Northwest Atlantic Fisheries Organization

Serial No. N4965 **NAFO SCR Doc. 04/17**

SCIENTIFIC COUNCIL MEETING – JUNE 2004

Update on Capelin Stock Status in Divisions 3NO

by

K. V. Gorchinsky

Polar Research Institute of Marine Fisheries and Oceanography (PINRO)
6 Knipovich Street 183763 Murmansk Russia
e-mail: inter@pinro.ru

Abstract

The purpose of the present paper is to check whether the capelin stock status has changed compared to the previous assessment in 2003. Although the relationship between capelin biomass indices from bottom trawl survey and the stock size remains unclear, data obtained indicate that the stock continues to be in a depression. Indices of trawlable biomass in 2003 correspond to low level of the stock in 1995-1996, which gives grounds to prolong the Scientific Council advice of no directed fishery for capelin in 2005.

Catch History and Management

The fishery for capelin commenced in 1971and total catch was maximal in the mid-1970s with a peak of 132 000 metric tons in 1975. There was no fishery from 1979 to 1986 but it was resumed in 1987-1992. Annual catches in that period did not exceed 25 000 tons. In subsequent years no directed fishery for capelin was carried out. Historically, the largest contribution to the total catch was made by Russia (former USSR), Norway, Iceland and Japan (Table 1).

A TAC first set in 1974 reached its maximum of 200 000 tons in 1977-1978. Then it was 30 000 tons in 1990-1992 and never been overfished. For the reason of the stock sharp reduction in recent years, since 1993 a ban of directed capelin fishery has been used as a management measure.

On account of intermingling during the spawning period, the stock distributed in Div. 3LNO and Subdiv. 3Ps at first was managed as a single one. Having regard to concurrent (June-July) spawning of capelin in both coastal Newfoundland and Southeast Shoal (Div. 3N) it was assumed that the stocks were separate. Further research into meristics and morphometrics as well as data on tagging and distribution supported the above assumption.

Survey Data

Stock assessment from acoustic survey data

Acoustic surveys for the capelin stock in Div. 3NO were carried out in 1975-1994 by USSR and Canada. At present it is difficult to compare results from those surveys as some Russian estimates were given combined for Div. 3LNO. Nevertheless, both surveys showed the stock growth in the mid-1980's and then abrupt reduction after 1990 (Table 2). In recent years STACFIS has repeatedly recommended that initial investigations to evaluate the status of the capelin in Div. 3NO utilize trawl acoustic surveys, however this recommendation is not fulfilled.

Biomass indices from Canadian spring bottom trawl surveys

The only one at present available indicator of the capelin stock dynamics can be capelin biomass indices obtained during stratified-random bottom trawl surveys by Canada. Prior to fall 1995, Engel 145 trawl was used in the surveys and in subsequent years it was Campelen 1800, catchability of which in relation to capelin was much higher. In this connection, absolute estimates of capelin by-catch increased several tens of times and were directly incomparable with earlier data (Fig. 1). For comparability of trends showed by the trawls of different types, Campelen's data from spring surveys on the capelin by-catch in 1996-2001 were converted to Engel trawl using conversion factor K = 49 (Shibanov *et al*., 2002). Since capelin is a pelagic species, the results obtained, in our opinion, reflects availability of its concentrations for bottom trawls rather than a true status of the stock and its distribution.

Based on primary data on catches taken during Canadian spring surveys, distribution of capelin biomass in Div. 3NO in 1990-2002 was mapped (Shibanov *et al*., 2002; Gorchinsky, 2003). Indices of biomass obtained using isoline and stratified-random methods were found to be similar to one another and in some years coincided completely (Table 3).

Size and age composition

In 2003 compared to the previous year in catches taken during the Canadian survey juvenile capelin of 6-9 cm in length were found. Modal size groups of males and females as well as a ratio of the largest individuals of 16-18 cm in length had not changed greatly. Size composition of capelin taken due to enmeshment in trawl wings during the Russian commercial fishery for redfish in Div. 3O (April-June 2003) was represented by individuals up to 18 cm in length similarly to Canadian estimates; juvenile capelin of 7-10 cm in length also occurred in catches (Fig. 2).

Capelin enmeshed in Russian trawls was aged 2 to 5 years with age 3 being predominant (Fig. 3).

Stock Perception

Last year assessment (Gorchinsky, 2003) indicated the capelin stock to remain depleted. Indices of trawlable biomass in 2003 corresponded to the low stock in 1995-1996, which would permit to prolong the Scientific Council advice of no directed fishery for capelin in 2005. A more accurate stock assessment will be possible if trawl-acoustic surveys are recommenced.

Acknowledgements

We thank Dr. F. Mowbray for making available data from Canadian trawl surveys and for her cooperation when preparing the present paper.

References

CARSCADDEN, J. 1986. The Southeast Shoal (Div. 3NO) capelin stock. NAFO SCR Doc. 86/53. 7 p.

GORCHINSKY, K. V. 2003. Using Trawlable Biomass Data from Canadian Bottom Trawl Survey in Spring 2002 to estimate Capelin State of the Stock on the Grand Bank. NAFO SCR Doc. 03/37, 6 p.

LILLY, G. R., and M. SIMPSON. 2000. Distribution and biomass of capelin, Arctic cod and sand lance on the Northeast Newfoundland Shelf and Grand Bank as deduced from bottom trawl surveys. DFO Can. Stock Assess. Sec. Res. Doc., 91. p. 1-40.

NAKASHIMA, B.S. 1991. The geographical distribution of capelin (Mallotus villosus) in the Northwest Atlantic based on tagging experiments. NAFO SCR Doc. 91/122. 25 p.

SHIBANOV, V. N., K. V. GORCHINSKY, and V. S. MAMYLOV. 2002. An attempt to estimate dynamics of capelin stock on the Grand Bank using trawlable biomass data from Canadian bottom trawl surveys, spring 1990-2001. NAFO SCR Doc. 02/20. p 1-10.

Table 1. Nominal catches and TAC of capelin in NAFO Div. 3NO (tons).

Year	BGR	CAN	CUB	DDR	ISL	IRL	JPN	NOR	POL	E/PRT	ROM	E/ESP	RUS	Total	TAC
1970														0	
1971													750	750	
1972	166												20598	20764	
1973		1658						41293	203				83721	126875	
1974		3698						43682		500		4016	48855	100751	148000
1975					15814		2734	37477	4306			3748	67704	131783	180000
1976	311	5233			8839	230	5007	23178	3778				63610	110186	180000
1977		36	700		2994		3746	21499	401				17322	46698	200000
1978				56	116		665	4237	7		7		119	5207	200000
1979														0	0
1980														0	0
1981														0	0
1982														0	0
1983														0	0
1984														0	0
1985			3											3	0
1986														0	0
1987							793						14	807	10000
1988							1395	1094					4738	7227	15000
1989							2222	4085					3189	9496	28000
1990			85				2054	8415					14076	24630	30000
1991			118											118	30000
1992			65											65	30000
1993			3											3	0
1994														0	0
1995														0	0
1996														0	0
1997														0	0
1998														0	0
1999														0	0
2000														0	0
2001														0	0
2002														0	0
2003														0	0
Total	477	10625	1059	56	27763	230	20670	193375	8695	500	7	7764	338772	609993	

Note: TACs in 1974-1978 are combined for Div. 3LNO

Table 2. Capelin biomass estimates from USSR and Canadian acoustic surveys data in 1975-1994 (‘000 tons).

Year	USSR 3LNO	Canada 3NO	Year	USSR 3LNO	Canada 3NO
1975	1050*		1985	2200	212
1976	685*		1986	1491	494
1977	1000*		1987	2161	229
1978	310		1988	3900	561
1979	483		1989	2455	28
1980	0		1990	3752	
1981	109	223	1991	118	
1982	-	419	1992		4
1983	346	219	1993	315	
1984	2880	85	1994	83	

* biomass of mature capelin in Div. 3NO

Table 3. Calculation of trawlable biomass with the isoline and stratified-random methods (‘000 tons) in Div. 3NO from the estimates of Canadian spring survey in 1990-2003.

Method	Year													
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Random stratification	0.87	1.88	0.67	9.08	0.20	0.54	0.57	0.34	1.18	0.15	0.83	0.22	0.59	0.52
Isolines	1.06	1.03	0.39	6.82	0.20	0.51	0.51	0.39	1.29	0.15	0.79	0.22	0.37	0.51
Deviation, %	17.9	-45.2	-41.8	-24.9	0.0	-5.6	-10.5	12.8	8.5	0.0	-4.8	-0.7	-37.3	-1.1

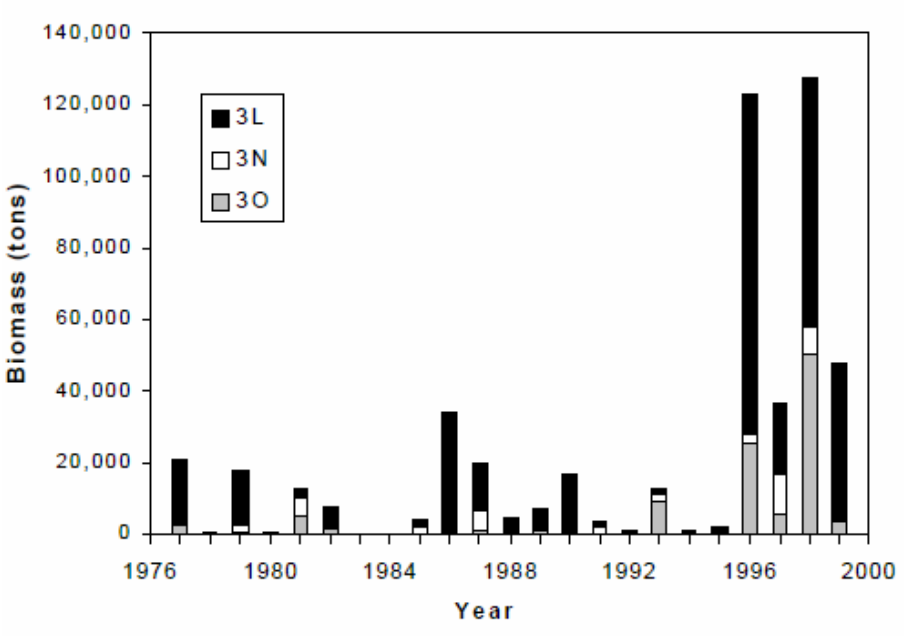

Fig. 1. Trawlable biomass estimates for capelin in Div. 3LNO in spring of 1977-1999 (Lilly and Simpson, 2000).

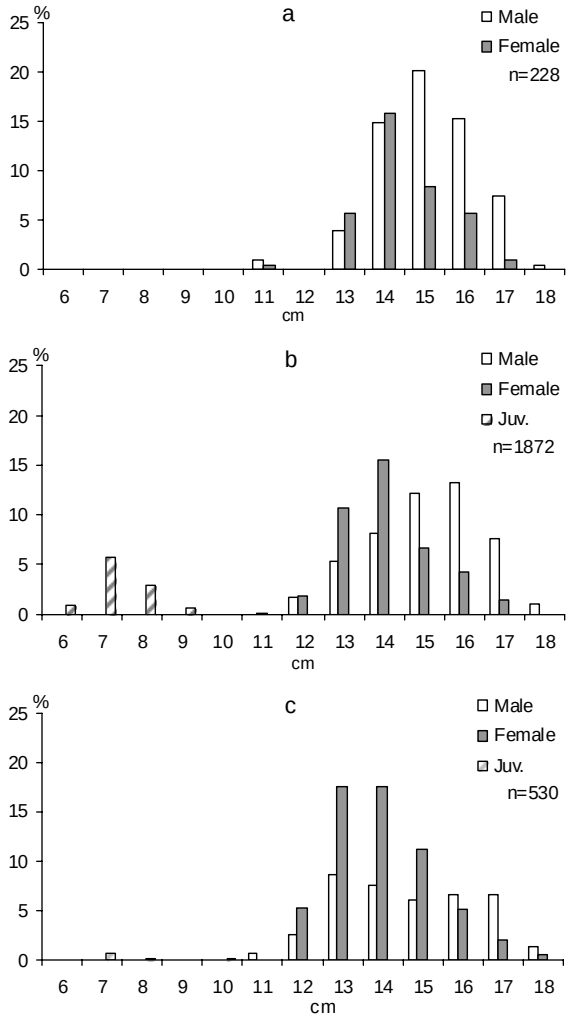

Fig. 2. Length composition of capelin from Canadian survey data in 2002 (a), 2003 (b) and enmeshment of capelin in trawls during Russian commercial redfish fishery in Div. 3O in 2003 (c).

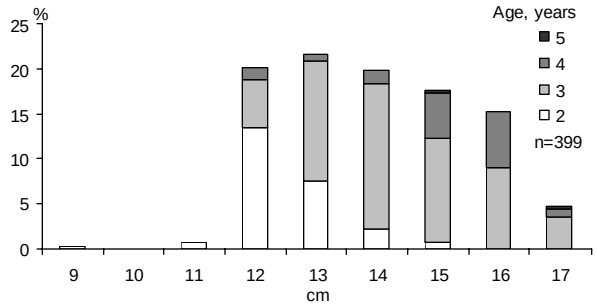

Fig. 3. Age composition of capelin from enmeshment during Russian commercial redfish fishery in Div. 3O in 2003.