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The Results of Russian Research and Fishery on Silver Hake *(Merluccius bilinearis)* on the Nova Scotian Shelf in 2000

by

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Abstract

During fishery by BMRT-0441 “Bizon” on the Nova Scotian shelf in April-August 2000, silver hake aggregations were distributed at 100-250 m depth, mainly near the 200-metre contour. Towards summer, hake tended to migrate eastward (from 64° to 60° W) to shallower waters. The highest catches were taken in May and June. The bulk of catches was made up by mature individuals 26-28 cm long. The proportion of immature fish generally did not exceed 10%. In May and June catches were dominated by pre-spawning fish, while in July, post-spawners were observed in catches. Feeding was most active in summer, euphausiids and *Themisto* being major food items.

Silver hake fishery allowed to suggest a relatively high fisheries efficiency and wide distribution of this species, that appears to indirectly indicate a healthy condition of the stock.

Introduction

Silver hake is a traditional object of Russian fishery in the Northwest Atlantic. The maximum catch of 298533 t was taken in 1973. Until 1993, Russia had been one of the leading countries fishing for this species on the Nova Scotian shelf. In the succeeding years the catches notably decreased (Table 1). In the last five years, catches were the highest (1169 t) in 2000 (preliminary data). Also in 2000, for the first time since 1993, sampling from commercial catches was resumed. Since silver hake is still of some interest for international fisheries, including Russia, we thought it appropriate to submit the most recent data on fisheries, distribution and biological status of this species in the area open for international fisheries.

Materials and Methods

Silver hake fishery was conducted on the Nova Scotian shelf in the period from 30 April to 2 August 2000 by BMRT-0441 “Bizon”. Hauls were made by Canadian bottom trawl with sorting grid (40 mm bar space) and 60 mm mesh size.

Sampling and primary processing of biological materials were done by the scientific observer according to PINRO methods (Instructions and Guidelines, 1980). The summary of the data collected is given in Table 2.

Fishery and distribution of silver hake

During fishery by BMRT-0441 "Bizon" on the Nova Scotian shelf, silver hake aggregations were mainly distributed near the 200-metre contour, especially along its western side. From late April to early August, commercial aggregations shifted from 64 to 61°W. The easternmost distribution boundary was observed at 60°W (Fig. 1).

Fishery for silver hake showed that in May, aggregations were largely distributed in relatively deep waters at 150-250 m depth (Table 3). In June, close to the spawning season, aggregations of silver hake shifted to shallower waters of 100-150 m depth. In July hake tended to migrate along the slope to the 250 m depth. No essential differences in the distribution of hake aggregations were found in comparison with the period of 1977-1993. Of course, the distribution patterns were not completely identical and there were some differences between the years. E.g., in May dense hake aggregations were observed at 64°W. The earlier data show that similar pattern was previously observed only in 1980 (Rikhter *et al*., 1981). Meanwhile, in the area between 60° and 63°W hake aggregations occurred in May-July over all years of observation. Since 1985, with the eastward extension of fishing area, hake has been successfully fished off in May-June also between 59° and 60°W.

CPUE were the highest in June, while in May, they were lower (Fig. 1). August fishery was the least effective that was related to spawning migrations of major hake aggregations to shallower waters closed for Russian fishery. Data on the time of silver hake spawning migrations for the year 2000 corresponded to those obtained in the previous investigations (Rikhter and Konovalov, 1985).

Due to sorting grids, the average proportion of silver hake in catches made up 97.3%. The by-catches consisted of redfish, argentine, haddock, cod and other species, the percentage of each species not exceeding 1%.

Biological characteristics of silver hake

Length composition of silver hake did not fluctuate substantially by months and subdivisions. Length ranged from 16 to 40 cm with modal class of 26-28 cm (Fig.2). According to AtlantNIRO data, in the period from 1977 to 1993 inclusive, prevalent length groups in the commercial catches were largely the same.

The bulk of catches was made up by mature individuals. The portion of immature fish generally did not exceed 10%. In May-July, pre-spawning fish were predominant, in July post-spawners occurred in catches.

Feeding was the most active during summer months, euphausiids and Themisto being major food items. Besides that, shrimp, different fishes, crabs and squids occurred in stomachs. Information on maturity rate and diet of hake was in line with the previous data. Apparently, no noticeable changes in the biological status of silver hake have been observed since 1993.

Conclusions

The results of BMRT-0441 "Bizon" fishing activity in spring-summer 2000 indicated a wide distribution and relatively high efficiency of hake fishery on the Nova Scotian shelf with low by-catches of other species. The collected data indirectly supported the assumption of a healthy status of silver hake stock in present time. At least, previous investigations revealed a direct correlation between stock size, CPUE and the area of dense hake aggregations.

In 2002, silver hake stock will obviously be at a relatively high level. This is supported by the results of AtlantNIRO research (Sigaev *et al*., 2000; Sigaev, 2000), according to which, in 1998-2000 the hydrological conditions on the Nova Scotian shelf favoured the formation of strong hake cohorts. A similar conclusion can be drawn by the results of the Canadian demersal fish survey undertaken in June and estimating the 1998 and 1999 cohorts as above-average (DFO, 2000). It can be therefore assumed that in 2002 hake fishery conditions will be quite satisfactory, allowing to ensure a sufficiently high fisheries efficiency.

References

DFO. 2000. Silver hake on the Scotian Shelf (Div. 4VWX). Science Stock Status Report A3-3.5 (2000).

RIKHTER V.A., V.F. TUROK and Yu.S. GRINKOV MS 1981. The distribution of some groundfish species and shortfinned squids on the Scotian Shelf during the 1980 fishing season from the data of of the soviet observers. *NAFO SCR Doc*. No. 49, Serial No. N331, 15 pp.

RIKHTER V.A. and E.I. KONOVALOV. MS 1985. On the question of relationship of growth rate of gonads, abundance and timing of silver hake migration from the Scotian Shelf slopes in summer. *NAFO SCR Doc.* No. 34, Serial No. N984, 8 pp.

RIKHTER V.A. and V.F. TUROK MS 1990. Dependence between stock size and concentration densities for Scotian Shelf silver hake by USSR observers' data for 1979 through 1988. *NAFO SCR Doc.* No. 18, Serial No. N1735, 11 pp.

SIGAEV I.K. 2000. Interannual variability of sea surface temperature and dynamics of surface water boundaries in the systems of the Labrador current and the Gulf Stream. Fisheries and biological research by AtlantNIRO in 1998-1999. *Trudy AtlantNIRO*, p. 37-56.

SIGAEV I.K., V.A. RIKHTER and P.S. GASIUKOV MS 2000. Russian research report for 1999. Part 1.- Research carried out by AtlantNIRO in NAFO Subarea 4. *NAFO SCS Doc*., No. 9, Serial No. N4221, 22 pp.

Table 1. Russian and total catches (preliminary) and TAC (mt) of Silver Hake in 1996-2000.

Year	1996	1997	1998	1999	2000
Russia	669	0	168	0	1169
Total	25927	16164	16062	8858	?
TAC	60000	50000	55000	30000	20000

Table 2. Summary of the data collected in BMRT-0441 "Bizon" cruise in April-August 2000.

NO. OF HAULS	319
NO. OF FISH MEASURED	26482
FIELD ANALYSIS OF MATURITY AND DIET	3682

Table 3. Silver Hake catch per effort (t/hr) related to depth range (m) in May-July 2000.

Depth	May	June	July
100-150	1.0	2.9	0.5
151-200	1.4	1.7	0.6
201-250	1.5	0.9	0.7
251-300	1.0	0.7	0.1
Average for all depths	1.36	1.60	0.56

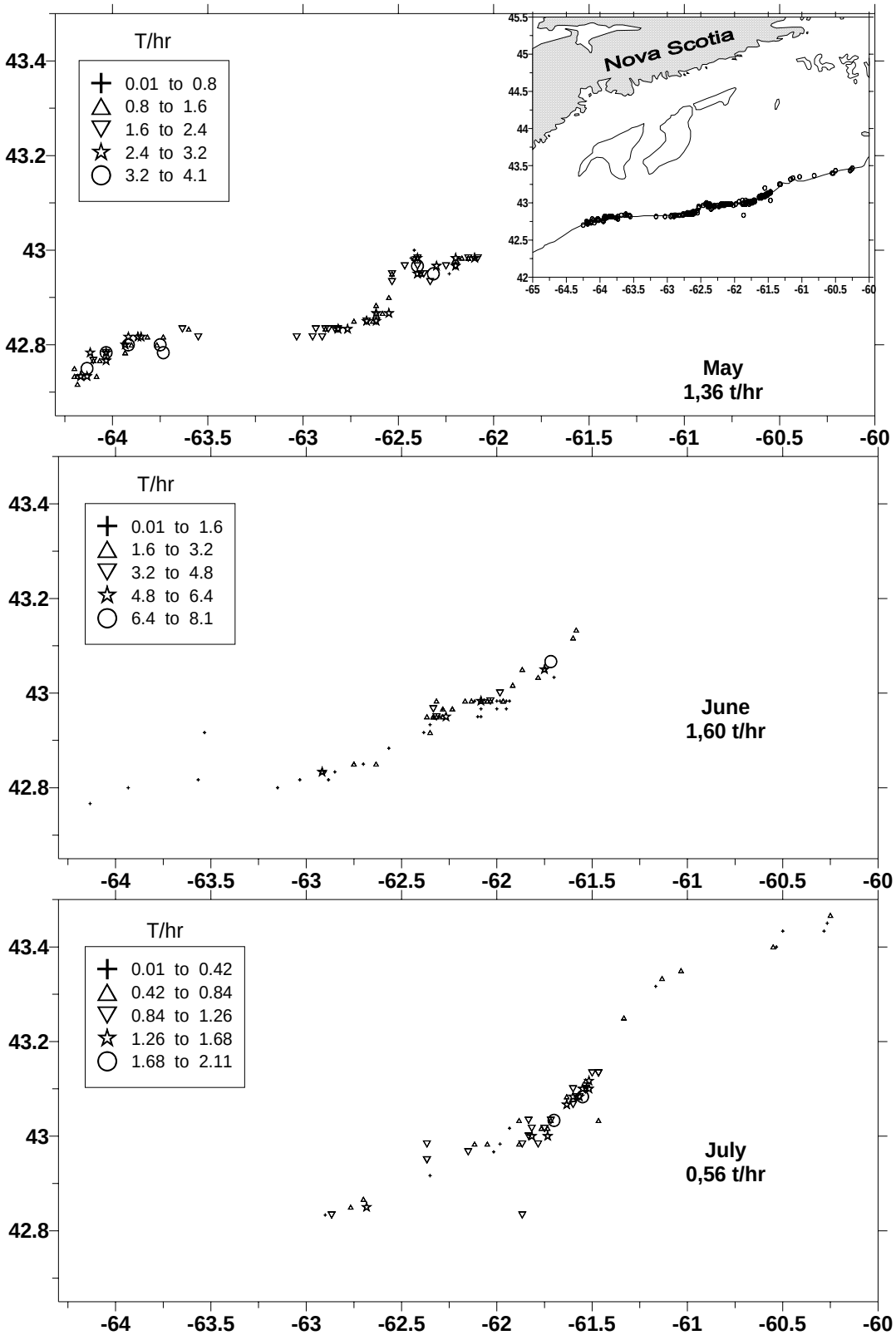

Fig. 1. Trawling points and catches per hour (t) for Silver Hake in May-July 2000.

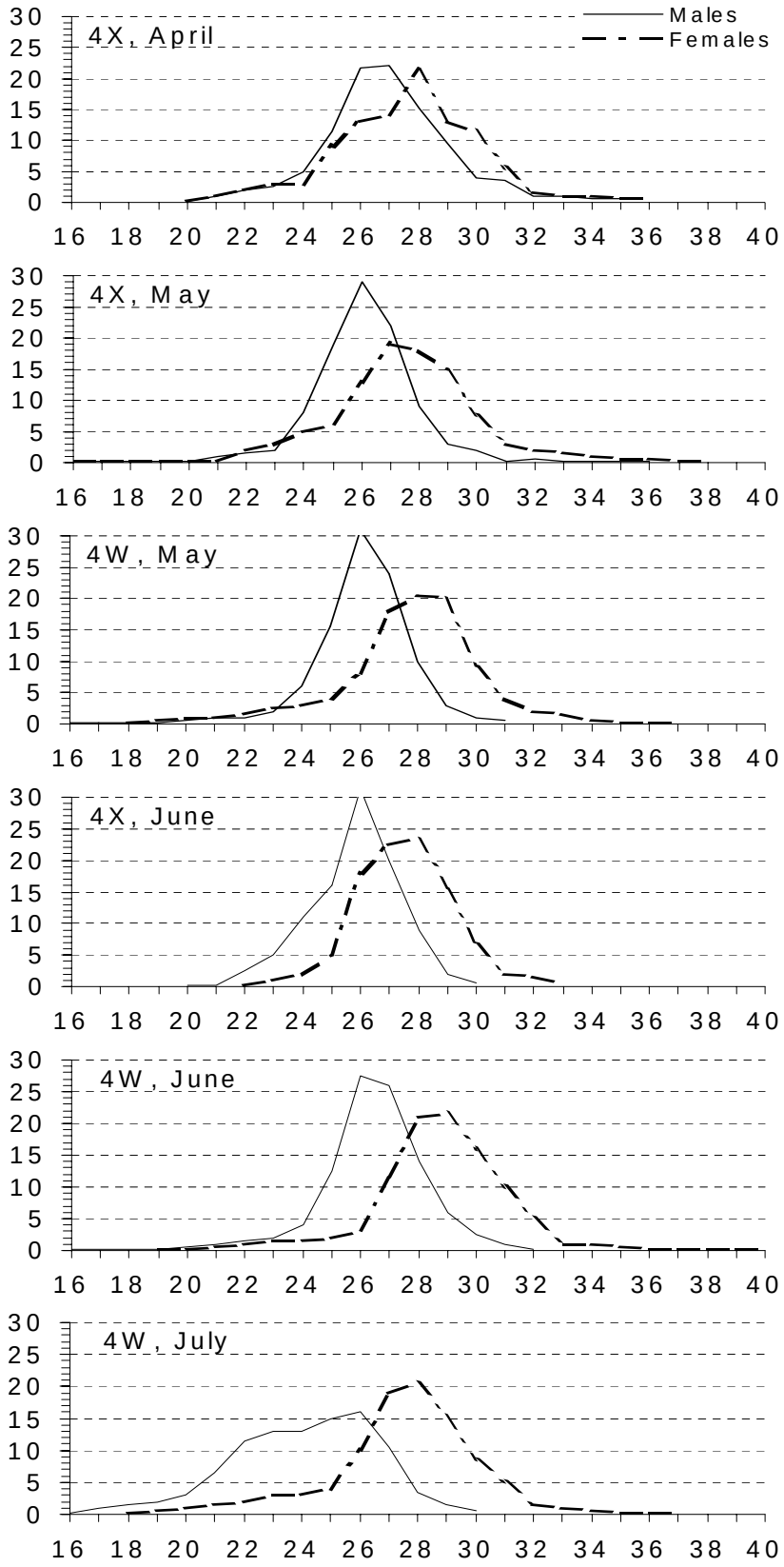

Fig. 2. Length composition of Silver Hake on Nova Scotian Shelf in April-July 2000.