Northwest Atlantic Fisheries Organization

Serial No. N700

NAFO SCR Doc. 83/VI/43

SCIENTIFIC COUNCIL MEETING - JUNE 1983

Report on Soviet Investigations in NAFO Subarea 4 in 1982

by

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A. Status of the fisheries

Silver hake. The Soviet catch of the silver hake in 1982 was 47,3 thous.tons against the alloted quota of 48,4thous.tons. In 1981 the silver hake catch was 40,2 thous.tons against the alloted 48.4 thous.tons. In 1982 the silver hake was caught from April to June inclusive on the southern slopes of the Nova Scotia shelf. The conditions for fishing were very favourable. The influx of cold waters to the shelf resulted in massive movement of the hake to the shelf slopes, where dense and stable aggregations were formed. In April 1982 the catches with BMRT class vessels per fishing day amounted to 49.7 tons compared with 13.5 tons in 1981, in May the catches were 37.9 and 28.0 tons, and in June 37.4 and 22.9 tons respectively. The total value of fishing effort reduced in 1982 due to large catches per effort.

As in the previous years, the bulk of the silver hake catches in 1982 was made of the specimens 28-35 cm in length, at the age of 3 and 4 (tables 1, 2). Both the mean body length and mean weight of the hake in the catches has remained almost unchanged in the recent three years (table 1). In 1984, as in the previous years, the catches will be mostly represented by 3 and 4 year olds of the 1980 and 1981 year classes. The data of the surveys of fry abundance show that the 1981 year-class is relatively strong, and the 1980 year-class is a poor one. So it can be expected that in 1984 the fishing stock of the silver hake will remain at the 1982 and 1983 level, i.e. about 800 thous.tons.

Short-finned squid. In 1982, in the areas fished by the Soviet fleet the species was found in small numbers and its catch amounted to 124 tons in all, the quota being 5 thous.tons.

Very small catches of the squid can be attributed to the fact that the species did not move to the shelf occupied in 1982 with extremely cold waters. In July the squids were represented in the catches by the specimens ranging from 12 to 23 cm in length with the mean length of 17.4 cm and mean weight of 97 g.

B. Special Studies

Hydrology. In 1982 the environmental studies in the Nova Scotia shelf area were limited to observations of the water temperatures in the 0-200 m depth layer made during the ichthyoplankton survey from 23 September to 13 October, and during the survey of silver hake fry abundance from 31 October to 14 November.

The surveys were made by the Soviet vessel SRTMK-8080 "EKLIPTIKA" under the bilateral agreement between the USSR and Canada.

The observations covered a greater part of the shelf area adjacent to the Nova Scotia Peninsula on the south. The obtained temperatures were processed by square (each square 20'x30' in size), and then the averaged water temperature values for each square were calculated based on two surveys and charts of autumn temperature distribution built for the 0, 50, 75 m depths and for the near-bottom layer. For illustration, in figs.1 and 2 the temperature distribution in the near-bottom layer is shown for autumn 1981 and 1982. As is evident from comparison of the two figures, a marked decrease of the water temperature took place on the shelf, being especially significant in the eastern part of the area and in traditional spawning grounds of the silver hake, which, probably, affected the survival of the larvae of this species. The analysis of changes of the water temperatures, which took place in the area in the recent 5-6 years, will be presented in a special report.

Zooplankton. The zooplankton samples collected during the surveys in August and September 1980 were processed in 1982. The zooplankton was mainly represented by Oithona spp., Centropages spp., Calanus finmarchicus and copepod eggs and nauplii, the proportion of which constituted 80%. Unlike the previous years, beginning with 1977, the zooplankton abundance in 1980 was the lowest and averaged to 910 thous.sp./m^3 compared with 1500 thous.sp/m^3 in 1977 and 1020 thous.sp./m^3 in 1979. The zooplankton biomass in 1980 was on the average 10 g/m^2, and more dense aggregations of 40 g/m^2 were found westward of Sable Island in the Emerald and Browns Banks area.

Ichthyoplankton. The results of the analysis of the materials of ichthyoplankton surveys carried out in August and September 1980 showed that, as in the previous years, the massive spawning of the silver hake took place on the western slopes of the Sable shoal.

In August, the number of eggs under m^2 was on the average 25, and in September - 12, fluctuating from 1 to 260 eggs. The total abundance of silver hake eggs in August 1980 was 4 times below that of 1978, and 1.5 times below that of 1979. The number of larvae in August 1980 averaged to 46 sp./m^2, and in September to 32 sp./m^2. The total abundance of larval hake in 1980 was two times below that of 1978, and 4 times below that of 1979.

Trawling survey of the hake fry carried out in the first half of November on the Nova Scotia shelf showed that the total abundance of the hake fry appeared to be 60 times below that of 1981 and constituted $17 \cdot 10^6$ sp.

Young short-finned squids. The R/V "Evrika" conducted the investigations of the distribution and abundance of the young short-finned squids in the Nova Scotia area from the continental slope to the Gulf Stream during the period from February to May. Preliminary results were submitted to the NAFO Session held in June 1982 (Res.Doc./82/VI/28). Additional analysis of the materials of the expedition made it possible to suggest that a low abundance

of the short-finned squids on the shelf in the NAFO Div. 4W in summer 1982 was caused by a redistribution of the youngs in the open sea prior to their movement to the shelf. So, in the area to the west of 60°W the abundance of the young short-finned squids averaged to 500 thous.sp./km^3, and in the area between 50° and 60°W it amounted only to 60 thous.sp./km^3. The redistribution of the young squids can be attributed to weakening of the main Gulf Stream jet.

Table 1 Size composition (%) of commercial silver hake catches taken off Nova Scotia in 1980-1982

Length, cm	1980	1981	1982
10-11	+	-	
12-13	+	-	+
14-15	+	-	0.1
16-17	0.2	+	0.4
18-19	0.4	0.2	1.0
20-21	0.7	0.4	2.2
22-23	1.8	0.3	2.1
24-25	3.5	0.8	1.9
26-27	7.8	3.9	6.5
28-29	14.0	16.4	11.9
30-31	24.5	32.1	20.7
32-33	24.2	24.4	23.5
34-35	14.1	13.0	16.6
36-37	5.0	5.2	7.6
38-39	2.2	2.1	3.3
40-41	0.7	0.7	1.3
42-43	0.3	0.3	0.6
44-45	0.4	0.2	0.2
46-47	0.1	+	0.1
48-49	+	+	+
50-51	0.1	+	+
52-53	+	+	+
54-55	+	+	-
56-57	+	+	-
58-59	+	+	-
60-61	-	+	-
62-63	-	+	-
Mean length, cm	31.1	31.5	31.4
Mean weight, g	202	224	238
No. of sp.	56701	36482	32603
Fishing gear	trawl,815-Hake	trawl,815-Hake	trawl,815-Hake
Mesh size, mm	60	60	60

Table 2 Age composition (%) of silver hake commercial catches taken off Nova Scotia in 1980-1982

Age years	1980	1981	1982
1	1.4	0.7	4.9
2	16.8	9.9	14.9
3	36.2	42.6	24.1
4	32.4	33.0	37.6
5	9.6	10.3	12.8
6	2.2	2.6	4.1
7	0.6	0.7	1.1
8	0.5	0.1	0.4
9	0.2	0.1	0.1
10	0.1	+	+
Mean age, years	3.1	3.5	3.6
Fishing gear	trawl,815-Hake	trawl,815-Hake	trawl,815-Hake
Mesh size, mm	60	60	60

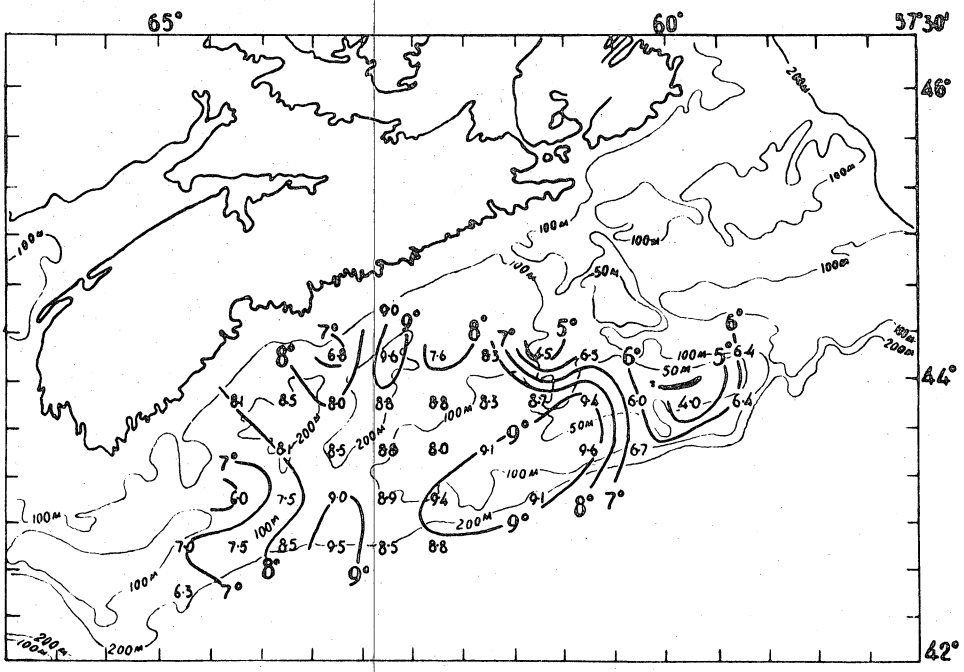

Fig.1 Water temperatures in the near-bottom layer, autumn 1981.

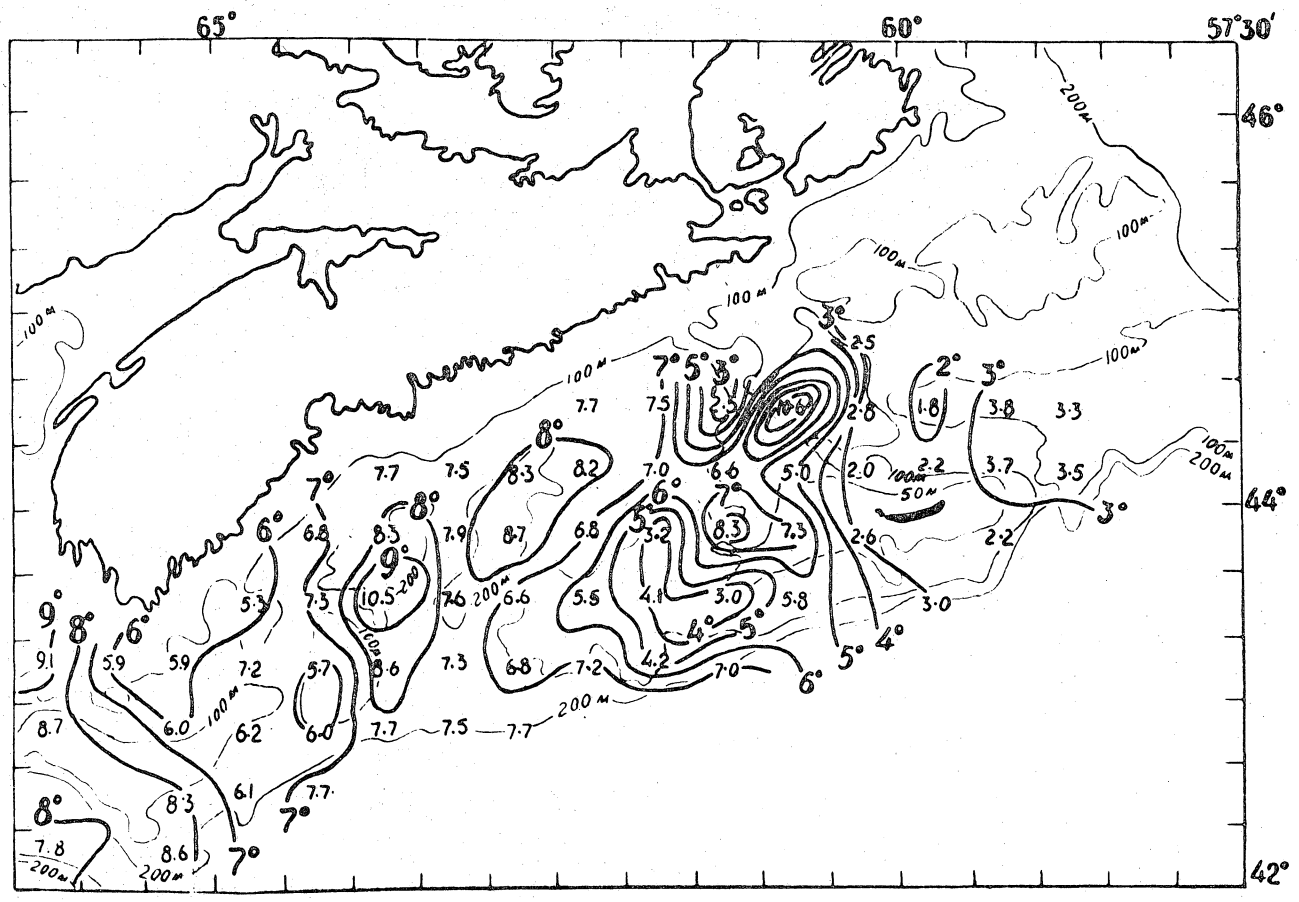

Fig.2 Water temperatures in the near-bottom layer, autumn 1982.