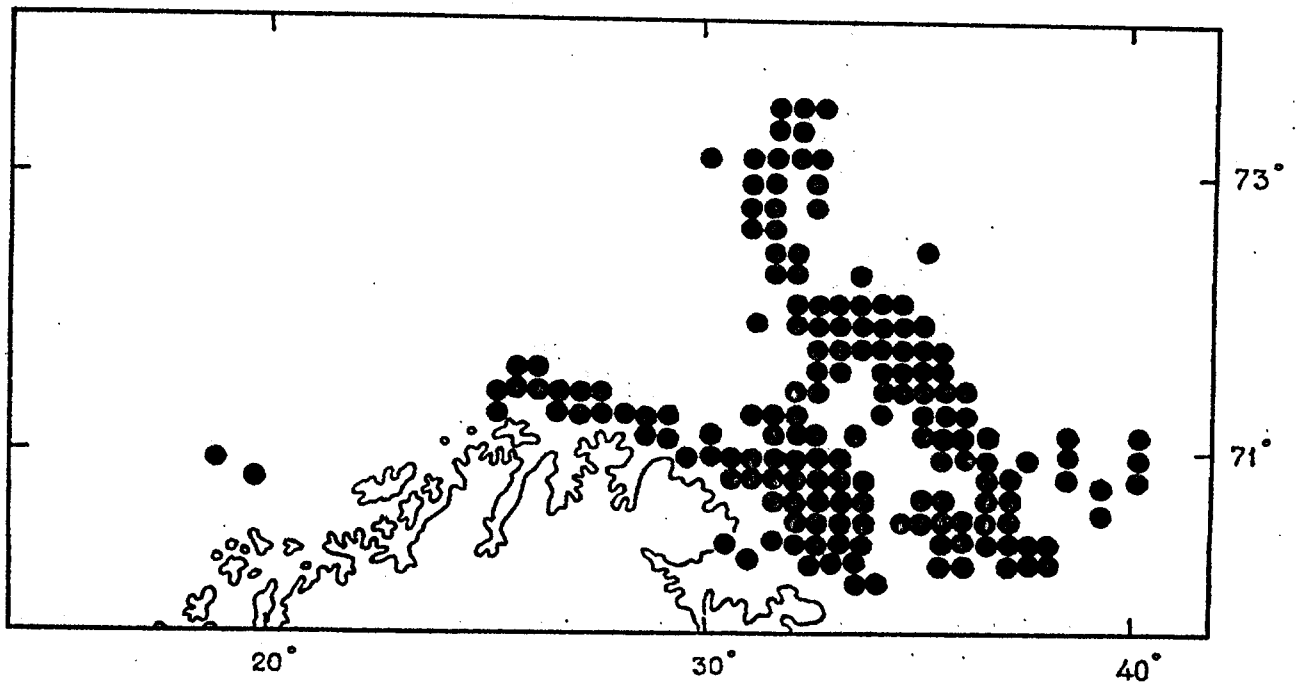


Figure 1. Distribution of cod according to data of catches in February 1970.

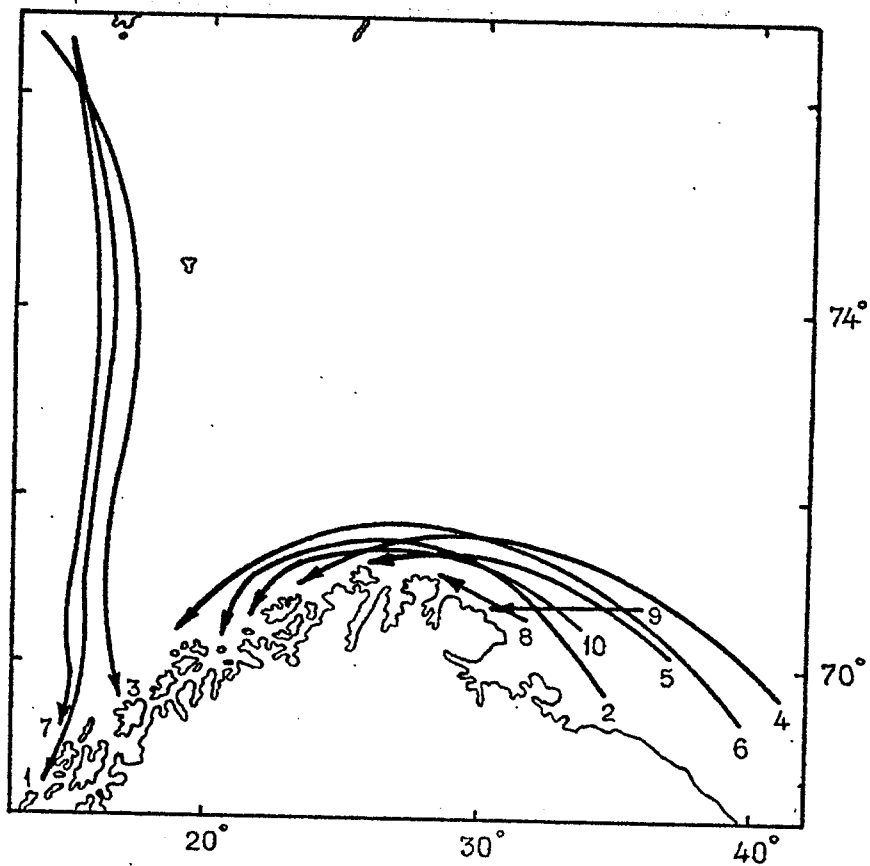


Figure 2. Migrations of mature cod in the first quarter of 1970 according to tagging data by Soviet and Norwegian scientists.

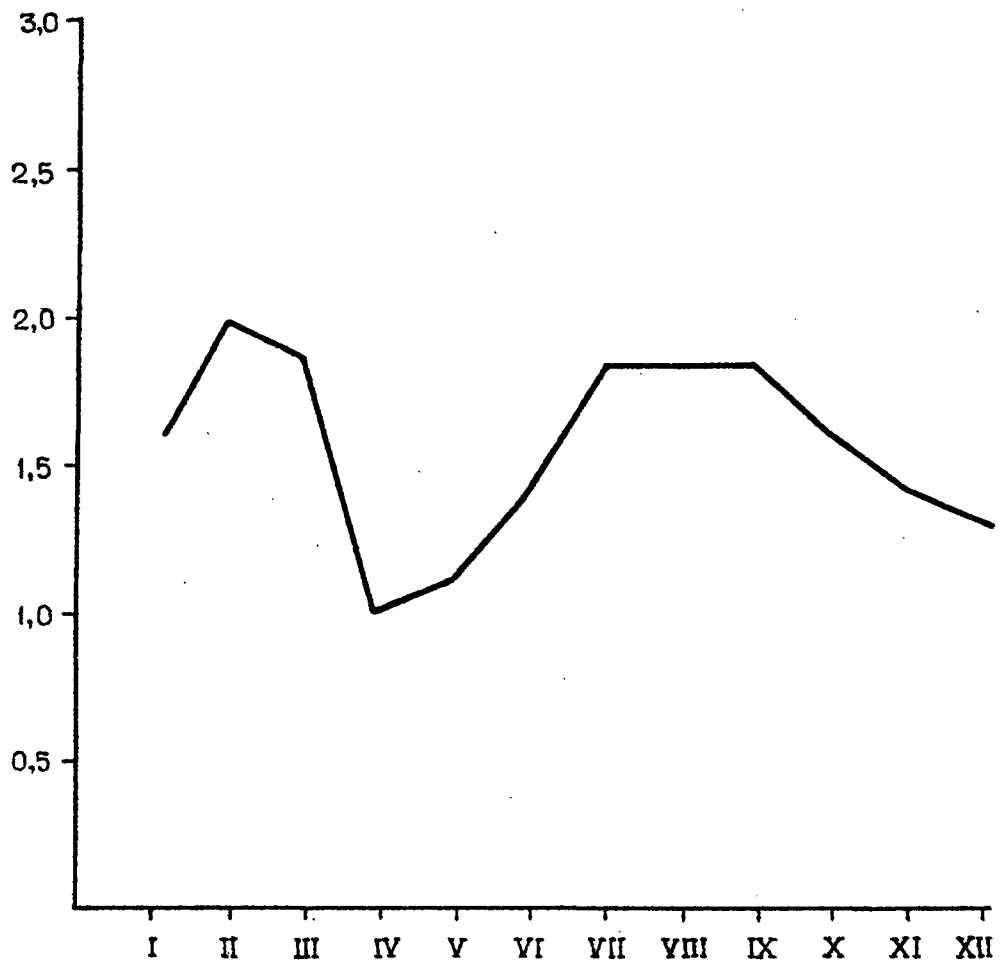


Figure 3. Average index of stomach fullness in cod during the different months, 1970, in the southern Barents Sea.

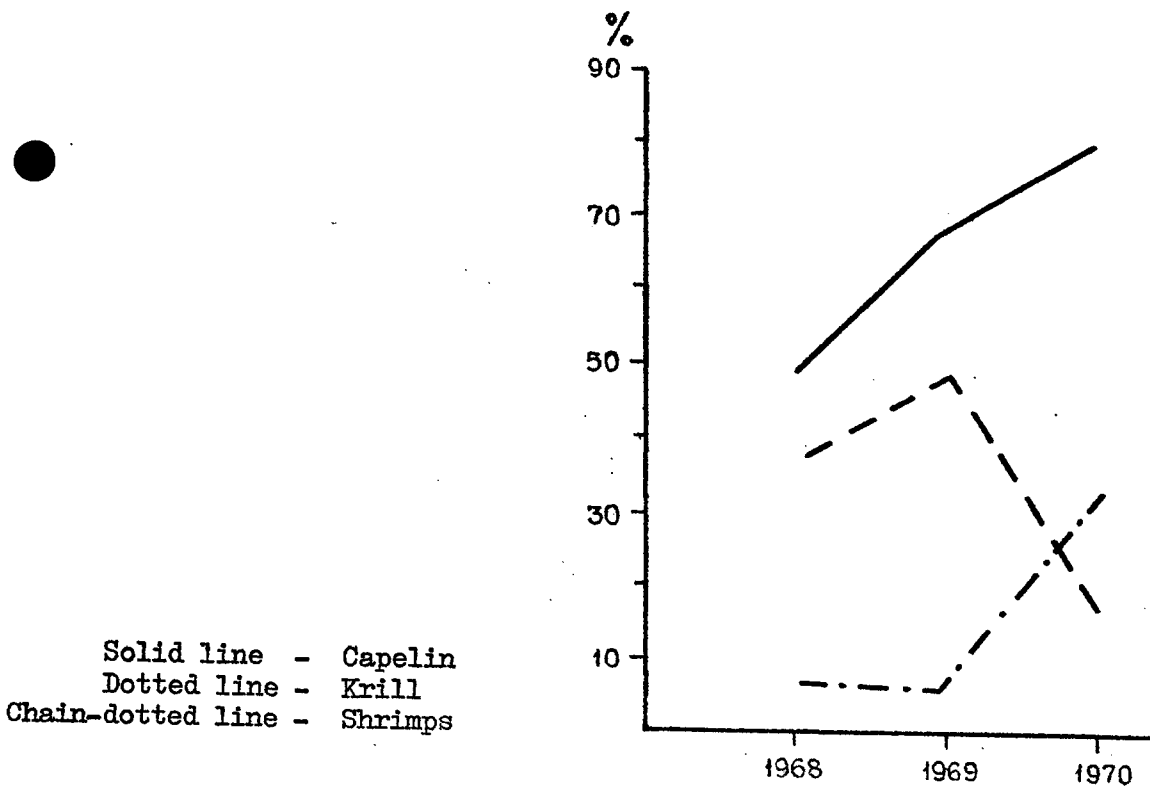


Figure 4. Value of main food objects of cod in the southern Barents Sea in 1968-1970.