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On Investigations of Capelin from the Barents Sea

by

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Abstract

Being an abundant object of fishery,capelin is, at the same time ,considered to be an important trophic link in the Barents Sea ecosystem.Investigations on capelin are carried out in joint Russian-Norwegian cruises as well as by national programmes and include all stages of fish life cycle. Results of the investigations mantioned above are the base of recommendations for capelin fishery regulaton.

During the depression in capelin stocks in 1986-1990 its fishery have been prohibited,though investigations have been carried out in full scale. Besides, the control over dynamics of populational strength allowed to reveale timely the stocks recovery which led to the possibility to recommend resumption of the fishery in 1993).

Material and Methods

The paper presents data on assesment of year-class abundance of capelin and cod obtained in the joint Russian-Norwegian surveys of 0-group fish (Anon., 1976-1992).In addition, it deals with results of joint acoustic surveys on assesment of capelin stock and with statistics of its catch according to the materials of the ICES Working Group (Anon.1993).

Results and Discussions

The Barents Sea capelin is one of few boreal commercial species reaching a high abundance and of a great importance in the Arctic ecosystem.

Its investigations in the Barents Sea have been carried out annually according to the international Russian - Norwegian programmes as well as to the national plans.

International annual works include:

-assesment of 0-group fish abundance (including that for capelin) in August-September,with participation of 2-3 Norwegian and 2-3 Russian vessels;

-acoustic survey to assess capelin stocks on feeding grounds in September-October with participation of the same vessels as for the 0-group one.

National plans include:

-studying of character of capelin approaching the coast for spring spawning;

-studying of capelin spawning grounds and of its spawning conditions in the coastal areas;

-studying of larvae distribution and assesment of year-class abundance at early stages of the life cycle;

-collection of materials on trophic interspecific relations between fish to develop pattern for the Barents Sea ecosystem.

The plans for investigations, methods and order of the fulfillment are agreed on during annual March meetings between Russian (PINRO, Murmansk) and Norwegian (IMI, Bergen) specialists and adopted by protocols of annual sessions of the Joint Russian - Norwegian Fisheries Commission.

Results of these investigations as well as fishery statistics, were the basis for recomendations on regulatory measures of capelin fishery in 70's, when the intensification of its fishery and introduction of 200-mile zone led to a necessity of such regulations. Recommendations for the total allowable catch (TAK) was based upon results from the joint acoustic surveys on stock assesment. Incidentially, TAK was determined for spring and autumn fisheries separately. During summer period, from May 1 to August 31 (when fish grows intensively and increase in its biomass is observed to be highest) the fishery is prohibited. Along with, such measures of regulations as minimum commercial size - 11 cm, allowable by-catch of juveniles under 11 cm - 10%, minimum mesh size of fishing gears - 16 mm are used. In addition, annualy, it was provided to leave (according to calculations) untouchable spawning stock at the level of 500 thou.t for reproduction, and observance of regulatory measures should provide 2 mill.t of capelin biomass as feeding basis for other fish, birds and mammals of prey.

This management aimed to conserve the stock for stable reproduction, recruitment and, mainly, for effective fishery. The regulatory measures, mentioned above, were inculcated within the frames of the Joint Russian-Norwegian Fisheries Comission after examining the joint investigations results by the ICES and ACFM Working Groups.

Having been used since 1978 these measures contributed to conservation of populational stock at the level of 4-7 mill.t till 1983., which provided annual total catch of 1.6-1.9 mill.t (Fig.1). Nevertheless, in spite of a strict scientific approach to fishery management, capelin stock started to decrease sharply since 1984. Joint acoustic surveys in autumn 1985 showed that total capelin biomass made up 820 thou. t , and the spawning portion of the stock made up only 270 thou. t. Such a level of stock required immediate cessation of fishery. However, the Joint Fisheries Commission prohibited capelin fishery actually only since autumn 1986. Nevertheless, the Comission also recommended to keep the same investigations and research cruises on capelin at the level of previous years both by national and international programmes.

This investigations continuation allowed to observe pecularities of distribution, reproduction and restoration of capelin stock during its depression period 1986-1990. Accidentially, the joint acoustic surveys revealed that recruitment of the populational stock (without fishery) had been retarded much till 1990. Only with the appearance of a high - yielding year-class 1989 and subsequent rapid grouwth, capelin stock biomass sharply increased and reached in 1992 - 5.8 mill.t , in 1991 - 7.1 mill.t and in 1992 - 5.4 mill.t. Such a level of stock allowed again to recommend in 1991 and 1992 total catch of capelin to be at the lavel of 1.1 mill.t. More than this, the main catch (up to 850 thou.t) was recommended for a spring period. With diminishing of 1989 year-class in spring 1993 the total catch reduced to 600 thou.t.

It was recommended to conduct rational autumn fishery, 50% of which contained recruitment, according to historical data, and did not exceed 260 thou.t in 1991-1992. This restriction resulted from the availability of only one 1989 strong year - class in the stock, low abundance of subsequent ones (Fig. 2) and from a necessity to maintain recruitment for further reproduction. For the very same reason (after the 1989 year-class fished out and further reduction of the stock) autumn 1993 capelin fishery is not recommended. However, like in previous years capelin investigations will be carried out in full scale.

Data analysis showed that the capelin stock depression had been caused by coincidence of some factors, where the most important one was the appearance of high-abundant year-classes of cod in 1983-1986. Simultaneously,a sharp decrease in capelin year-classes abundance was registered (Fig.2),and at the same time, stapping up the rate of autumn catch took place (Fig.1) when fishing affected adversely recruitment.Combination of these factors and the continuation of the capelin consumption by other ways caused rapid decrease of recruitment strength as well as total populational stock.

In consequance of all above mentioned,continuation of capelin investigations and especially those on trophic relations between ecologically related to capelin species is an important element of controlling capelin stocks dynamics and fishery management.

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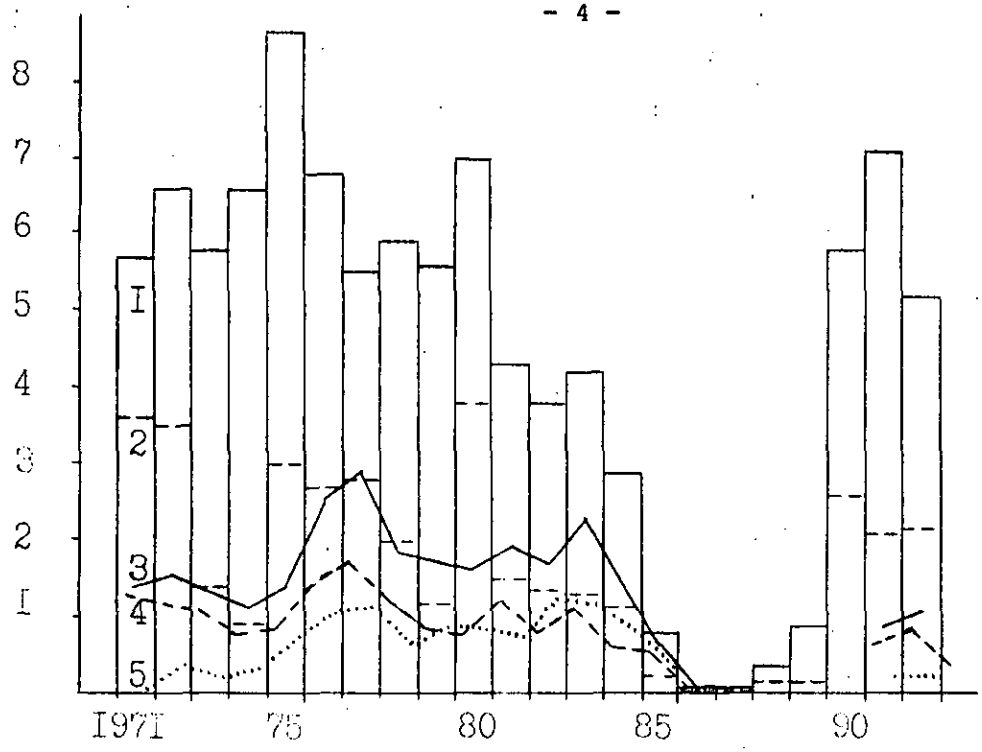

Fig.1. Dynamics of capelin stock and catch (mill.t)
1–total stock; 2–spawning stock; 3–total annual catch; 4–total spring catch; 5–total autumn catch.

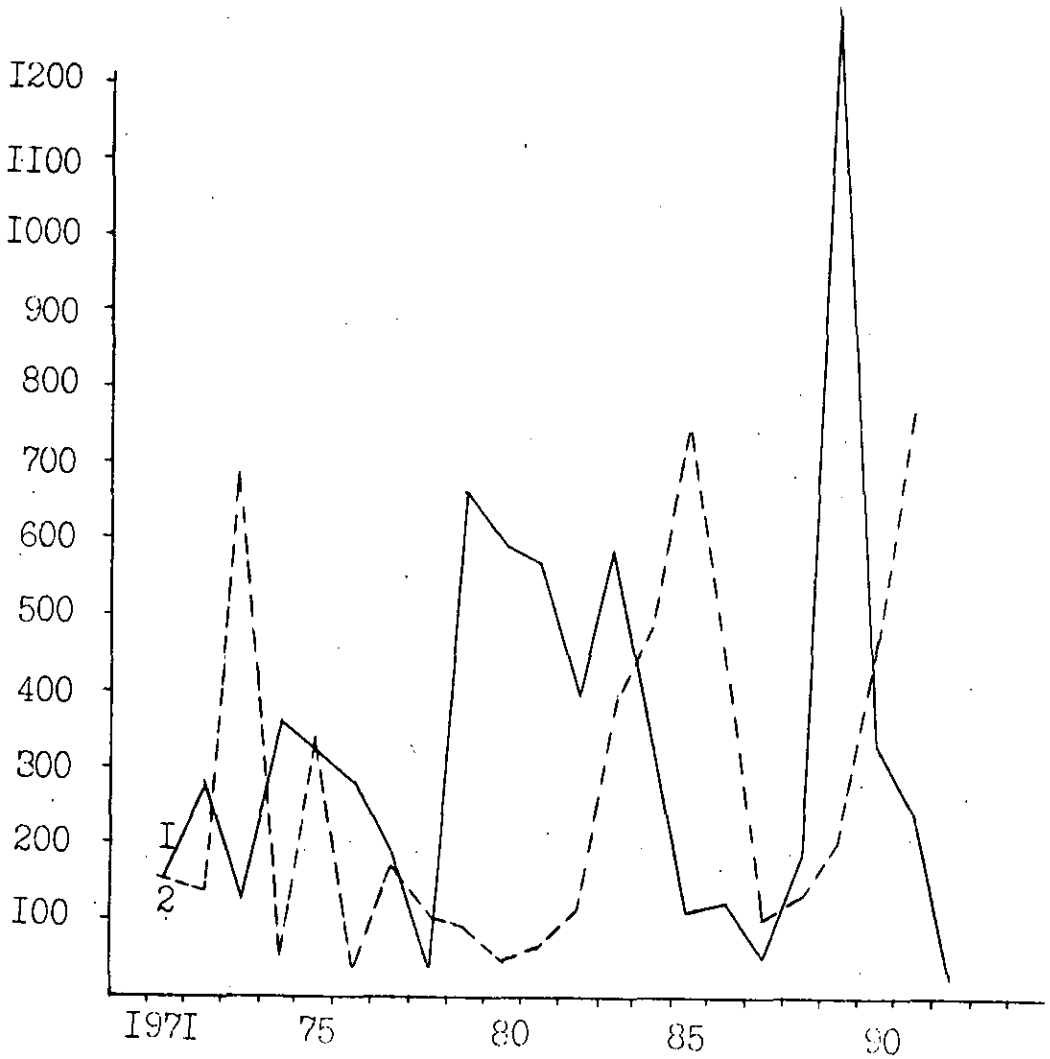

Fig.2. Year–classes abundance of capelin (1) and cod (2) by the results of 0–group fish surveys (relative indices).