



Serial No. 2611  
(B.g.1)

ICNAF Res. Doc.71/105

ANNUAL MEETING - JUNE 1971

Polish Research Studies on Georges  
Bank Herring

by

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Polish studies on herring occurring in the area of Georges Bank and USA shelf were focused on quantitative estimate of the year-classes present in the exploited stock and on the effect of fishing on its abundance. This paper makes an attempt to present the variability in the abundance of particular year - classes established on the basis of catch data from Polish fishing operations in the years 1969 - 1970 as well as the factors for total mortality.

As it is known the assessment of the stock is based on the data available from catch statistics and on biological observations on the exploited stock. For evaluation of mortality and density of fish in the fishing ground - the two most important factors characterizing the abundance of the stock - there is necessary the information on the size of catch and the amount of fishing effort. Until now our studies on the variability in the stock abundance of Georges Bank herring were based on the variation of the quotient of annual catch by the amount of fishing effort of a chosen type of fishing vessel using a definite kind of fishing gear. Apart from the fact that thus calculated factor was not quite representative for the estimation of stock density in the actual fishing ground it also contained an error due

to the tactics of trawl fisheries in the region of Georges Bank. In the recent years Polish trawlers conduct the so-called mixed fishing operations catching herring along with other fish species.

In the present study the estimation of the approximate amount of fishing effort on herring was based only on those daily fishing reports from mixed fisheries in which the by-catch did not exceed 30 % within a given period of time, when those daily landings with more than 30 % of by - catch were rejected from the calculations. It was found that among all these vessels the steam trawlers using bottom trawls had the least number of days with by - catch exceeding 30 %, their data thus being the most representative and their fishing day was therefore adopted as a standard unit of fishing effort for further calculations. Now, having a standard unit of fishing effort a mean catch per day, derived from the annual catch, also for these steam trawlers, was to be calculated. It was 5.8 tons in the year 1969 and 6.8 tons in the year 1970.

Since however fish make local concentrations of higher than mean density and while fishing fleets in search for best results as a rule operate in the areas of such densest concentrations of fish the above two values of mean daily catch are not adequately representative.

To establish the true average density of herring stock in the area of Georges Bank and USA shelf the known Gulland's method /J.A.Gulland - Manual of Methods for Fish Stock Assessment, FAO Manuals in Fisheries Science No 4, FRs/M4, Rome, 1969/ was adopted. According to this method the investigated region had to be divided into subregions, each of equal surface area. For each of them monthly catch and amount of fishing effort by steam trawlers /as above discussed these data were the most representative/ were established and from them catch per day was derived.

Since the density of the stock is the weighted mean from catch per day in each subregion, it was possible, by weighting the obtained values to evaluate the index characterizing the stock density in all the region in a given month. In turn these indexes were used for calculation of mean catch per day for the whole year and this was accepted as an index of true average density of the stock in a particular year. This was as follows: in 1969 - 5.4 tons per day; in 1970 - 5.8 tons per day. These values were used for the estimate of the variability in abundance of particular herring year - classes in the catches.

From otolith readings for herring caught in 1970 appeared that the stock comprised younger fish as compared to previous years. This was evidenced by great abundance of young fish in the catches. They belonged to the year-class 1966 /46.0 %/ and 1965 /22.9 %/ - see Table 1.

The 1964 year-class and older fish were less abundant in the catches in 1970. The year - classes 1960 and 1961 were very considerably reduced as the result of high rate of total mortality.

Following the changes in the number of individuals of the same year-class, fully recruited, in the daily catches first in 1969 and then in 1970 the factors of total mortality for particular year-classes were determined /Table 1/.

Mean value for the factor of total mortality for all the year-classes participating in the catches in the period of both the years was  $Z = 0.98$  which corresponds to 62 % reduction of each year-class per year.

Only a part of the year-classes 1966 and 1967, which were of an average abundance, recruited into the spawning stock in 1970, whereas a part of them was beyond the reach of fisheries in summer and autumn months. We may expect that the fish belonging to these two year-classes along with 1968 year-class will contribute to sustain herring stock on the level of the year 1970.

Table 1

Age composition of herring caught  
in the years 1969 and 1970

Year	Percentage and number of fish in the catches	Year - classes									
		1968	1967	1966	1965	1964	1963	1962	1961	1960	Older
1969	%	-	-	30,9	274,6	155,9	127,6	80,8	125,8	172,0	32,4
	No of individuals per day fished	-	-	701	6233	3534	2896	834	2855	3904	735
1970	%	3,3	115,7	460,0	229,0	50,0	44,0	19,0	32,0	40,0	7,0
	No of individuals per day fished	94	3320	13.202	6572	1435	1262	545	918	1148	200
Total mortality /Z/		-	-	-	-	0,90	0,86	0,42	1,13	1,22	1,31