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On occurrence and distribution of mackerel in the Nova Scotian shelf area in winter

by

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Introduction

Until 1963 the mackerel in the area of Nova Scotia was exploited only by the Canadian fishermen. In the sixties the mackerel yield increased appreciably due to the development of the USSR fishery in the Nova Scotia shelf area, and reached 33.2 thous. tons in 1974. The mackerel landings from this area by other countries are insignificant.

The highest catches are taken in May-July and in October-December when the mackerel schools are fished on their migration routes to the spawning and overwintering grounds. The fishing of the mobile mackerel aggregations in this period may be successful over the whole Nova Scotian shelf area. The Browns Bank, La-Have Bank, Emerald Bank, Sable Island and Nova Scotian Trench areas are most favourable regions for mackerel fishing.

Not much is known about the distribution and occurrence of mackerel in the Nova Scotia area in winter. Therefore, in the present paper the analysis of mackerel distribution and fishery in December-March is given based on the material collected on board the Soviet research and fishing ships.

Results

According to Morris et al. (1974) hydrological conditions on the Nova Scotian shelf are unfavourable for overwintering of mackerel. Nevertheless, there still may be assumed the possibili-

ty of overwintering of mackerel schools in the shelf waters in warmer winters (Fig. 1). In 1969 the mackerel was fished all the year running. The fishery for mackerel moving southward started in November 1968 on the western and south-western parts of the Sable Island shoal. The mackerel was mainly taken as a by-catch in the demersal fishery. The juveniles of 22-23 cm of the 1967 year class prevailed in the catches. In January-February 1969 the mackerel still occurred as a by-catch in the hake fishery on the southern slopes of Emerald Bank at depths 100-250 m. In March mackerel was taken on the slopes of Emerald and Sambro Banks at depths 90-220 m and in the shallow waters of Sable Island. The proportion of mackerel in the catches was on the average 20% in November-February, and 5% in March, some catches were presented exclusively by mackerel, the aggregations being mobile and unstable. In this period both the larger and smaller mackerel was caught (Fig. 2). The mackerel aggregations kept to warmer water with the pre-bottom temperature of 7-10° (Fig.3). The analysis of the mean weighted water temperatures along the standard hydrological section and of the hydrological survey data showed that despite severe meteorological conditions in the Nova Scotian shelf area considerable heat supply of water masses remained during the whole hydrological winter of 1968-1969 due to intensive influx of the warmer component of the deep Atlantic water to the shelf.

Layer m	No. 35 T°C	Station No. 36		I - 1969					
		43°55'	62°52'	I - 1969	I - 1965	II - 1967	No. 37	No. 38	No. 39
0 - 30	1.45	2.92	2.50	3.00	4.01	4.92	5.22	5.41	3.99
30 - 100	2.21	4.95	3.50	5.30	5.63	5.64	7.00	5.86	5.38
100 - bottom	-	8.47	5.40	5.80	-	-	7.45	7.53	7.82

The presence of the juveniles in winter catches of 1968-1969 can be attributed to high abundance of the 1967 year class. In November 1968 the juvenile mackerel was also abundant along the south-eastern coast of Newfoundland, which phenomenon is far from common (Parsons and Hodder, 1970). It should be noted that in winter period the juvenile mackerel are concentrated in more cold water than the larger fish. The larger mackerel avoid the regions where water temperature drops below 6°. According to our data the schools of juvenile mackerel were observed both in the New England and Nova Scotian shelf areas with the pre-bottom layer temperatures ranging between 4.5-7.0°, the young fish being recorded, however, at higher water temperatures as well.

Favourable overwintering conditions for mackerel were observed in winter 1972. In February 1972 the juvenile mackerel were fished incidentally on the south-eastern slopes of Emerald Bank at depths 100-250 m. The mackerel was weakly feeding on the euphausiids. A hydrological survey conducted on February 25-29 revealed the availability of a vast influx of warmer water to the area surveyed, where the pre-bottom temperature reached 9.5-10°. The conditions were similar in winter 1970.

The mean weighted temperature along the standard hydrological section (calculated from the temperatures within the layer 100 m - bottom) taken as a characteristic determining the heat content in the shelf waters in winter, allows to suggest that in the period under investigations (1968-1974) hydrological conditions were favourable on the south-eastern slopes of Emerald Bank for the overwintering mackerel aggregations. The water temperature in the layer 100 m - bottom exceeded 6° on all occasions. Relatively high water temperature in the pre-bottom layer maintained in the spring period as well.

The very large mackerel catches in winter periods of 1968-1974 were recorded in December 1968 and 1974 (Table 1). In December 1969-1973 the catches markedly declined, which can be attributed to limited fishery on the Nova Scotian shelf in some years, reduced fishing intensity and low density of mackerel aggregations. In January-March mackerel is most common on the south-eastern

slopes of Emerald Bank. In winter fishery of hake (January-March), however, carried out in places of anticipated mackerel aggregations (depths to 350 m) no significant concentrations were recorded. The total yield of mackerel in 1968-1974 did not exceed several hundred tons.

Conclusions

1. A correlation between hydrological conditions and occurrence of mackerel in the Nova Scotian shelf area is revealed.

The occurrence of mackerel aggregations on the Nova Scotian shelf is stipulated by the availability of the pre-bottom water of the Atlantic origin with the temperature exceeding 6°.

2. No considerable mackerel concentrations were recorded in January-March 1968-1974 in the Nova Scotian shelf area.

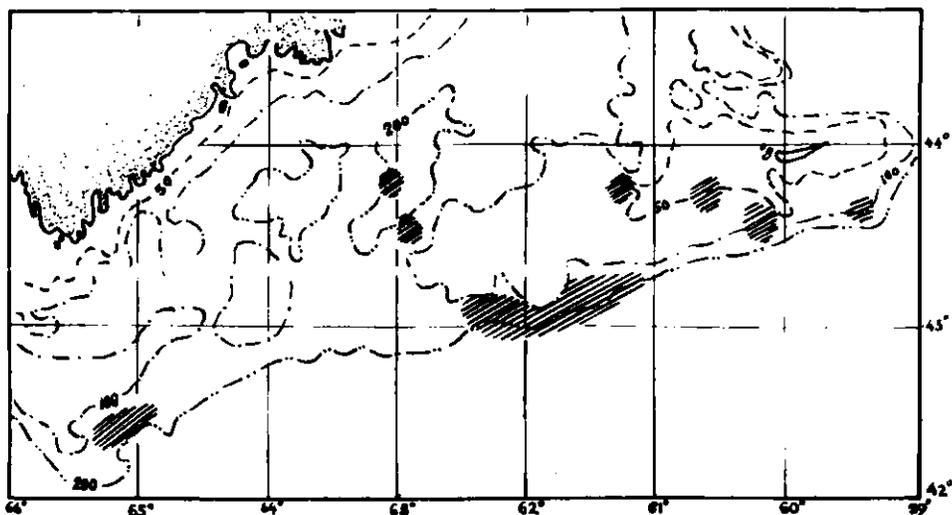
References

1. MOORES J.A., WINTERS C.H. and PARSONS L.S., 1974. Some biological characteristics of mackerel (*Scomber scombrus*) in Newfoundland waters. ICNAF Res.Doc. 74/8.
2. PARSONS L.S. and HODDER V.M., 1970. Occurrence of Juvenile and Spawning Atlantic Mackerel in Southeastern Newfoundland Coastal Waters. (J.Fish.Res.Bd.Canada V.27, No. 11, Nov. 1970, pp. 2097-2100).

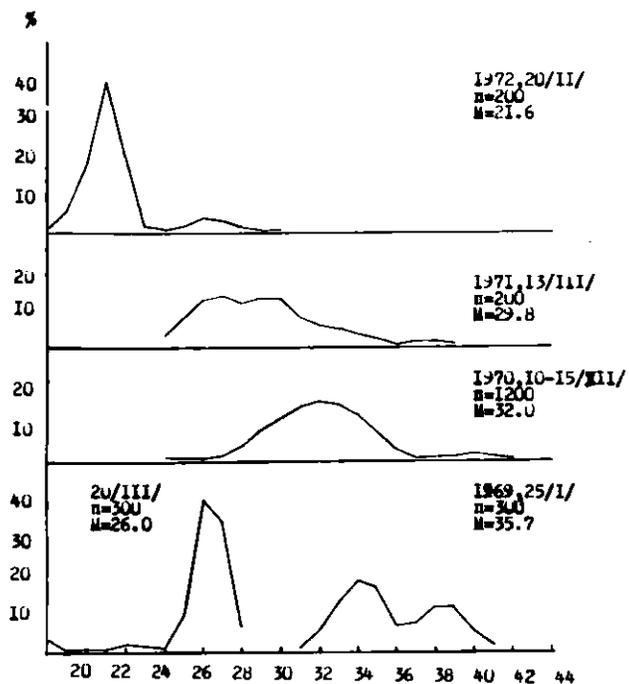
Table 1

Mackerel catches in the Nova Scotian
shelf area, 1968-1974 (tons)

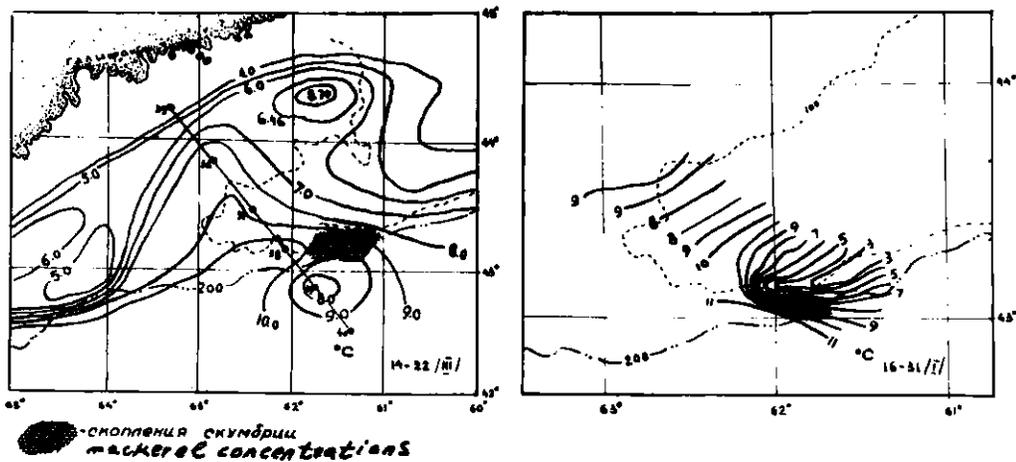
Country	Subarea 4				Div. 4X			
	January	Febr.	March	Dec.	January	February	March	December
	1968							
USSR	-	-	-	5995	-	-	-	-
Canada	-	-	-	-	-	-	-	48
	1969							
USSR	143	121	121	-	-	-	-	-
Canada	-	-	-	-	-	-	-	51
	1970							
USSR	5	-	10	218	-	-	-	-
Canada	-	-	-	-	-	-	-	33
	1971							
USSR	-	135	448	85	-	-	-	-
Canada	-	-	-	-	-	-	-	33
Rumania	-	-	1	-	-	-	-	-
	1972							
USSR	-	9	-	-	-	-	-	-
Canada	-	-	-	-	-	-	-	27
Poland	243	-	-	-	-	-	-	-
	1973							
USSR	-	-	19	41	-	-	-	-
Canada	-	-	-	2	-	-	-	28
Japan	-	-	-	-	-	-	-	1
	1974							
USSR	-	-	216	840	-	-	-	144
Canada	-	-	-	-	-	-	-	154
TOTAL:	391	265	815	7181	-	-	-	519



1. Distribution of mackerel in winter 1968-1974 on the Nova Scotian shelf.



2. Size composition of mackerel catches from the south-eastern slopes of Emerald Bank.



3. Pre-bottom water temperature distribution and mackerel aggregations on the south-eastern slopes of Emerald Bank in 1969.

