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An Acoustic Survey of Capelin (*Mallotus villosus*) in Divisions 3LNO, 1979

by

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ABSTRACT

An acoustic survey of capelin in NAFO Division 3LNO was conducted on the research vessel Gadus Atlantica between June 6 to July 2, 1979. A relative estimate of capelin biomass for Division 3LNO of 185,500 tons was made. A relative estimate of spawning capelin in Division 3N was between 3,300 to 20,250 tons.

INTRODUCTION

Capelin concentrations in Division 3LNO were first surveyed acoustically by Norway in 1971 (Devold et al. 1972). Norway again surveyed the stocks in 1972 (Dragesund and Monstad 1973). Soviet surveys of capelin in Division 3LNO have been carried out on an annual basis since 1976 (Kovalev et al. 1977; Klochkov et al. 1978; Ermolchev et al. 1979). Canada has conducted acoustic surveys in Division 3N since 1977 but equipment problems have prevented collection of data suitable for a biomass estimate until 1979. This paper describes distribution and age composition of capelin in Division 3LNO and provides a relative biomass estimate for spawning concentrations in Division 3NO and the total 3LNO stock.

METHOD

The surveys were made using the acoustic echo counting system hardware (Shotton and Dowd 1975) with echo integration software. Errors in the integration software have been corrected and relative biomass estimates presented in the south (Division 3LNO) are comparable with those presented

for the northern stock (Division 2J3K) at this meeting (Carscadden and Miller 1980). Target strength values of -49.5 dB to -51 dB were used. These corresponded to different capelin mean weights and were calculated from target strength - mean weight regressions (Buerkle, pers. comm.). Midwater trawl and bottom trawl fishing sets were made throughout the surveys to verify species composition in acoustic counts and provide capelin samples for size and age distributions. Three separate surveys were made, an initial large scale survey in 3LNO (Fig. 1), followed by two smaller surveys concentrating on spawning concentrations in Division 3NO (Fig. 2 and 3).

RESULTS

In Division 3L, significant capelin concentrations were found only in the southern portion of the area surveyed (Fig. 1). Capelin were also found in Division 3NO with spawning concentrations on the Southeast Shoal (Division 3N) of the Grand Bank (Fig. 2 and 3). Two and 3-year-old capelin predominated in Division 3L and 3- and 4-year-olds predominated in Division 3NO (Fig. 4). Fishing sets made during the survey indicated that sand lance (Ammodytes dubius) and cod (Gadus morhua) were the other major constituents of pelagic biomass. Location of fishing sets and % capelin by weight for each set are shown in Fig. 5. A biomass estimate of 185,500 tons of capelin resulted from the first survey while biomass estimates of 20,250 tons and 3,300 tons were made from Surveys 2 and 3 (Table 1) which were concentrated in the capelin spawning area. Our observations suggested that the area covered by Survey 3 was the major capelin spawning area in 1979; whales were present in this area as well.

The results from these surveys would suggest that the total capelin biomass in Division 3LNO during June 1979 was approximately 200,000 tons. This estimate is about 4 times the acoustic biomass of capelin estimated for the Division 2J3K stock during October-November 1979 (Carscadden and Miller 1980).

A high degree of uncertainty in the value of target strength used for capelin density estimation (Carscadden and Miller 1980) precludes the use of these biomass estimates as absolute values.

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Table 1. Data used in the calculation of biomass estimates of Div. 3LNO capelin stock from acoustic surveys and relative biomass estimates from the three surveys in June 1979.

	Survey				
	1		2		3
	a	b	c	d	
Area (tm ²)	2.061 x 10 ⁴	6.801 x 10 ⁴	1.931 x 10 ⁴	6.142 x 10 ³	2.053 x 10 ³
Density/m ²	2.000 x 10 ⁻²	1.324 x 10 ⁻¹	2.845 x 10 ⁻⁴	1.217 x 10 ⁻¹	5.975 x 10 ⁻²
\bar{W} (gms)	19.7	19.7	27.3	26.9	26.9
Target strength (dB)	-51	-51	-49.5	-49.5	-49.5
% capelin (by wt)	14.9	98.8	0.3	84.9	41.7
Area	3LN0		3N		3N
Biomass	185,500		20,250		3,300

a - Div. 3L in Fig. 1.

b - Div. 3N0 in Fig. 1.

c - From the area in Fig. 2 where no density estimates are shown.

d - From the area in Fig. 2 where density estimates are shown.

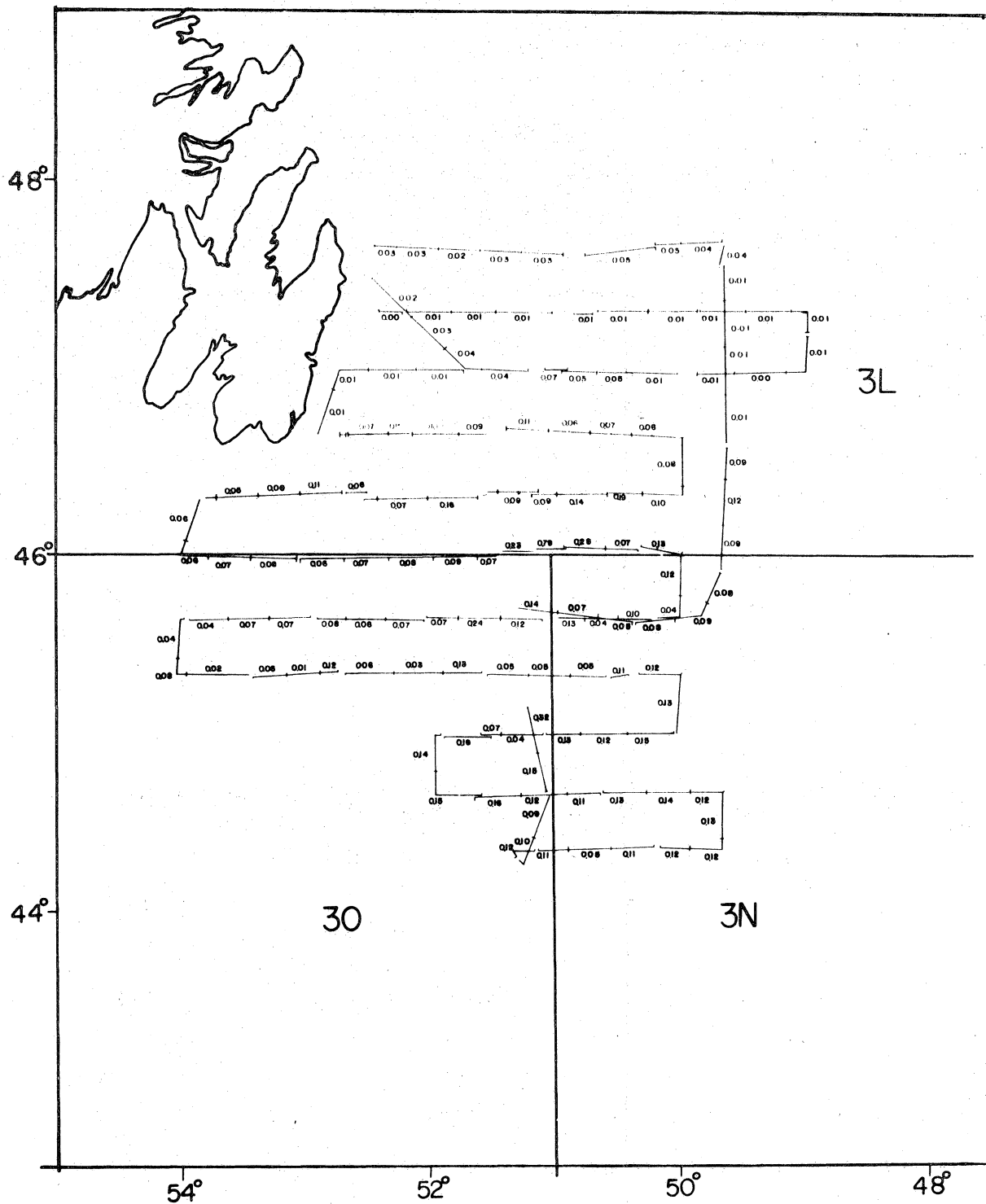


Fig. 1. Survey track and capelin densities Div. 3LN0, June 6-22, 1979

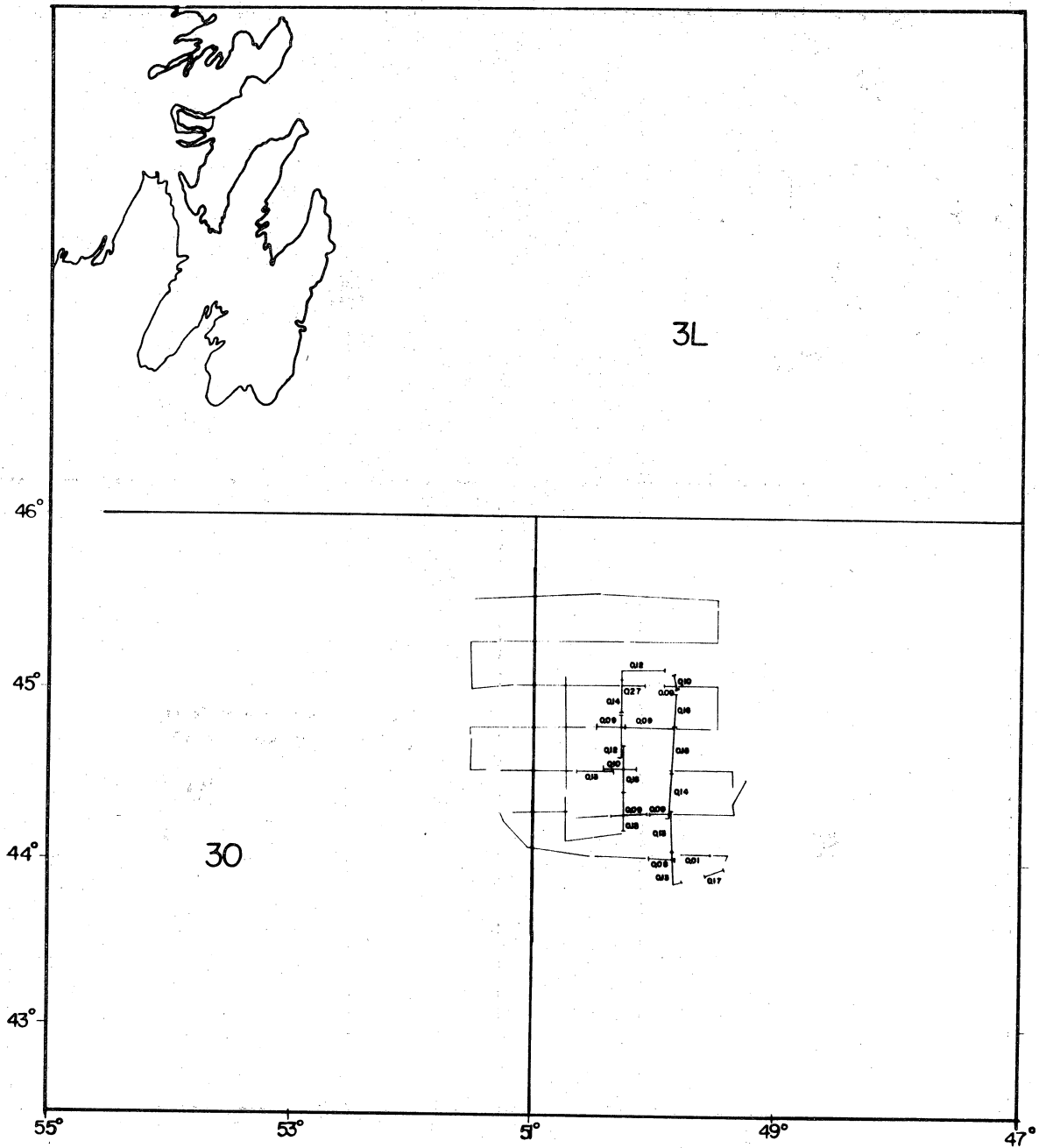


Fig. 2. Survey track and capelin densities Div. 3LN0, June 23-29, 1979

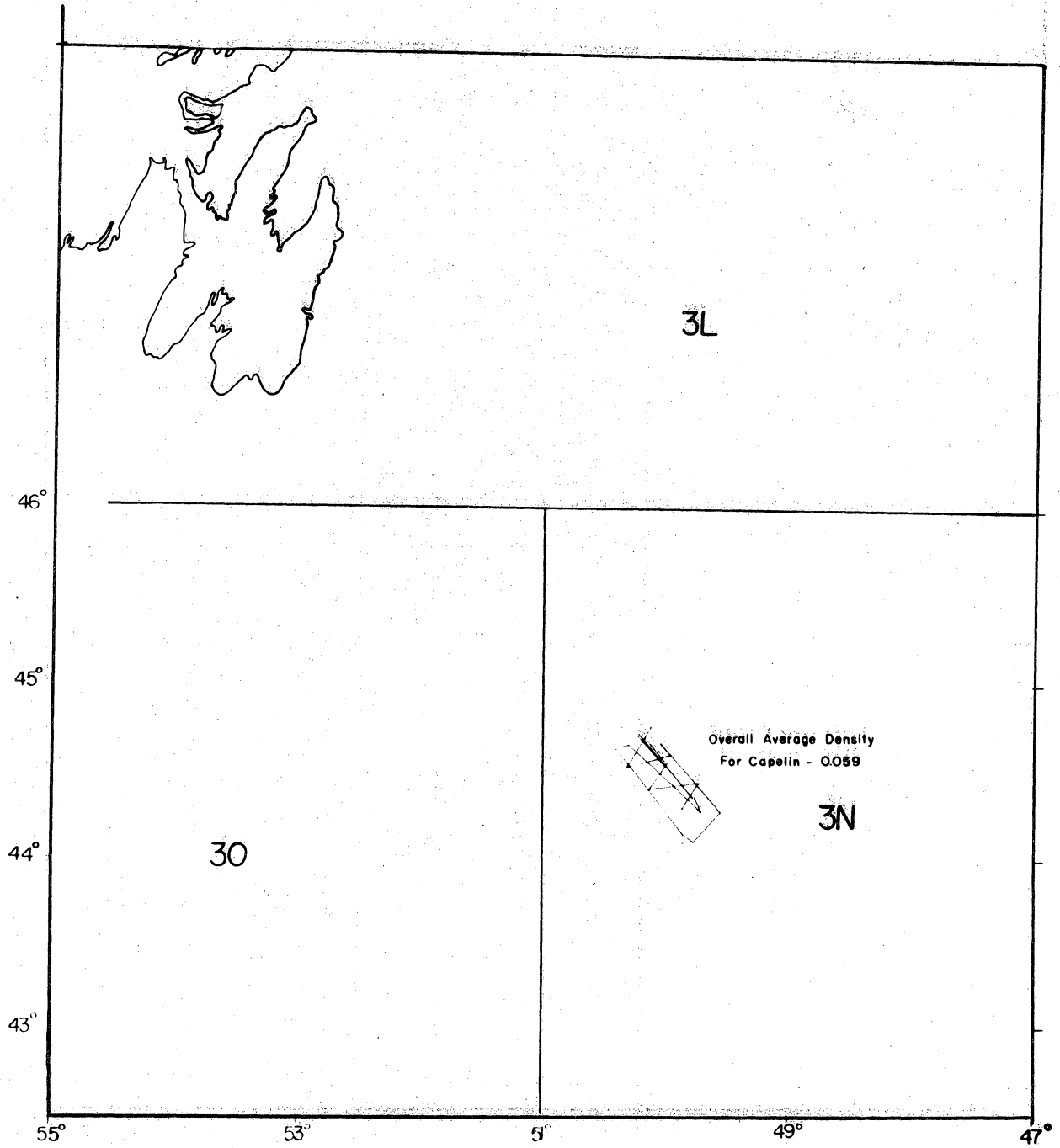


Fig. 3. Survey track and capelin densities Div. 3N, June 29-
July 1, 1979

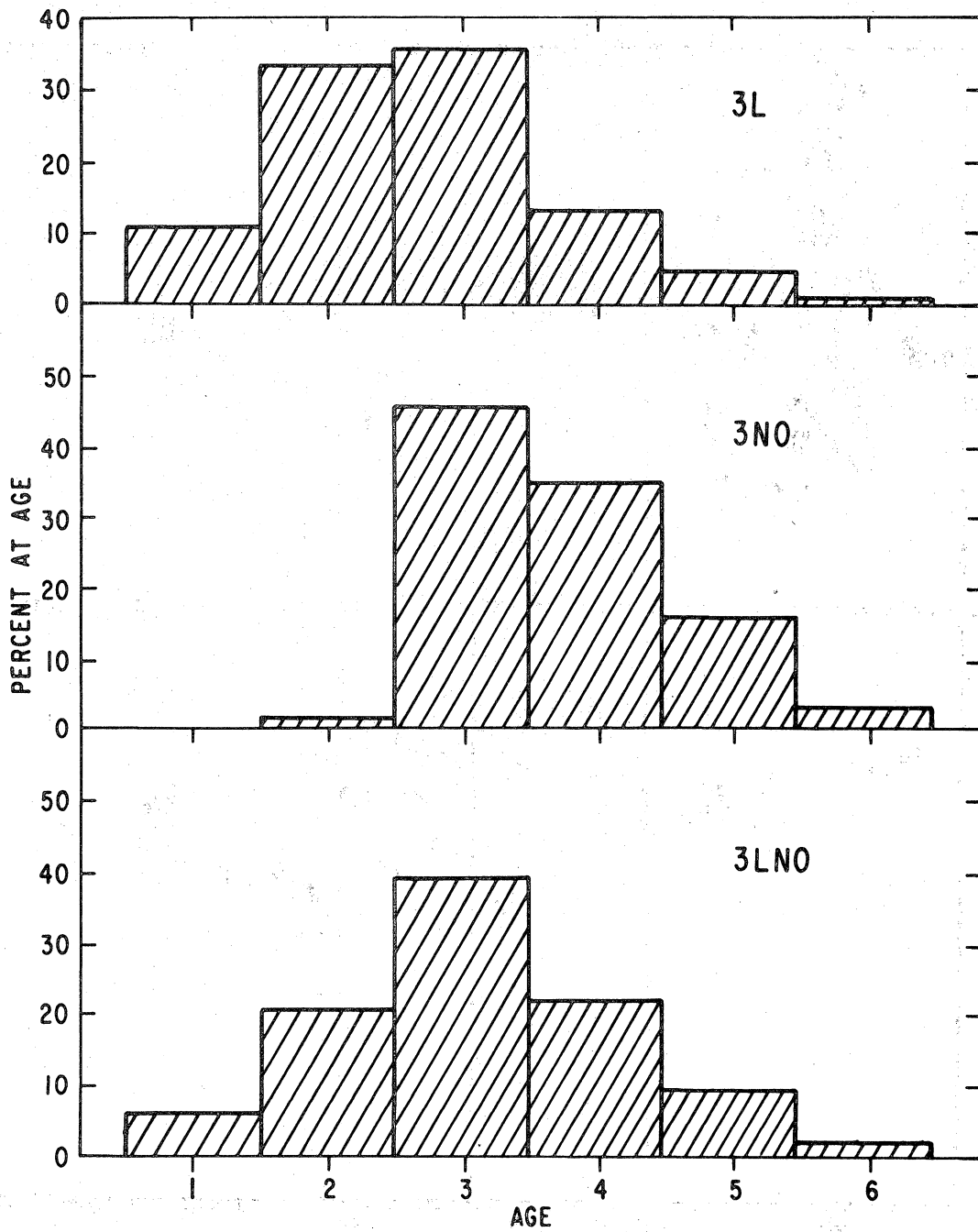


Fig. 4. Age-composition of capelin, Div. 3L, 3NO, and 3LNO during survey in June, 1979.

