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ANNUAL MEETING - JUNE 1975Distribution and abundance of cod eggs in the South Labrador
and Newfoundland areas in 1974

by

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Abstract

Results, obtained, are compared with data for 1970-1973. In 1974 the abundance of cod eggs in the above areas was the greatest.

It is believed, that the abundance of adult cod 1970, 1972 and 1974 year classes will be greater than that of 1971 and 1973.

Introduction

Quantitative assessment of cod eggs in the South Labrador and North Newfoundland areas is carried out by the Pollar Institute since 1970. The results of ichthyoplankton survey in 1974 are presented in the paper.

Data on the abundance of cod eggs in 1974 are compared with those for previous years according to the results of vertical hauls by egg net on all the standard sections.

Material and methods

The work on the quantitative assessment of cod eggs was continued in the South Labrador and North Newfoundland areas in 1974 on board the R/V "Gemma". Ichthyoplankton was collected on all the sections (Fig. 1) from 16 May to 6 June. Ichthyoplankton was collected by egg net (diameter of the opening was 80 cm). Three kinds of hauls were made on each station: vertical, surface, oblique. Vertical haul where the depth was more than 500 m, was carried out in the 500-0 m layer, in the places shallower, than 500 m the bottom-surface layer was investigated. The speed of the net lifting was 1 m/sec.

The oblique haul was combined with the surface one during the ten minute's circulation on the dead slow speed. Nets used for the surface and oblique haul were attached on the same cable at a distance of 50 m one from the other.

The ichthyoplankton samples were fixed in the 4% solution of formalin. For determining the stages of the egg development, the ~~paper~~ ^{method} by Bass (1949) was used.

Results

In 1974 the pattern of cod egg distribution (Fig.2-4) was similar to that in previous years. The greatest number of cod eggs was met with on "triangle" tracks as before especially on the southern and western stations, on the stations of section 6-A (Newfoundland area) and the southern stations of section 7-A.

As in the previous years number of eggs per egg net haul increased southwards up to 47°N, while it decreased further south. On the sections 3-A, 4-A there were less eggs than on the sections northwards.

Quantitative distribution of eggs at the different stages of the embryonal development for the different ways of hauling is given in Table 1.

On all the sections cod eggs of all the development stages were met with, eggs at the first and second stages of development prevailed, as before.

It should be noted that on the sections north of 47° cod eggs of the Labrador stock occurred but in more southerly areas it is apparently that confusion of the Labrador cod eggs with the eggs of cod, that spawned on the north-eastern slope of the Grand Newfoundland Bank took place (Postolaky, 1973; Serebryakov 1967).

Duration of embryonal egg development depends on temperature of the surface layer, where they drift and develop.

Long-term observation in the Labrador and Newfoundland areas showed, that in April-May water temperature on the surface and in the 0-50m layer is negative almost everywhere. It is positive only

on the continental slope and near it . The main bulk of cod eggs develop in the shelf waters of the North Newfoundland Bank and on the northern Grand Newfoundland Bank. Cod larvae in the areas mentioned, appeared generally in June-July (Serebryakov 1967) because of the low temperature and delayed embryonal development of eggs.

The speed of the Labrador Current on the surface ^{reached} ~~makes up~~ about 10-12 miles per day (KILLERICH 1943; Bogdanov 1959).

Eggs develop 45 days when the water temperature is 0°, at the temperature -1 they develop 60 days. For the eggs ,to reach the second stage of development at the above water temperature, 17-24 days are needed respectively and to reach the third stage of development they needed 33 and 46 days respectively (APSTEIN, 1909).

The distance between the spawning grounds of North Labrador and the North-Eastern slope of the Grand Newfoundland Bank is about 770 miles. The distance between the spawning grounds of the Central and the South Labrador and the North-Eastern slope of the Grand Newfoundland Bank is respectively equal to 400 and 300 miles. Taking into account speed of the Labrador Current, distance between spawning grounds and main area of the early stages of the egg development, delayed rate of the embryonal development, one can suppose, that eggs at the third and fourth stages of development were brought by the current from all the spawning grounds, while eggs at the first and second stages of development drifted from the South Labrador, partially from the Central Labrador.

For quantitative assessment of cod eggs in separate years the average catch of cod eggs per one vertical haul by egg net for all the sections (Tabl.2) and the average catch during the vertical haul on sections 6-A, 7-A, south-eastern and south-western "Triangle" tracks (Tabl.3) were used.

As it is seen from the average egg number, the highest abundance was registered in 1970, 1972 and in 1974.

It is believed that abundance of the Labrador adult cod of 1970, 1972, 1974 year classes, at equal conditions of development during early stages and formation of the future recruitment to the fishing proportion of the stock, will be greater than the abundance of the 1971-1973 year classes of cod.

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Table 1. The average number of cod eggs per egg net haul on the different sections in May-June 1974.

Section	Date of observation	Haul	Stages of eggs maturity.				Total	Number of Station
			I	II	III	IV		
3-A	16-17 May	vertical	0,4	0,2	0,1	-	0,7	10
		oblique	4,7	1,2	1,5	0,3	7,7	10
		surface	5,0	2,2	1,6	0,6	9,4	10
4-A	21-22 May	vertical	0,4	-	-	0,1	0,5	8
		oblique	-	0,1	0,1	0,1	0,4	8
		surface	-	-	-	-	-	8
6-A	26-28 May	vertical	34,5	27,0	10,3	0,1	72,0	12
		oblique	43,8	19,3	19,2	1,8	84,2	12
		surface	71,3	60,7	25,2	26,6	163,8	12
7-A	28-30 May	vertical	0,7	0,5	0,5	0,1	1,8	10
		oblique	18,9	10,8	20,4	1,9	52,0	10
		surface	2,4	3,7	4,3	0,7	11,1	10
Section 5 O	31-1 June	vertical	1,9	0,9	0,5	0,1	3,4	10
		oblique	2,8	3,7	4,7	1,6	12,8	10
		surface	4,3	6,2	1,7	0,6	12,8	10
Section 5 W	1-2 June	vertical	7,2	3,0	1,1	0,4	11,6	8
		oblique	29,6	19,0	11,1	3,1	62,8	8
		surface	16,2	7,4	4,7	2,1	30,4	8
Section H W	2-3 June	vertical	3,8	4,3	2,1	1,0	11,2	8
		oblique	6,6	6,7	4,0	-	17,2	8
		surface	7,5	11,9	5,6	-	25,0	8
4I-A	4-5 June	vertical	3,2	0,8	2,0	0,2	6,2	5
		oblique	55,6	2,8	3,6	0,0	62,0	5
		surface	65,2	5,0	2,8	0,4	73,2	5

Table 2. The average number of cod eggs per vertical egg net haul on all the sections in May-June in 1970-1974.

Year and date	Number of stations	Average number of eggs per vertical haul	Stage of eggs maturity %			
			I	II	III	IV
1970, 6-25 May	84	8,2	30,6	22,4	25,9	21,1
1971, 5 May-5 June	82	3,2	37,9	20,5	17,0	24,6
1972, 16-25 May	55	5,9	48,4	28,7	19,9	3,0
1973, 14 May-23 June	112	2,9	44,7	20,7	24,2	10,4
1974, 16 May-6 June	71	16,0	48,3	35,4	14,9	1,4

Table 3. The average number of cod eggs per vertical egg net haul in 1970-1974. Sections 6-A, 7-A southwestern and southeastern "triangle" tracks.

Year and date of observation	Number of stations	Stages of eggs development %				Average number
		I	II	III	IV	
1970, 16-20 May	28	2,96	2,4	2,2	1,98	9,6
1971, 24 May-June 4,	34	2,1	0,58	0,39	0,7	3,8
1972, 25-31 May	27	5,6	2,9	2,0	0,2	10,8
1973, 22 May-June 2,	41	1,76	0,59	0,43	0,16	2,91
1974, 26 May-June 2.	40	12,4	9,0	3,6	0,16	24,8

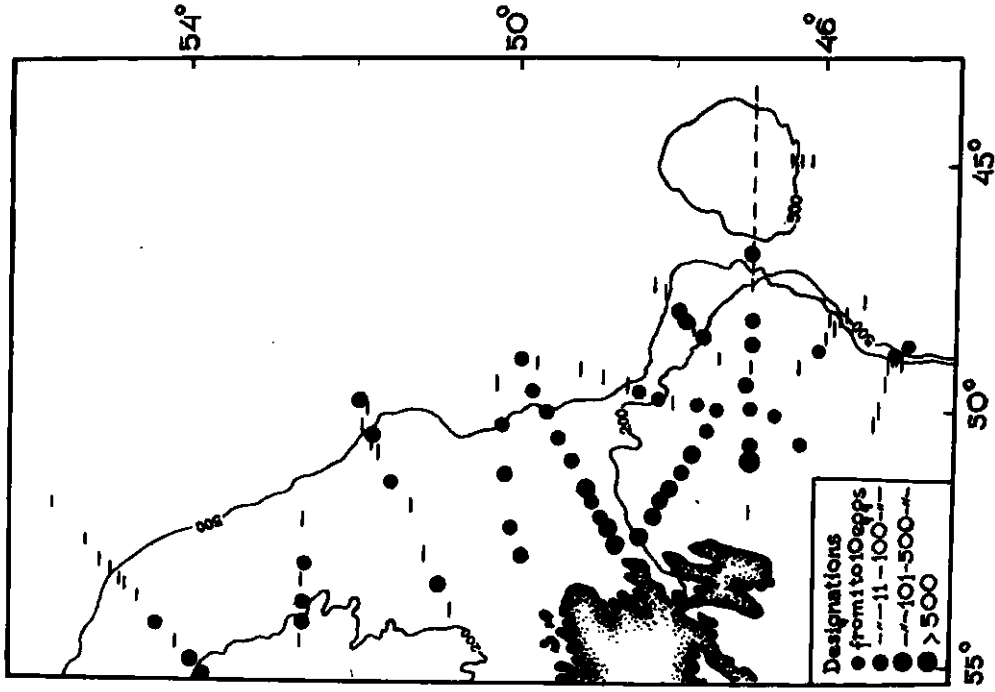


Fig. 2. Distribution of eggs per vertical haul by egg net in 1974 (symbols are given on the figure).

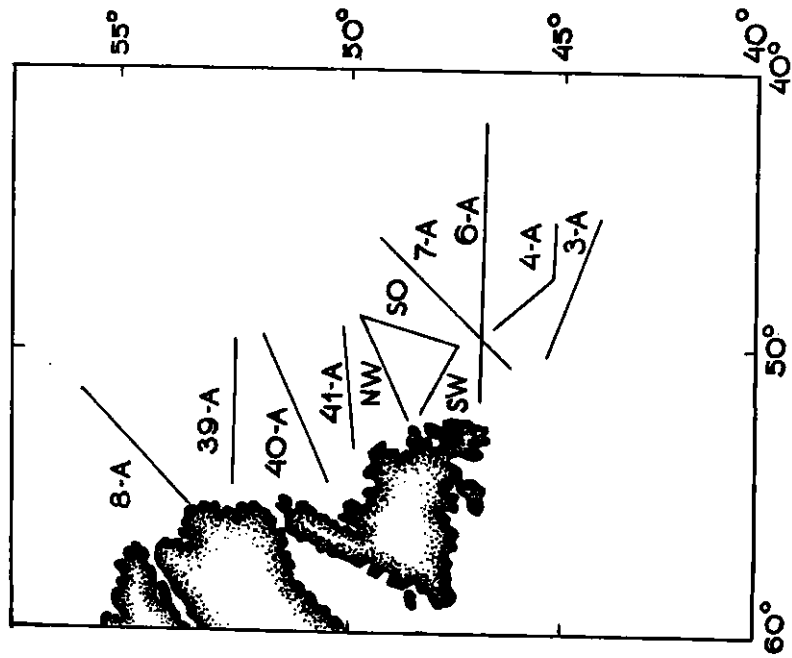


Fig. 1. Standard hydrological sections, where cod eggs are registered every year.

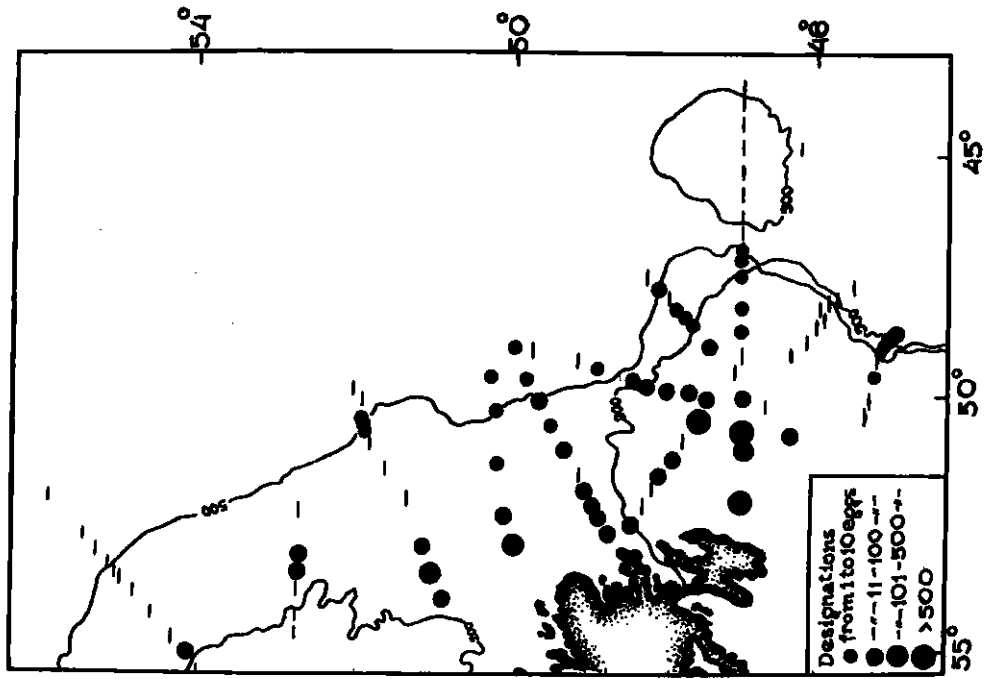


Fig. 4. Distribution of cod eggs on the surface.

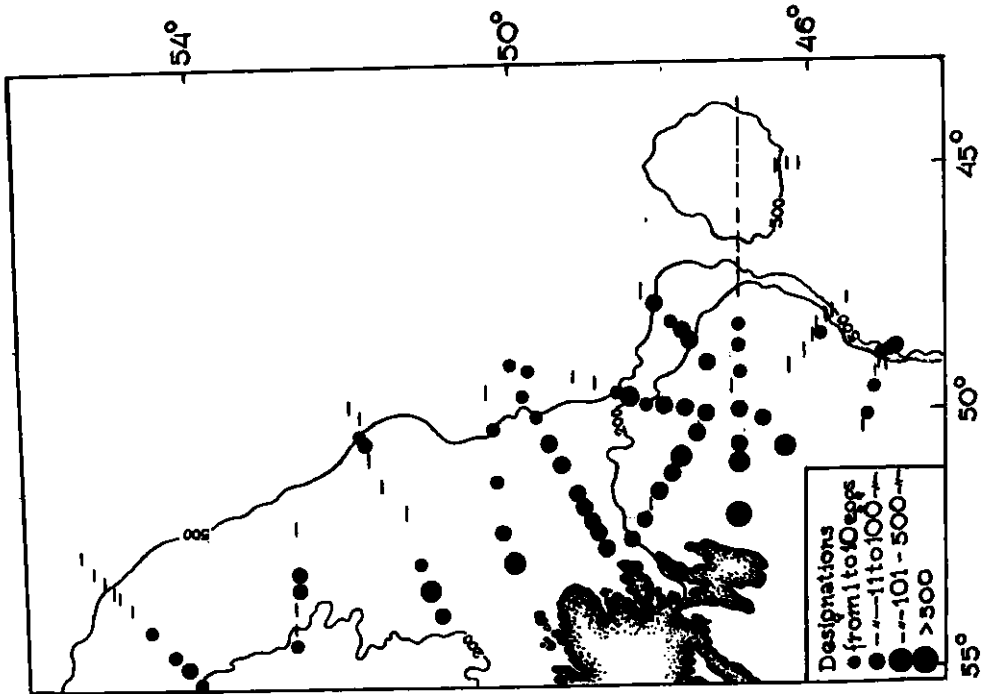


Fig. 3. Distribution of cod eggs on the data of the oblique haul (50-0 m).