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Capelin (*Mallotus villosus*) Hydroacoustic Surveys in NAFO Divisions 3L and 3LNO in 1984

by

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INTRODUCTION

Hydroacoustic surveys of capelin stocks were carried out from the research vessel, GADUS ATLANTICA, in NAFO Divisions 3L during the period April 24-May 13, 1984 and in 3LNO during the period June 16-July 2, 1984. Hydroacoustic data collected during each survey were analyzed and a biomass estimate for areas covered by the cruise track is presented. Midwater trawling was carried out during both surveys and samples from these trawl sets are used to provide age and length compositions applicable to the capelin biomass estimates. Biomass for NAFO Division 3L was estimated at 421,000 tons during the April-May survey and 540,000 tons during the June-July survey. The Southeast Shoal Division 3N stock was estimated at 113,000 tons.

MATERIALS AND METHODS

Hydroacoustic data were collected and analyzed as for previous hydroacoustic surveys for capelin (Miller and Carscadden 1984). A standard target strength value of -34 dB/kg was used instead of the target strength-length regression that has been used to determine T.S. in previous years. When a length-weight relationship is combined with the target strength-length regression, the target strength per kilogram is within ± 0.5 db of -34 dB/kg. This is well within the range of variation in the length sample data previously used to determine target strength. This value for capelin of -34 db/kg will be used for future surveys until dual beam target strength data can be collected and analyzed to refine target strength estimation.

RESULTS

Figures 1 and 2 show the survey coverage for the Division 3L (April-May) survey and for the Division 3LNO (June-July) survey. Coverage during the April-May Division 3L survey was restricted by ice to the north of block A. High capelin densities were observed on the northern boundary of block A which suggests that the ice covered area to the north which could not be surveyed contained a significant but unknown proportion of the total capelin stock. Table 1 summaries the acoustic survey results for both cruises. Table 2 summarizes the numbers and weight composition of acoustic biomass estimates for surveys in 1982, 1983 and 1984. Figures 3 and 4 show length and age compositions for each survey block and totals for each NAFO division weighted by the survey block biomass estimates.

Diurnal movements of capelin schools may result in significant quantities of capelin escaping detection and counting by the hydroacoustic data acquisition system during the nighttime. This, combined with the survey problem due to ice coverage during the April-May 3L survey, indicates that the biomass estimates provided in Table 1 should be interpreted only as minimum biomass estimates for these NAFO divisions.

REFERENCES

Miller, D. S. and J. Carscadden. 1984. Capelin Acoustic Biomass Survey for NAFO Division 2J3K, October 1983. CAFSAC Res. Doc. 84/79.

Table 1. Summary of acoustic survey results for Gadus Atlantica Cruises #93 and #96.

Block	NAFO Div.	Area (km^2)	Biomass/m^2 (grams)	Coeff. of variation	Delta	Lower limit of delta	Biomass (metric tons)	Transects	Transect length (km)	Range of densities	Range of number of intervals/ transect
Gadus 93											
A	3L	18080	18.8	0.14	0.97	-.02	339904	22	111.9	1.2-57.2	44-50
B	3L	25220	3.2	0.33	0.97	-.02	80704	18	111.9	0.3-18.2	44-48
TOTAL		43300					420608				
Gadus 96											
A	3L	9032	11.4	0.19	0.92	-.08	102964	27	37.2	0.8-39.3	11-17
B	3L	16361	14.0	0.22	0.97	-.03	229054	12	111.9	1.7-47.5	31-45
C	3L	12512	4.2	0.16	0.96	-.03	52550	3	117.2	2.6-5.4	40-42
D	3L	25488	6.1	0.18	0.97	-.03	155476	7	117.6	1.0-10.4	38-41
TOTAL		63393					540044				
E	3N	13737	8.2	0.19	0.95	-.03	112640	15	98.2	2.3-22.6	30-39

Table 2. Age composition of capelin acoustic survey biomass estimates 1982-84. (Numbers in billions, weights in thousands of tons).

			Yearclass					
Cruise	Div.		1981	1980	1979	1978	1977	1976
64 (1982)	3L	N	0.1	11.0	18.0	2.7	0.8	0.2
		W	0.1	55.8	370.0	69.8	23.7	6.3
66 (1982)	3L	N	27.6	4.9	5.3	0.2	0.1	0.1
		W	42.0	50.3	117.2	6.0	0.8	0.1
	3NO	N	0	0.1	17.6	0.8	0.1	0.1
		W	0	1.1	414.7	23.5	5.3	1.2

			Yearclass					
Cruise	Div.		1982	1981	1980	1979	1978	1977
77 (1983)	3L	N	0.1	5.2	2.7	1.0	0.1	0.1
		W	0.1	39.7	51.1	28.6	2.1	3.5
80 (1983)	3L	N	52.6	1.9	1.5	0.5	0.1	0
		W	102.1	17.5	31.0	12.9	0.5	0
	3N	N	0	0.1	3.2	3.3	0.4	0.1
		W	0	1.8	73.6	99.9	14.8	0.2

			Yearclass					
Cruise	Div.		1983	1982	1981	1980	1979	1978
93 (1984)	3L	N	0.1	24.9	7.3	3.9	0.6	<0.1
		W	0.3	151.8	139.5	110.1	17.8	0.5
96 (1984)	3L	N	52.4	34.1	4.6	3.3	0.4	0.1
		W	107.0	218.5	104.0	96.9	12.7	0.4
(1984)	3N	N	2.0	0.4	2.8	1.1	0.2	0.1
		W	4.1	5.2	61.4	35.2	6.4	0.3

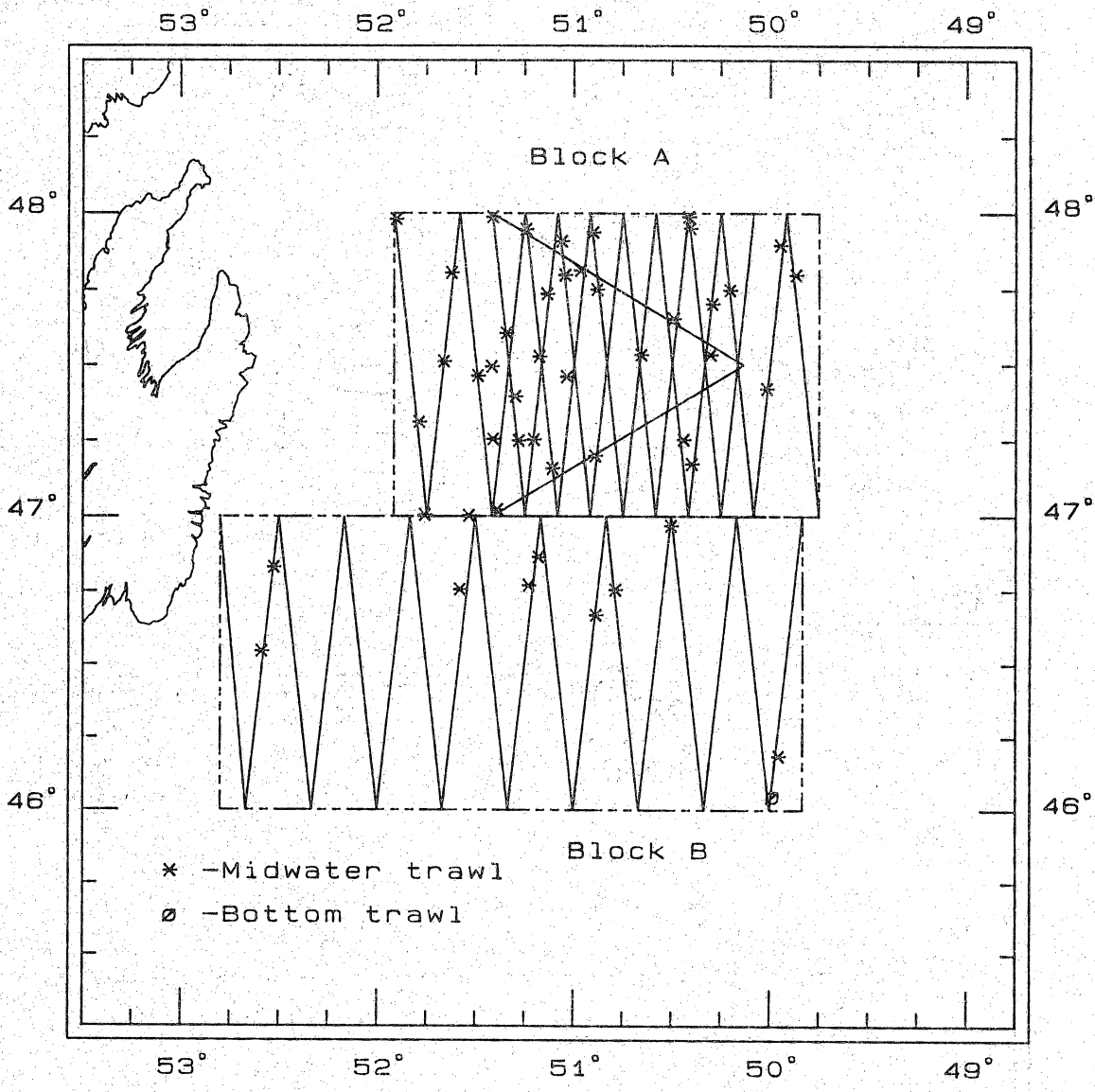

Figure 1. Gadus Atlantica cruise 93 survey track
NAFO Division 3L April–May 1984

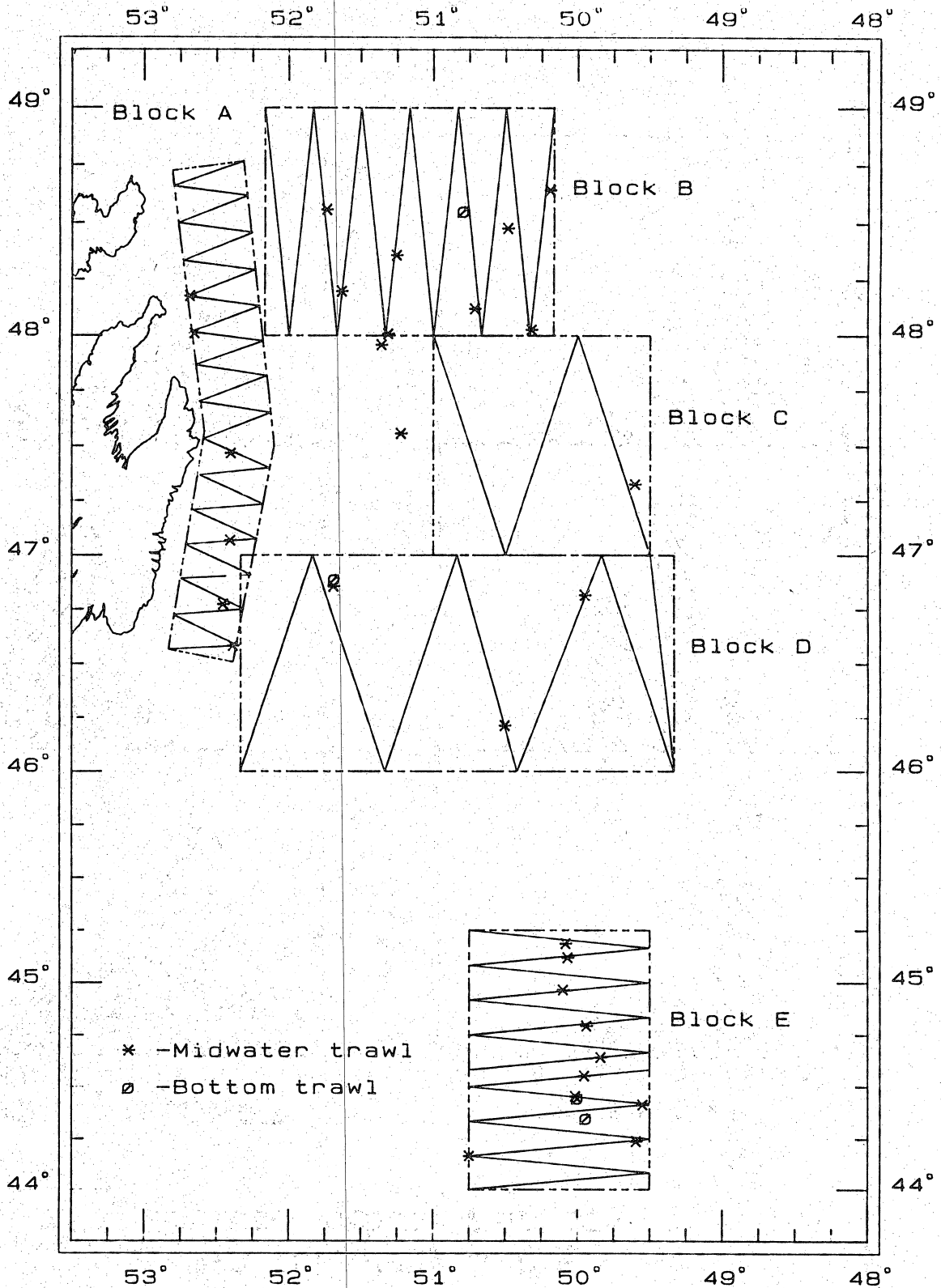

Figure 2. Gadus Atlantica cruise 96 survey track
NAFO Division 3LN June–Juiy 1984

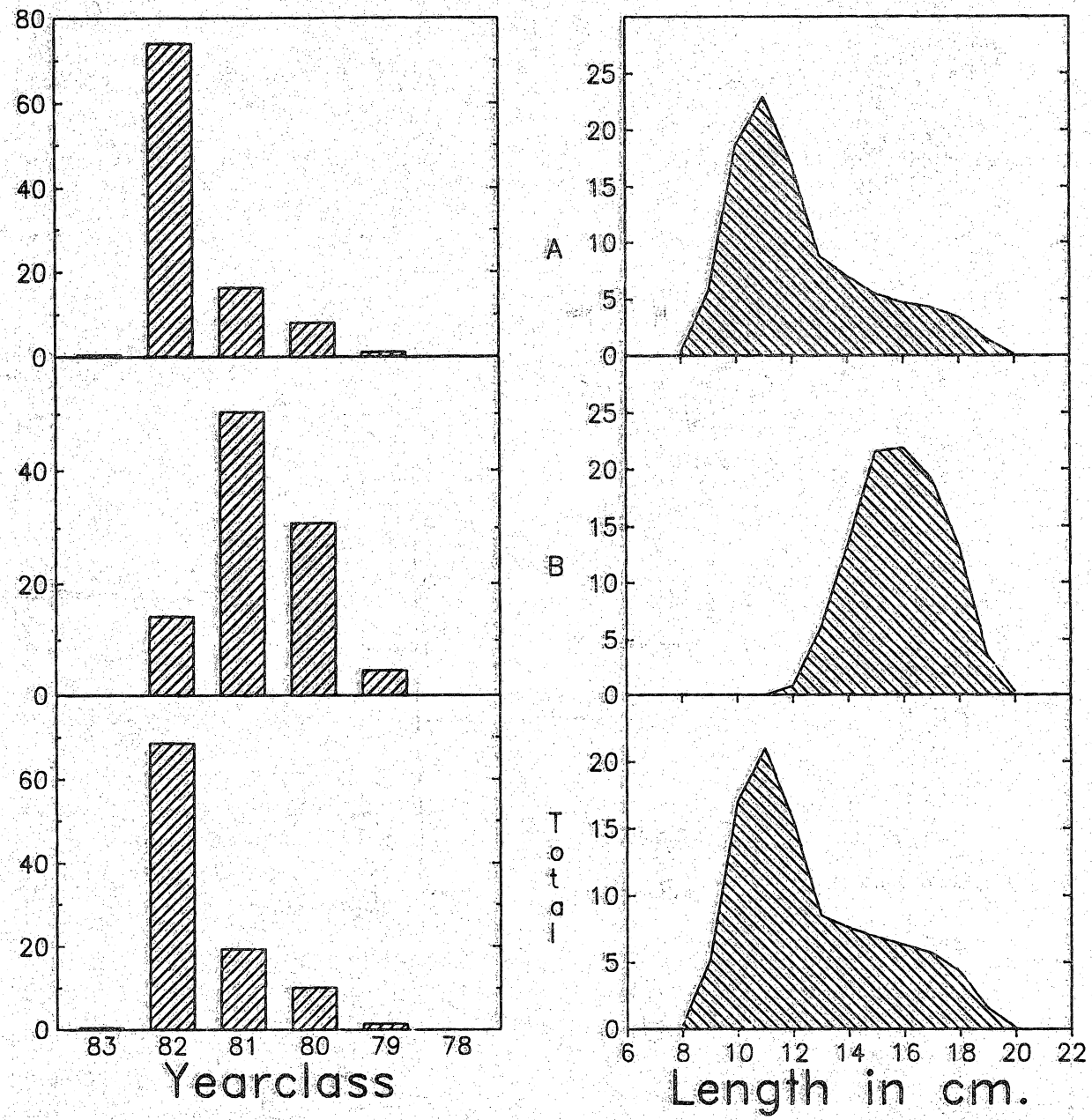

Figure 3. Age and length compositions from Gadus Atlantica Cruise 93

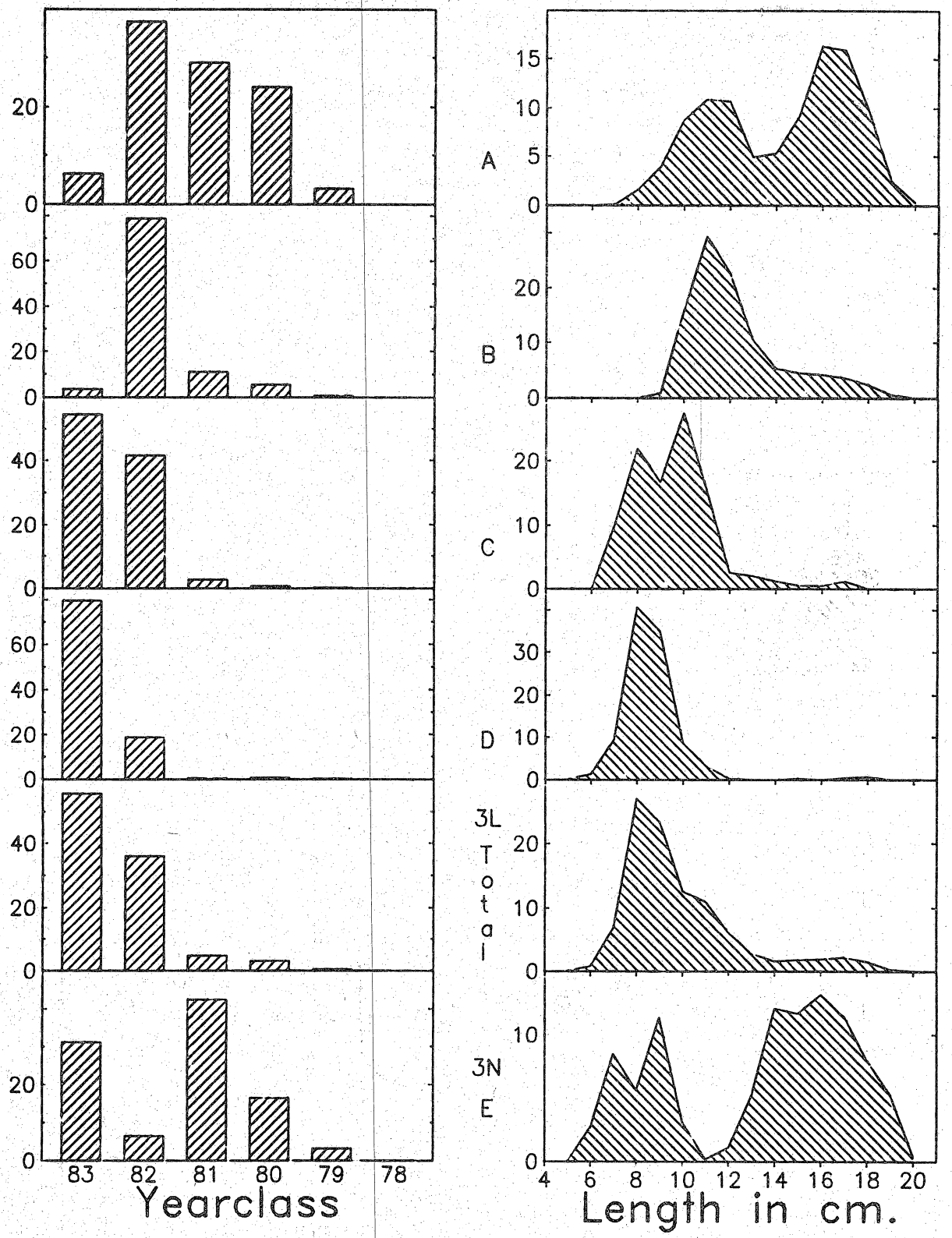

Figure 4. Age and length compositions from Gadus Atlantica Cruise 96