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SPECIAL MEETING OF STACRES - FEBRUARY 1979

An Acoustic Estimate of Capelin Biomass in ICNAF Divisions 2J and 3K,
October 1978

by

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Near the end of paragraph 2 of the "Materials and Methods" section,
the value of 2.63 should read 2.0.



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Acoustic surveys of capelin stocks in ICNAF Divisions 2J and 3K were carried out on the Canadian research vessel "M.V. Gadus Atlantica" in the autumn of 1978. Stock biomass estimates from three surveys carried out in October ranged from 97,000 to 754,000 tons. Age and length sampling indicated substantial amounts of juvenile capelin in the area.

Introduction

Acoustic biomass surveys of capelin stocks in the 2J-3K area have been carried out by Canadian and USSR scientists since 1974 (Miller, Carscadden, Bennett, 1978; Serebrov, Bakanev, Kovalev, 1975; Bakanev, Seliverstov, Sevebrov, 1976; Klochtov, Seliverstov, Serebrov, 1977; Bakanev, Seliverstov, 1978). USSR surveys exclude areas inside Canada's 12 mile territorial limit, Canadian surveys include areas within the 12 mile limit. Biomass estimates from the USSR surveys during the period 1974 to 1977 ranged from 0.86 to 1.33 million metric tons.

The Canadian survey conducted in 1977 estimated a biomass of between 0.507 to 0.635 million metric tons.

This paper describes the distribution of capelin during October and gives biomass estimates from 3 independent surveys conducted during this period.

Materials and Methods

The surveys were made using the same acoustic system and echo integration analysis program as was used in 1977 (Miller, Carscadden, Bennett, 1977). Length and age distributions for capelin sampled throughout the survey are shown in Figures 1 and 2. Mean length for males and females combined was 14.7 cm. Using a regression of target strength versus fish length for clupeiformes (Dalen, Raknes, Røttingen, 1976), a maximum dorsal target strength of -42 dB is predicted for 14.7 cm capelin. Investigations into herring target strength indicate a reduction of about 6 dB from maximum dorsal value as a result of fish swimming at different aspect angles in the acoustic beam (Nakken and Olsen, 1977). Assuming a similar reduction for capelin, a value of -48 dB was used as target strength during the 1978 surveys.

An initial survey track of 2127 kilometers covered the area illustrated in Figure 3. Capelin were found only to the south in Division 3K in a 236 kilometer portion of the survey track. Two additional surveys were conducted in the area of capelin concentrations with track lengths of 426 and 459 kilometers. Cruise tracks for the three surveys are indicated in Figures 4, 5, and 6. Damage to the towed body and transducer at the end of the second survey necessitated using a different towed body and transducer for the third survey. Subsequent analysis of integrator output from the third survey indicated a malfunction in the transducer assembly and, as a result, integrator density estimates for this survey were unusable. Consequently, density estimates are indicated only in the track figures for surveys 1 and 2. The density estimates

are at 20 kilometer intervals. Comparison of density counts between day and night in portions of the surveys indicated daytime values were 2.63 times that of nighttime. This correction factor was applied to adjust nighttime density values.

Although integrator output from the third survey was unusable, it was felt that there was an increase in capelin abundance during this survey. Table 1 gives school frequency and size for each of the three surveys.

Table 1. School frequency and size - 1978 2J-3K Survey.

Survey	No. of Schools	Total Area of Schools	Survey 3 School Area as Percent	Course Length
1	114	1145	516	236
2	182	2656	223	426
3	567	5913	100	459

Discussion and Results

Integrator density estimates and biomass estimates for surveys 1 and 2 are listed in Table 2. A biomass of 97,000 tons was calculated from the first survey and 339,000 tons from the second survey. The increase in school frequency and size during the third survey is consistent with our observations that capelin were becoming more abundant and concentrated during the latter part of the cruise.

Biomass estimates from the 1977 survey (Miller, Carscadden, Bennett, 1977) ranged from 507,000 to 635,000 tons assuming target strength values of -41 and -42 dB, respectively. If target strength values had been lowered to account for aspect angle distribution as in 1978, the 1977 biomass estimate would have been between 2,000,000 and 2,500,000 tons.

With this change in the 1977 estimate, our acoustic surveys of 1977 and 1978 show that biomass for this stock declined substantially.

Table 2. Biomass estimates for 2J-3K capelin stock - Survey 1 and 2.

Survey	Average Density/m ²	Area of Distribution km ²	Mean Wt. gm	Biomass metric tons
1	.48	12,189	16.64	97,355
2	1.91	10,671	16.64	339,149

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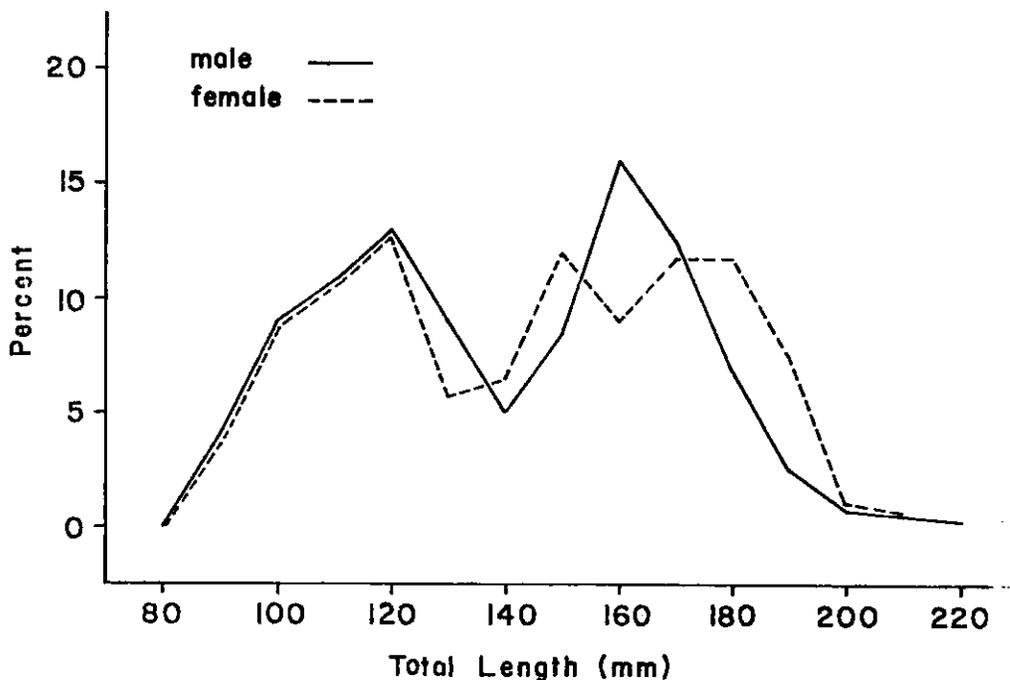


Fig. 1. Capelin length distributions - 1978 2J-3K Survey.

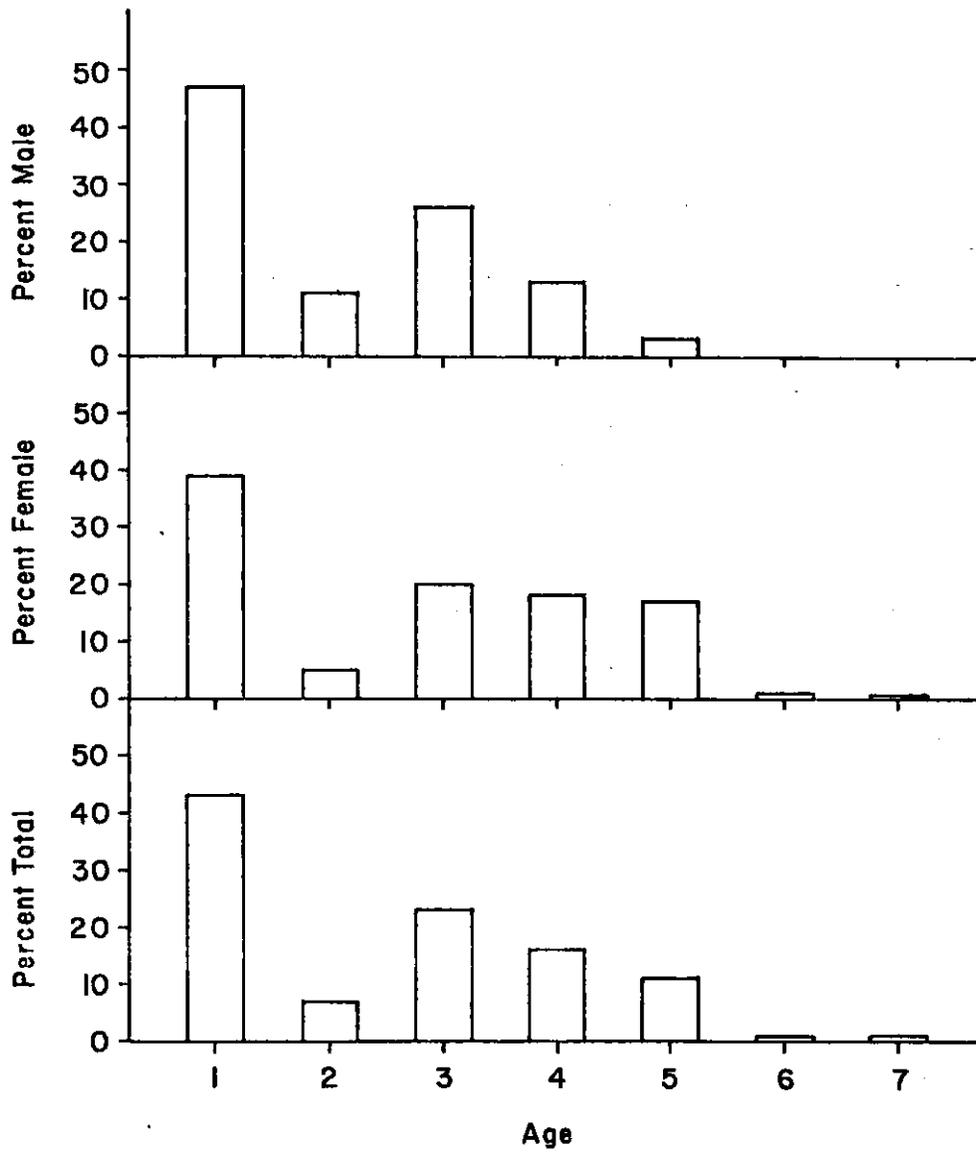


Fig. 2. Capelin age distributions - 1978 2J-3K Survey.