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Length and Age Composition of Herring in Polish Catches from ICNAF Subareas 4, 5 and 6 in 1969

by F.Chrzan and B.Draganik
Sea Fisheries Institute, Gdynia

Catches and fishing effort

In 1969 Polish vessels fished for herring from Misaine Bank in Subarea 4 to Chesapeake Bay in statistical Subarea 6. The fishermen were interested mainly in herring, but they also caught other species. Thus in Subarea 4 along with herring they caught redfish, while in Subareas 5 and 6 a comparatively large amount of mackerel was caught. The data on the catches of herring and other species in particular Subareas are given in Table 1.

Table 1.

Subarea	Catches in tons			
	herring	%	other species	%
4	4,855	83.4		
5	32,368	57.4	967	16.6
6	12,653	64.5	24,040	42.6
Total	49,876	56.1	6,969	35.5
			31,976	43.9

These data show that most herring were caught in Subarea 5. Here too, the by-catch of other species was the largest. Fishing operations were carried out mainly on Georges Bank. Only 1,832 tons of herring and 4,108 tons of other species (mackerel) were landed from the western part of this Subarea (5Zw).

Five types of vessels took part in these fishing operations. In view of the decreased catch of herring per unit effort the vessels more than in previous years sought to utilize catches of other fish species, particularly the pelagic ones. Data on catches and fishing effort for these vessels are given in Table 2.

Table 2.

Type of vessel	Gross tons	Catch in tons		No. of fishing hours	No. of days fished
		herring	other species		
Factory trawler	2,600	1,680	491	1,705	165
Freezer trawler	3,100	11,941	9,968	8,074	817
" "	1,400	2,469	5,578	4,275	344
Motor side trawler	800	14,576	11,732	15,271	2,261
Stern trawler	650	19,210	4,207	34,595	3,489
All types of vessels - total:	49,876	49,876	31,976	63,920	7,076

From these data it appears that most of the herring were caught by stern trawlers. The next were motor side trawlers and in third place - large freezer trawlers of 3,100 gross tons capacity. There was noted a decrease of herring landings along with the increase of landings of other species. Comparatively large catch of mackerel made 23.8% of Polish landings from Subarea 5 and 25.4% of the landings from Subarea 6.

It was difficult to make comparisons of the catch of herring per unit effort between the years 1968 and 1969 in view of the decrease of herring landings by most of the vessels and simultaneous increase of landings of other species. It was, however, possible to make some estimations. On the basis of fishing results of large freezing trawlers, which in 1968 and 1969 caught similar quantities of herring and other species, though with different amounts of fishing effort it was possible to follow the changes of fishing yield in these years. This yield per 1 hour trawling amounted to 1.71 tons of herring in 1968 to 1.44 tons of other species, while in 1969 it was 1.49 tons of herring and 1.23 tons of other fish. Thus the yield of herring dropped by 13.5%. The decrease of fishing yield of herring for side trawlers was considerably larger (about 50% as compared to 1968) and was not compensated by increase of catch of other species.

Length of herring

Length measurements of herring were performed by scientific observers during fishing seasons aboard commercial vessels. Some 1,230 herring were measured on the fishing grounds of Nova Scotia, mainly on Misaine Bank. The length of these fish ranged from 26 to 38 cm; mean length was 32.3 cm.

On Georges Bank 13,797 herring were measured from August till October. Their length was from 24.5 to 37 cm; mean length - 30.6 cm.

Length measurements on the fishing grounds off Cape Cod were made in August and December. In total 5,147 fish were measured. Their length range was 20-35 cm; mean length - 27.0 cm.

The data obtained from measurements are given in graphic form in Fig.1. From the shape of the curves it appears that in 1969 the largest herring occurred on the fishing grounds of Nova Scotia. The curve representing frequency of length-groups of herring caught in Subarea 4 has three peaks. The first peak (at 31.5 cm) refers to fish of the length 28.0 to 32.5 cm; the second peak (at 34.0 cm) - the lengths from 32.5 to 35.0 cm and the third peak (at 36.0 cm) - 35 to 37.0 cm. The fish of the length from 28.0 to 36.5 cm made 895⁰/oo of the sample.

The curve for the length of herring on Georges Bank takes the middle part of the graph. Hence - herring in this region was of medium length. This curve has two peaks. The first one (at 29.0 cm) refers to fish of the lengths from 26.5 to 30.0 cm; the second one (at 32.5 cm) - the fish of the lengths 30.0 to 34.0 cm. The fish within the range of the first peak made 390⁰/oo of the sample; within the second peak - 540⁰/oo. Comparatively poor abundance of smaller fish - as we note from the curve - point, it seems to rather poor recruitment into the stock of herring on Georges Bank.

The smallest herring were caught in the fishing grounds situated eastwards of Cape Cod (5Zw). Here the herring were most often in the range of lengths from 23 to 29 cm, making in total 769⁰/oo of the sample. We do not know yet whether just these herring will recruit into spawning stock in Georges Bank. Being, however, abundant it is expected that these fish will be the object of a fishery on one of the adjacent fishing grounds in the near future.

Age of herring

Age of herring was read from otoliths, which were collected in quantities corresponding to the number of fish measured. The interpretation of otolith reading was according to that described by Chrzan and Draganik (Redbook 1968, Part III). The following number of otoliths were read for particular regions: Nova Scotia - 123, Georges Bank - 1,129 and Cape Cod - 690.

Regretably the otoliths of the oldest age-groups of herring, caught in the northern part of Subarea 4, were very difficult to read. Most of fish of the length above 33.5 cm had otoliths unfit for reading. It was not possible, therefore, to determine accurate age composition of the whole sample. There was noted, however, a number of herring age-groups - from 3 years old (year-class 1966) up to 13 years old (year-class 1956). Undoubtedly there occurred also older fish, the otoliths of which were not readable. Among this number of year-classes, the year-class 1963 made 195⁰/oo of the sample. The younger year-classes were less abundant: 1966 - 32⁰/oo, 1965 - 107⁰/oo and 1964 - 98⁰/oo. Also among older year-classes none was found to be as abundant as the 1963 one, namely: 1962 - 97⁰/oo, 1961 - 106⁰/oo, 1960 - 81⁰/oo, 1959 - 66⁰/oo and 1958 - 49⁰/oo. The other year-classes were also proportionately less abundant.

Herring caught on Georges Bank were younger than herring on the fishing grounds of Nova Scotia. Most of young herring, 3 and 4 years old, were found in the region of Cape Cod. The frequency of age-groups is given in Fig.2 and the weight per age-group in Table 3.

Figure 2 shows that actually only six year-classes made up the stock of herring on Georges Bank. The most abundant was the year-class 1965 (274.6⁰/oo). Next in abundance was the year-class 1960 (172⁰/oo), whereas the year-class 1962 was of low abundance (81⁰/oo).

From the data in Table 3 we note that on Georges Bank the year-class 1960 was in first place in respect of weight (21.7%). This is particularly interesting in view of the fact that this year-class has been subjected to fisheries since 1963. The next is the year-class 1965 (20.2%) and in the third place - the year-class 1961 (14.9%).

Viewing the data in Table 3 we see that in spite of the presence of the year-class 1965 the recruitment into the stock of herring on Georges Bank was rather poor.

In the stock of herring in the fishing grounds east of Cape Cod, up to the meridian 69⁰W, particularly abundant was the year-class 1966. In our sample it amounted to 428⁰/oo. Less abundant was the year-class 1965 - 290⁰/oo of the sample. In respect of weight, however, we do not see any greater difference between these two year-classes. Both of them may be supposed to be of a considerable importance already in the catches in 1970. It is hardly possible to predict, however, in which fishing area since for the time being there is not available the data, on the basis of which it might be possible to determine the place of occurrence of these herring during spawning, i.e. fishing season.

The occurrence of a number of different populations of herring in Div.5Z gives grounds for reconsideration of the boundary of its division. For statistical purposes this was divided into two Subdivisions, 5Ze and 5Zw, along the meridian of 70⁰ west longitude. According to our observations the spawning population of herring on Georges Bank occurs up to about 69⁰ west longitude. Farther westward, closer to the US coasts, occur other herring stocks. These circumstances suggest a shifting of the boundary of Subdivisions by 1⁰ eastwards, which would, it seems, better correspond to the natural location of different fish populations. In this way statistical data might be better utilized in biological research.

Table 3. Participation of particular age groups and year-classes in the catches (in tons and percent)

Fishing Ground	Age groups and year-classes										Total
	II 1967	III 1966	IV 1965	V 1964	VI 1963	VII 1962	VIII 1961	IX 1960	IX+	1960+	
Georges Bank	-	549.6	6,165.4	4,253.6	4,079.6	2,845.9	4,543.7	6,635.5	1,462.7	30,536	
%	-	1.8	20.2	13.9	13.4	9.3	14.9	21.7	4.8	100.0	
Cape Cod	7.3	544.1	522.1	247.3	150.2	62.3	131.9	157.5	9.3	1,832	
%	0.4	29.7	28.5	13.5	8.2	3.4	7.2	8.6	0.5	100.0	

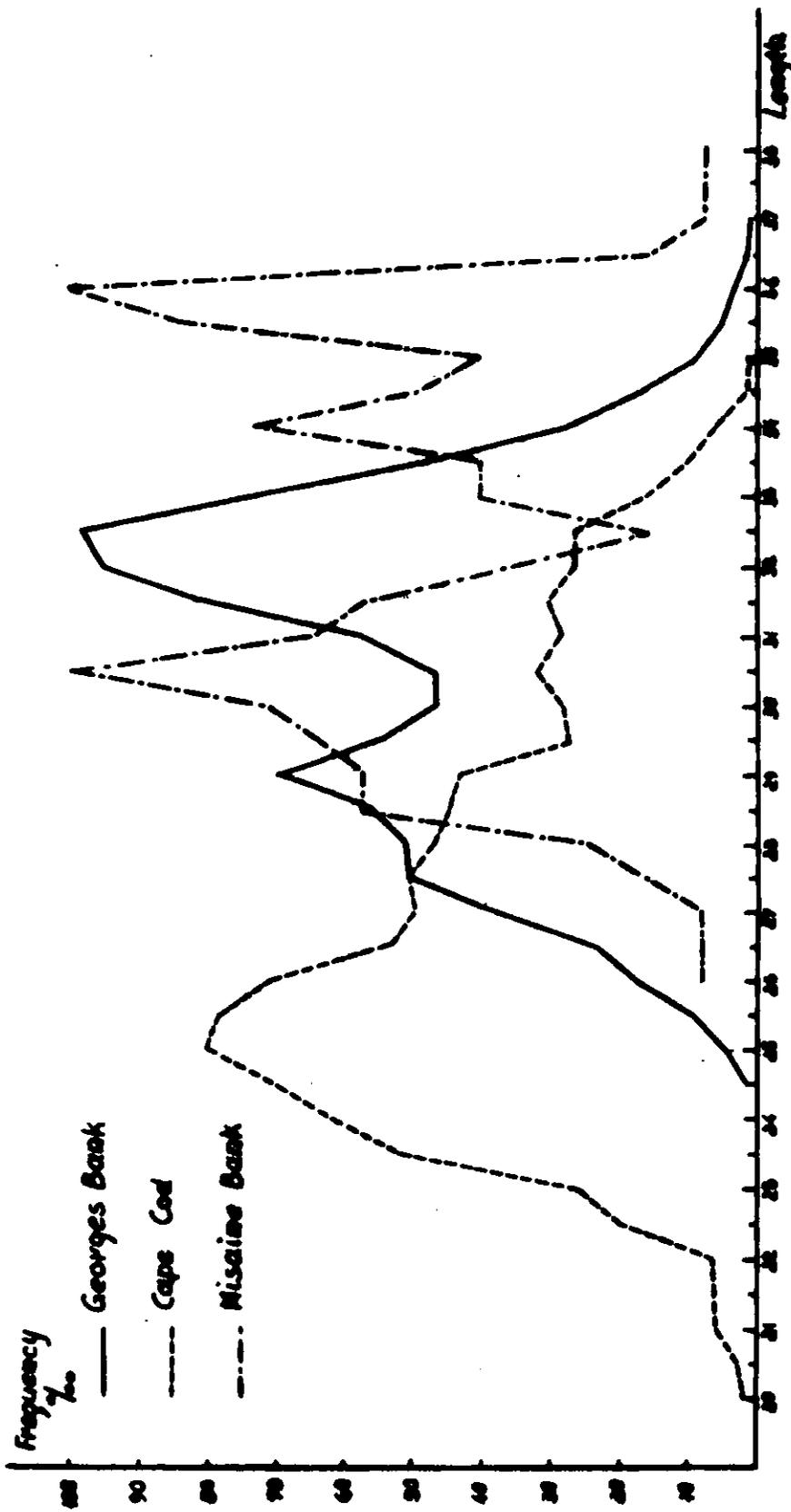


Fig. 1 Length composition of herring caught in 1969

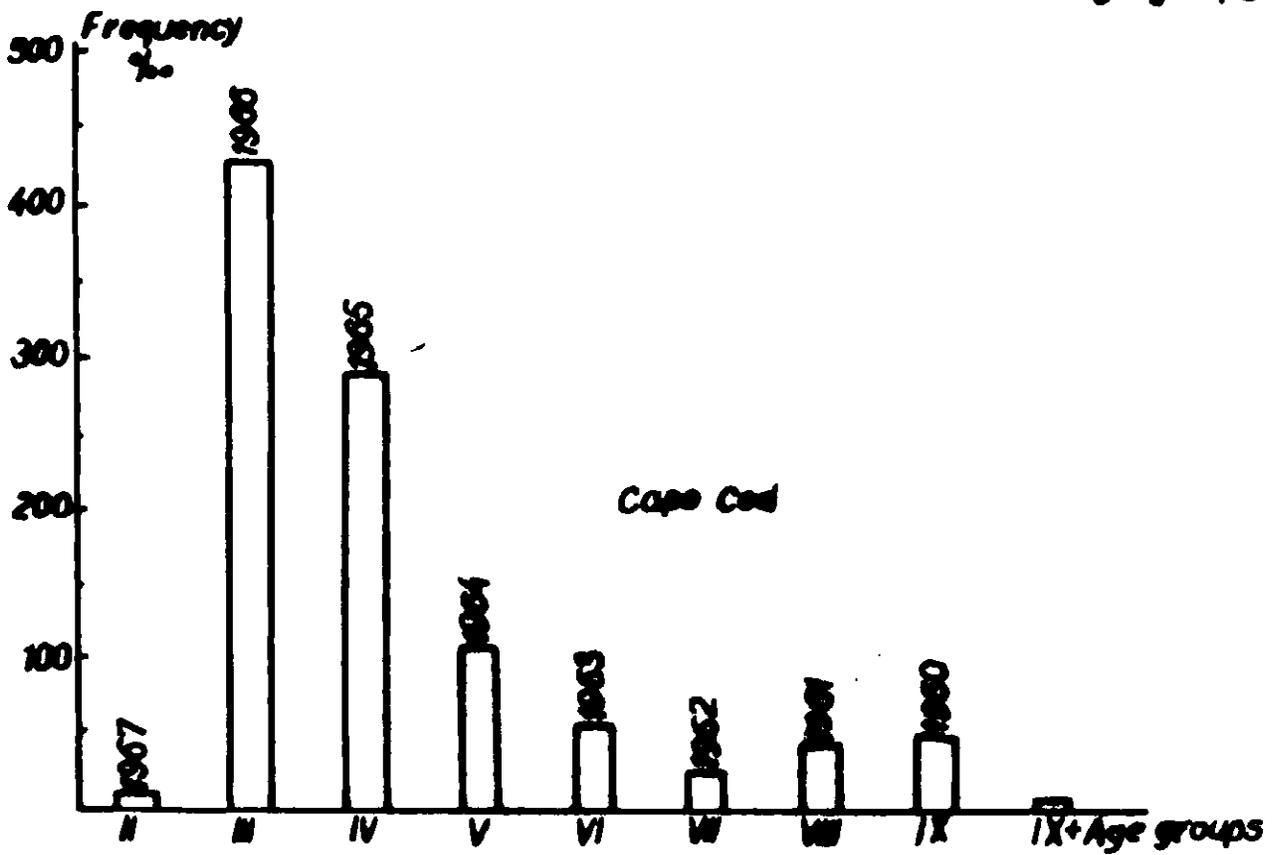
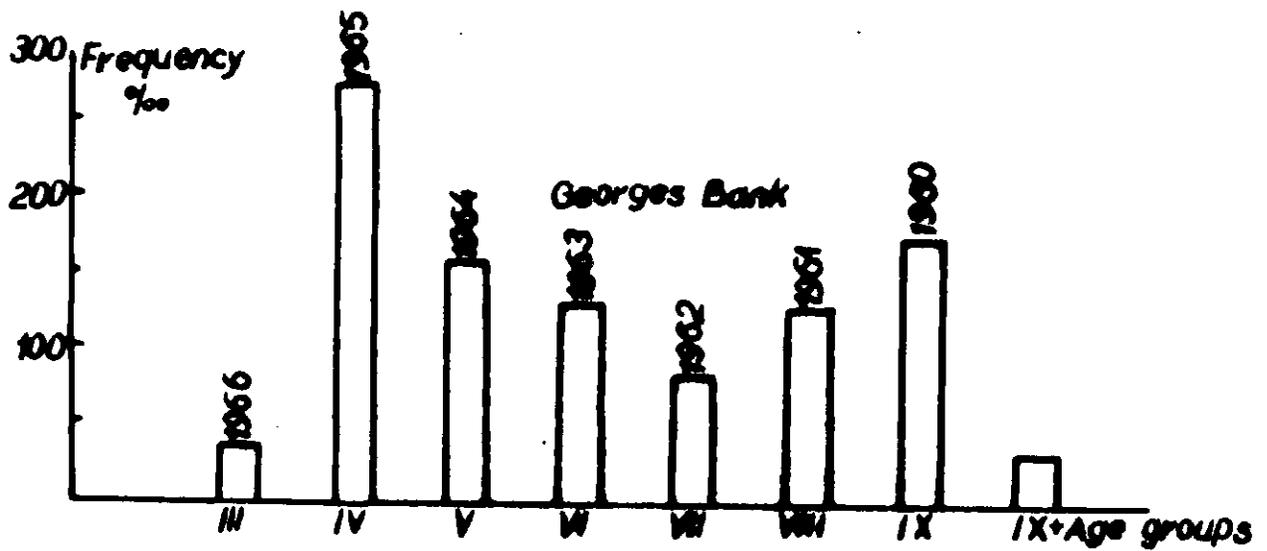


Fig-2 Age composition of herring caught in Georges Bank and Cape Cod region