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Results of a Hydroacoustic Survey of NAFO Div. 2J3K Capelin

by

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Abstract

An acoustic survey for capelin was carried out from the research vessel, GADUS ATLANTICA, during the period September 26 to October 19, 1985. Capelin biomass was estimated at 1,035,774 tons. Age and length compositions from samples taken during the survey are presented.

Résumé

Le navire de recherche GADUS ATLANTICA a procédé, à l'aide d'équipement acoustique, au dénombrement de stocks de capelan entre le 26 septembre et le 19 octobre 1985. La biomasse de capelan est évaluée à environ 1 035 774 tonnes. On présente la composition par âge et par longueur des échantillons prélevés.

Introduction

This survey is part of a continuing program of annual hydroacoustic surveys of the NAFO 2J3K capelin stock carried out by Canada and the USSR (Miller and Carscadden 1983, 1984, 1985; Bakanev and Gorchinsky 1985; Mamylov and Bakanev 1984; Bakanev 1983). The survey is carried out in the fall of the year (September 26-October 19, 1985) when overwintering capelin are found offshore.

Materials and Methods

Data were collected using the same equipment and survey techniques as in earlier surveys (Miller and Carscadden 1984). Data were analyzed in the same manner as earlier surveys with one important exception. The attenuation coefficient is now calculated using a more recent model describing the phenomenon of absorption of sound in seawater (Foote 1981; Fisher and Simmons 1977). Previous calculations of the attenuation coefficient were made using the model of Schulkin and Marsh (1962) described by Clay and Medwin (1977). The estimate of the attenuation coefficient, α, is dependent upon the depth, salinity, and temperature of the water during the survey. In the case of the 2J3K survey, the estimate of α changes from 0.0175 dB/meter to 0.0122 dB/meter. This results in a change in the TVG correction factor table (Miller and Stevens 1984). To provide a relative abundance index comparable to previous years, a biomass estimate for 1985 was also calculated using an attenuation coefficient (α) of 0.0175 dB/meter. However, the 1985 estimate using α= 0.0122 dB/meter should be used as the appropriate estimate of capelin abundance.

Results

Figure 1 shows the survey track and fishing set locations during the survey. No fishable concentrations of capelin were found below latitude 51°15'N. Figure 2 gives length and age compositions and mean length at age for each survey block and weighted mean distributions for the entire survey area. Two-year-old capelin of the 1983 year-class were predominant in all areas. There was an increase in mean length at age with latitude. Table 1 provides a summary of the acoustic survey results. Total absolute biomass was estimated at 1,035,774 t. Table 2 gives numbers and biomass at age from all Canadian 2J3K capelin acoustic surveys.

The total biomass for 1985 (Table 2) is calculated using both attenuation coefficients to allow comparison with biomasses from previous years which are calculated using the old attenuation coefficient. The biomass and numbers of individual age-groups from the 1985 survey are calculated using the new attenuation coefficient since these estimates are often taken as absolute estimates to be used in projections. As given in Table 2, the estimates of biomass and numbers of individual age-groups for 1985 are not directly comparable to estimates from 1981-83 because of the use of different attenuation coefficients. Recalculation of 1981-83 estimates is time consuming but will be done for the 1986 assessment.

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Table 1. Summary of acoustic survey results, NAFO Div. 2J3K, September-October 1985.

	Block A	Block B	Block C	Block D
Mean density	3.5	5.8	36.1	16.9
Area (sq. km)	20562	13263	14692	20978
Total biomass	71912	77443	530855	35564
# of transects	14	17	23	10
# of estimates	509	675	909	493
Delta	.97	.97	.97	.98
Lw limit delta	-.03	-.03	-.03	.-02
C of variation	46.8	19.2	14.6	20.0
Min. density	.1	.4	3.7	2.6
Max. density	19.9	17.8	83.0	42.1

Block A			Block B			Block C			Block D		
T#	#Ds	Mean D	T#	#Ds	Mean D	T#	#Ds	Mean D	T#	#Ds	Mean D
1	36	19.9	1	41	5.6	1	42	3.7	1	50	2.6
2	36	17.3	2	40	14.2	2	39	34.2	2	49	13.5
3	37	3.2	3	40	10.7	3	40	36.4	3	49	15.7
4	36	1.4	4	40	5.3	4	39	24.3	4	49	8.2
5	36	.3	5	42	7.9	5	40	25.5	5	49	26.4
6	37	.5	6	38	1.7	6	40	20.9	6	51	8.9
7	37	.2	7	38	3.3	7	40	17.2	7	49	10.9
8	36	.3	8	41	2.4	8	37	21.1	8	50	19.1
9	37	.1	9	39	4.4	9	37	77.1	9	50	42.1
10	35	.9	10	40	2.7	10	37	39.8	10	47	22.3
11	37	.3	11	39	10.4	11	42	13.1			
12	36	.1	12	39	4.4	12	46	5.6			
13	35	1.3	13	39	2.4	13	42	6.2			
14	38	3.3	14	40	.4	14	39	18.6			
			15	38	.6	15	38	83.0			
			16	42	4.8	16	38	30.6			
			17	39	17.8	17	39	75.5			
						18	38	69.0			
						19	39	69.4			
						20	39	55.5			
						21	40	78.0			
						22	39	17.1			
						23	39	24.6			

Combined total biomass is 1,035,774 tons (using α = 0.0122 dB/m)
1,255,376 tons (using α = 0.0175 dB/m)

Table 2. Numbers and biomass at age of capelin from Division 2J3K acoustic surveys.

Year	Cruise No.		Total	Age 1	2	3	4	5
1985	115	No.'s (billions)	1225*	9.8	53.3	13.6	1.4	0.5
		Biomass ('000 t)	1035*	9.5	682.9	289.8	36.4	16.0
1984	100	No.'s (billions)		6.8	36.1	7.4	4.0	0.3
		Biomass ('000 t)	859	29.4	518.9	189.1	109.8	11.7
1983	85	No.'s (billions)		12.4	5.5	2.4	0.3	0.1
		Biomass ('000 t)	224	78.6	82.7	53.8	8.1	0.4
1981	56	No.'s (billions)		84.0	71.0	10.0	2.0	1.0
		Biomass ('000 t)	1790	414.0	1063.0	227.0	57.0	29.0

* Total biomass calculated using old attenuation coefficient (0.0175)

** Biomass of individual age groups in 1985 calculated using new attentuation coefficient (0.0122)

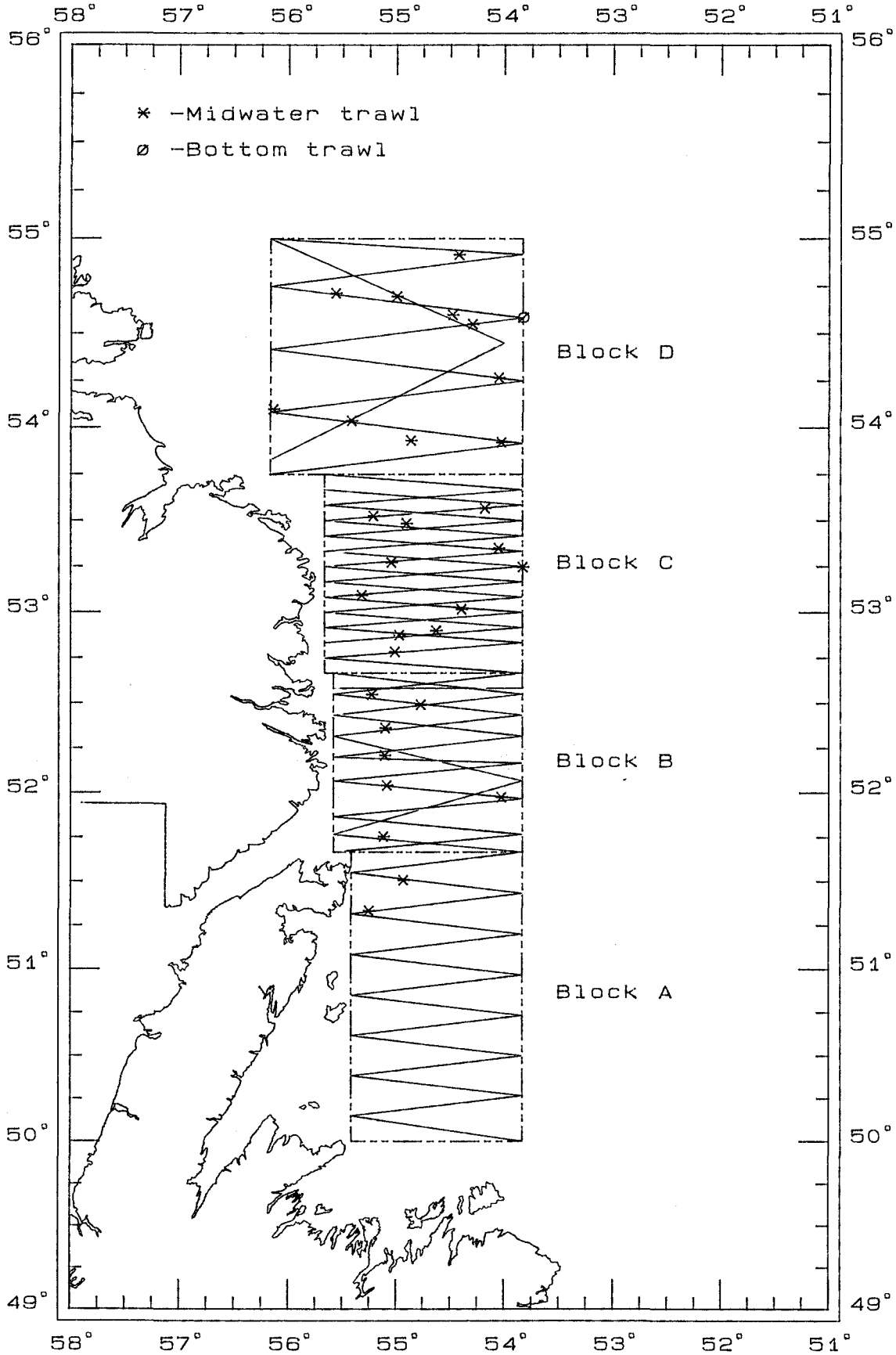

Fig. 1. Acoustic cruise track and fishing set locations for GADUS Cruise No. 115, NAFO Div. 2J3K, September-October 1985.

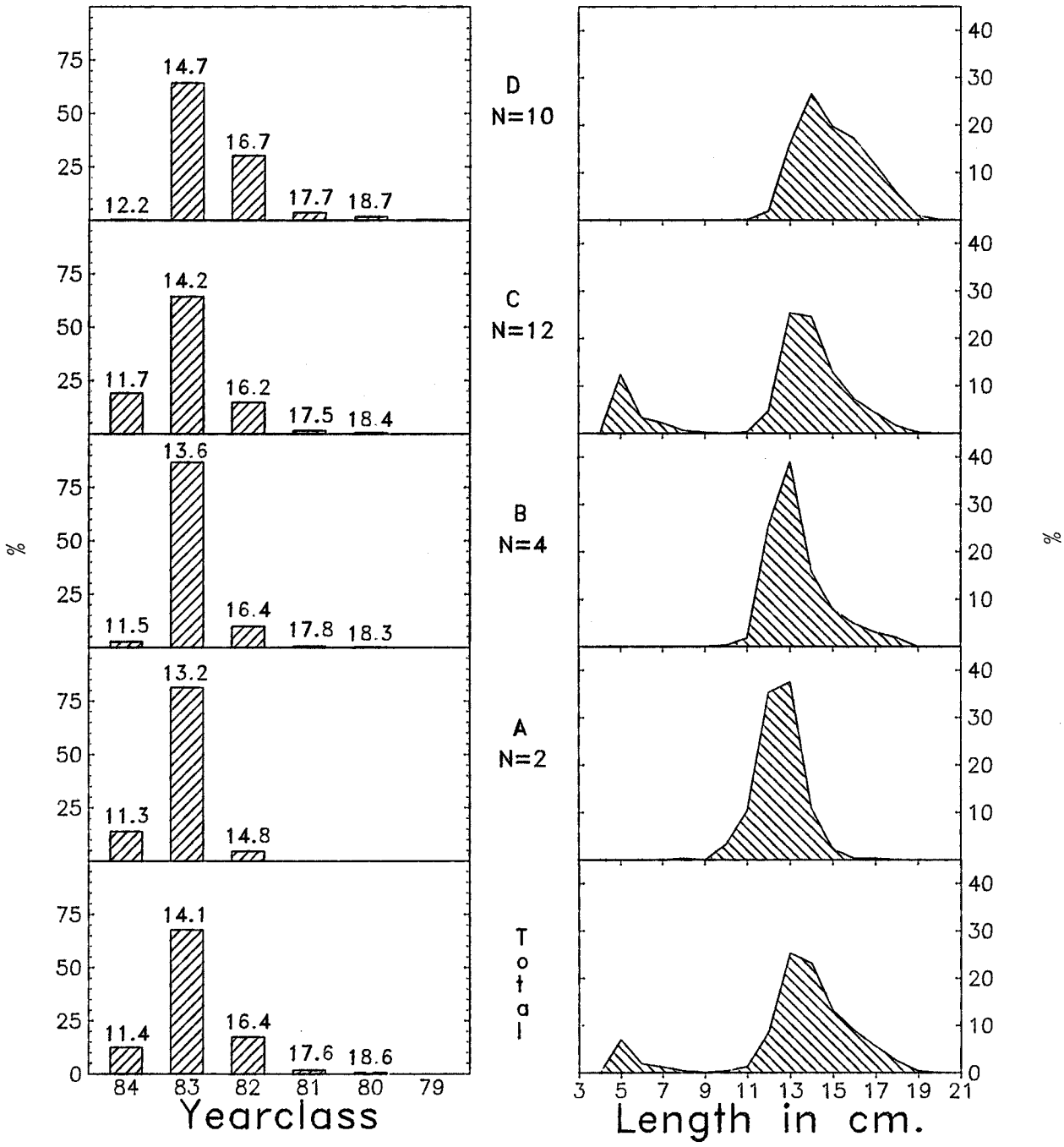

Figure 2. Age and length compositions and mean length at age from 2J3K capelin