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Present stock condition and some problems of regulation of the Atlantic herring fishery

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As it is known, the Atlantic herring subspecies relating to the oceanic or marine herring (Svetovidov, I952) inhabits the North Atlantic and the seas of the European North. The Atlantic herring make some stocks within their inhabiting area, those distinguish between them by some biological characteristics such as stock size and the amplitude of their fluctuations (Marty, I956, I962; Fedorov, I962, I965, I966).

The largest stocks are the Atlanto-Scandian spring spawning herring (mainly, the stock of the Norwegian herring), the North Sea autumn spawning herring and the West Atlantic herring, which is mostly the autumn spawning herring stock in the area of Georges Bank.

The total catch of the Atlantic herring for I962-I968 according to FAO, ICES and ICNAF) in comparison with the total catch of all the marine herrings is given in Table I.

Table I (million tons)

	1962	1963	1964	1965	1966	1967	1968 x/
Total catch of all marine herring	3.36	3.65	4.32	4.63	4.62	4.35	3.50
Total catch of the Atlantic herring	2.79	2.93	3.54	4.03	4.09	3.88	3.00
including							
The catch of the largest stocks and groups of herring	I.99	2.24	2.94	3.60	3.59	3.29	I.96

x/ preliminary data

On the background of the total increase in the catch of marine herring after the Second World War sharp changes in total catches of some countries as well as stabilization or decrease in the productivity of the fishery are observed in some traditional areas of herring fishery (Marty and Fedorov, I963; Fedorov, I965, I966 and others).

These changes are due to fluctuation in the stock size of some herring tribes, which depends on the fluctuations of strength of herring year-classes entering the stock and forming the commercial stock.

Considering from those positions the recent changes in the catches and stocks of the main groups of the Atlantic herring we

may come to the following conclusions:

I. During the last years, the catch of the North Sea herring fluctuates more sharply than previously, when the total catch was stable enough and made 800-900 thousand tons per year. During the last years, the catches fluctuated from 828 to 1565 thousand tons, that may be seen from the figures given below.

	1962	1963	1964	1965	1966	1967	1968 x/
Catch (thousand tons)	832	1004	1319	1565	1120	1068	828

x/ Preliminary data

The last increase in catches may be explained by a higher intensity of fishery and enlargement of the areas of the herring fishery. Of great importance is also the development of the purse seine fishery, particularly by Norway, the data of which are given below:

	1962	1963	1964	1965	1966	1967	1968 x/
Catch (thousand tons)	13	33	186	618	455	336	208

x/ Preliminary data

It is characteristic that with growing intensity of the fisheries, immature and the firstly maturing herring were taken in greater numbers by fishery. Thus, in 1964-1967 the immature herring made in catches from 27% to 53% by weight and from 50% to 80% by number of specimens.

The take of a large number of immature and firstly maturing herring caused the decrease in the recruitment of the adult stock, the rapid fishery for mature fish, of some year-classes, and consequently, greater fluctuations in catches (Fedorov, 1966).

Thus, the abundance of the North Sea herring I960 rich year-class recruiting the adult stock in I963-I964, decreased considerably in I966-I967, and a rich I963 year-class intensively fished in I964-I967 is, already, of a less commercial significance since I968.

The intensive fishery for the immature and firstly ripening specimens of the year-classes especially high in abundance allow to obtain rich catches during one or two years, but in further it results in a sharp decrease in catches due to a long depression in the abundance of the mature stock. As is known, the last circumstance affects the economic results of the fishery of many countries.

2. All the above said is also confirmed by fishery practice of the Atlanto-Scandian and, on the most, of the Norwegian herring.

The total catch of the adult Norwegian herring increased continuously in the after-war period and in I966 reached about I.5 milion tons. Then, the catches decreased sharply and were at a low level up to I963. In the following years, the catches increased and in I965-I966 they prevailed the I954-I956 level.

The fishery of the Norwegian herring is mainly conducted by Iceland, Norway and the USSR. The dynamics of the catch of the adult part of their stock by those countrus for I962-I968 period is given in Table 2.

Table 2 (thousand tons)

	1962	1963	1964	1965	1966	1967	1968 x/
Total catch of the Norwegian herring	508	623	1168	1562	1801	1068	270
including							
Catch of Norway	235	158	372	253	505	424	55
Catch of Iceland	64	135	375	820	849	360	70
Catch of the USSR	209	330	421	489	447	284	145

x/ preliminary data

Changes in catches of the adult Norwegian herring were at the background of the fluctuations of their stock, which ranged from 6 to 10 million tons up to the middle of the fifties. In 1954-1956 their stock was at the level of 9-12 million tons. The growth in the stock was caused by the entering into it of a rich 1950 year - class. In the following years, the stock decreased sharply making in 1959-1962 about 2.5-3.5 million tons (Fedorov, Truskanov and Yudanov, 1964).

That was due to a considerable increase in catch of the adult herring in 1955-1956 as well as due a to small recruitment of stock with poor 1952-1958 year-classes, which were intensively caught at the age of 2 or 3 years.

From 1962 to 1963, rich 1959 and 1960 year-classes and that of 1961, also abundant enough, recruited the stock. But, in spite of a high strength of these year-classes during the period of

their mass entering into the adult tribe in I964-I966, their stock was about 7-8 million tons, i.e. less than it was earlier at the entering into stock of the I950 year class.

That fact as well as a rapid decrease of the adult individuals of stock of the Norwegian herring give great troubles as to further fishery for that stock.

The analysis of the data obtained shows that in the last years the stock of the Norwegian herring reduced rapidly due to a considerable increase of the intensity of the adult herring fishery in I965-I966, and, it should be especially stressed due to the increased catch of immature herring mainly by Norway fishery.

The total catch of the immature herring by Norway and the USSR is shown in Table 3.

Table 3 (thousand tons)

Years of the fishery	Catch		Total
	Norway	USSR	
I960	294,0	6,6	300,6
I96I	39I,5	9,9	400,4
I962	308,0	I,6	309,6
I963	320,6	8,0	328,6
I964	I67,2	0,2	I67,4
I965	2II,4	I,4	2I2,8
I966	226,6	20,3	246,9
I967	45I,4	92,7	544,I
I968 x/	377,3	59,0	436,3

x/ preliminary data

A large take of immature individuals caused the decrease in the recruitment of the adult herring and considerably reduced its stock and in this way threatened the Norwegian herring fishery for a series of years in future.

3. Herring catches from separate areas of the North-West Atlantic are determined by the condition of some local stocks the abundance of those differs greatly. During a long period up to sixties the annual herring catch from this area made at an average up to 140 thousand tons. Then, the catches increased and they are presently about 260–490 thousand tons, that can be seen from the following data

	1962	1963	1964	1965	1966	1967	1968 x/
Catch (thousand tons)	344	285	302	263	425	490	450

x/ preliminary data

The greatest in number among the herrings of the North-West Atlantic are those of the Gulf of Maine and Georges Bank, which form one stock according to some authors (Bigelow & Shreder, 1956; Tibbo & Brown, 1960; Tibbo & Logare, 1960; McKenzie & Tibbo, 1958). This herring up to three years old inhabit within the limits of the Gulf of Maine and Fundy, and then migrate for spawning and feeding to Georges Bank.

Up to 1961, the fishery of this stock was conducted only by the USA and Canada. Previously and presently, those countries fish mainly immature herring at the age of two or three years old. The dynamics of these herring catches for 1962–1967 is shown in Table 4.

Table 4 (thousand tons)

		I962	I963	I964	I965	I966	I967
Catch	USA	72	70	29	34	33	32
	Canada x/	67	64	90	I24	I88	I90
T O T A L		I39	I34	II9	I58	22I	222

x/ catches in 4 X

As seen from the Table, the catches of the immature herring by the USA and Canada increased considerably in the Gulf of Maine and Fundy since I965.

Since I96I, the USSR began fishery for the adult herring in the area of Georges Bank after preliminary investigations. The results of the USSR fishery are given below:

	I96I	I962	I963	I964	I965	I966	I967	I9[illegible]
Catch (thousand tons)	68	I6I	I00	I33	42	I20	I24	94

In the area of Georges Bank, the herring fishery is conducted by Poland from I966, and by the German Democratic Republic, Romania, Canada and German Federal Republic from I967. In I967, the herring catches exceeded 90.0 thousand tons.

According to materials of Soviet investigators (A.S. Noskov, AtlantNIRO), the stock of the spawning herring only made I,I80 thousand tons on the main spawning grounds of Georges Bank in I964.

In 1965, the stock decreased up 580 thousand tons and in the following years it continued to reduce. The decrease in the stock can not be explained only as a result of a weak recruitment due to a series of poor year-classes. A great influence on it was made by an increased amount of catch of all the biological herring groupings.

The practice of the World herring fishery shows that the influence both of the unfavourable natural factors and of high fishery intensity, especially, a great catch of immature fish, can lead to a sharp depression in the abundance of the exploited stocks (Fedorov, 1966). That can by observed on different stocks of the Pacific and the Atlantic herring.

Thus, A. Hantsman (1953) shows to disappearance of the herring stock of the Kyoddy Area in the North-West Atlantic to the end of the last century, due to an intensive fishery for immature fish.

It should be noted that stock condition of the adults almost of all the Atlantic herring stocks, which are the base of the fishery of various countries and are caught for feeding of the population, depends greatly on the size of catch of immature fish especially for industrial purposes.

It is evident that the present condition of the Atlantic herring stocks requires to provide urgently a rational exploitation of fish stocks. We consider that the most effective measures are:

- discontinuance of catches of the immature fish or their considerable decrease and the extension of research for determining the maximum possible yield of the adult herring, especially in the years of the decrease in the recruitment of the mature herring stock due to the natural reasons.

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