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# Biological characteristics of capelin (*Mallotus villosus*) from Div. 3K and 2J in November 1975

by

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## Introduction

It is known that concentrations of capelin occur in the Hamilton Bank area in late August and September (Devold, 1970; Devold *et al.*, 1972). Kovalyov and Kudrin (1973) reported capelin in ICNAF Div. 3K and 2J between September and December 1972. Campbell and Winters (1973) suggested that capelin found offshore in Div. 3K and 2J during the fall comprise one stock (Stock A: Labrador-northeast Newfoundland stock) which spawns inshore in Labrador and northeast Newfoundland in the spring of the following year.

Since 1973, catches of capelin in Div. 3K and 2J have been in excess of 100,000 tons, taken during the latter half of each year. In spite of the importance of this fall fishery few data on these capelin have been reported. This paper supplies information on biological characteristics of capelin taken in Div. 3K and 2J during November 1975.

## Materials and Methods

All samples were selected randomly from catches made by the research vessel *A. T. Cameron* using a Diamond 5 midwater trawl with a codend liner of 1/4 inch (6 mm). Capelin samples from Div. 3K were taken between the dates November 3-14, 1975 and from 50°02'30"N to 51°23'00"N and between 55°07'W to 56°32'W. Samples from Div. 2J were taken on November 7, 1975 at 52°17'N, 55°15'30"W. All fish were frozen and analysed later in the laboratory.

Total length of each fish was measured to the nearest mm and adjusted for shrinkage during freezing by multiplying by 1.03 (Winters, 1974 a). Each fish was weighed to the nearest gram. Ages were read from otoliths and an arbitrary birthdate of January 1 was assumed. Maturity stage was determined by visual examination of the gonads and classified according to the following scale: 0 = immature, 1 = maturing, 2 = ripe, 3 = partly spent, 4 = spent and 5 = resting. The degree of stomach fullness was estimated by gross examination according to the following scale: 0 = empty, 1 = ¼-full, 2 = ½-full, 3 = ¾-full, 4 = full, 5 = empty except for sand and eggs.

## Results

### Division 3K

Capelin of age-class 2 predominated in both sexes. Males were larger in length and weight-at-age than females (Table 1). Most three-year-olds of both sexes were maturing and would spawn in 1976. However, 67% of age-group 2 males and 49% of age-group 2 females were immature. Approximately half of the fish sampled were immature (Table 2). Males and females were approximately equal in number (Table 3). Over 60% of capelin of both sexes had empty stomachs (Table 4) indicating that feeding intensity was low at this time.

### Division 2J

As in capelin from Div. 3K, age-group 2 of both males and females predominated. Mean length and weight-at-age was greater for males (Table 5). Some two-year-old capelin of both sexes were immature although the proportions were much lower than in samples from 3K. All three-year-olds were maturing

(Table 6). In age-classes where sample sizes were adequate, sex ratios were approximately 50:50 (Table 7). The majority of fish of both sexes were not feeding at the time of sampling (Table 8).

## Discussion

Samples taken in Div. 3K and 2J indicated that immature and maturing capelin were mixed. However, the proportions of immature fish were higher in 3K and these fish were smaller at age. Ulltang (1975) reported similar results for capelin taken from these areas in July-August, 1971.

Kovalyov and Kudrin (1973) suggested a general movement of capelin from the Hamilton Bank area to the Notre Dame Bay area between September and December. However, we caught capelin in Div. 2J in November suggesting that not all capelin have moved south at this time. The differences in capelin from Div. 3K and 2J in this paper add some support to Winters' (1974 b) theory that Div. 3K and 2J support separate spawning stocks of capelin which mix in the northern areas during summer feeding. Feeding of capelin had almost ceased in Nov. 1975 and the differences reported here may be indicative of stocks that have split after feeding in northern areas. Our results are based on relatively few fish and more data are necessary to determine whether capelin in Div. 3K and 2J are separate stocks.

The results of the feeding analysis agree with observations made by Prokhorov (1965) for Barents Sea capelin, Winters (1970) for Trinity Bay capelin, Campbell and Winters (1973) for Newfoundland capelin in general and Chan and Carscadden (1976) for Labrador capelin. Although Able *et al.* (1975) reported that feeding by Gulf of St. Lawrence capelin declined in the fall, they suggested that feeding continued until at least late November.

## References

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Table 1. Per mille age-composition and mean length and weight-at-age of capelin taken in Div. 3K, November 1975.

| Age | °/₀₀ | Mean length (mm) | Mean weight (g) |
|---|---|---|---|
| | | MALE | |
| 1 | 3 | 87 | 2 |
| 2 | 868 | 147 | 15 |
| 3 | 129 | 179 | 32 |
| Mean | | 151 | 17 |
| | | FEMALE | |
| 1 | 9 | 120 | 7 |
| 2 | 798 | 143 | 13 |
| 3 | 144 | 168 | 23 |
| 4 | 40 | 182 | 29 |
| 5 | 3 | 184 | 31 |
| 6 | 6 | 185 | 31 |
| Mean | | 148 | 15 |

Table 2. Numbers of capelin at maturity stages, November 1975, Div. 3K.

| Age | Maturity | | | | | | % Immature |
|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | |
| | | | | MALE | | | |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 100 |
| 2 | 157 | 79 | 0 | 0 | 0 | 0 | 67 |
| 3 | 1 | 34 | 0 | 0 | 0 | 0 | 3 |
| Total | 159 | 113 | 0 | 0 | 0 | 0 | 58 |
| | | | | FEMALE | | | |
| 1 | 3 | 0 | 0 | 0 | 0 | 0 | 100 |
| 2 | 129 | 132 | 0 | 0 | 0 | 0 | 49 |
| 3 | 6 | 41 | 0 | 0 | 0 | 0 | 13 |
| 4 | 0 | 13 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| Total | 138 | 189 | 0 | 0 | 0 | 0 | 42 |

Table 3. Sex ratios by age of capelin taken in Div. 3K, November 1975.

| Age | No. of males | No. of females | % Males |
|---|---|---|---|
| 1 | 1 | 3 | 25 |
| 2 | 236 | 261 | 47 |
| 3 | 35 | 47 | 43 |
| 4 | 0 | 13 | 0 |
| 5 | 0 | 1 | 0 |
| 6 | 0 | 2 | 0 |
| Total | 272 | 327 | 45 |

Table 4. Extent of capelin feeding in November 1975 in Div. 3K, expressed as percentage of fish at each degree of stomach fullness.

| | Degree of stomach fullness | | | | | |
|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 |
| Male | 65 | 31 | 4 | 0 | 0 | 0 |
| Female | 63 | 32 | 4 | 1 | 0 | 0 |

Table 5. Per mille age-composition and mean length and weight-at-age of capelin taken in Div. 2J, November 1975.

| Age | °/₀₀ | Mean length (mm) | Mean weight (g) |
|---|---|---|---|
| | | MALE | |
| 1 | 13 | 149 | 15 |
| 2 | 779 | 162 | 22 |
| 3 | 195 | 184 | 36 |
| 4 | - | - | - |
| 5 | 13 | 196 | 44 |
| Mean | | 166 | 25 |
| | | FEMALE | |
| 1 | - | - | - |
| 2 | 575 | 150 | 15 |
| 3 | 288 | 174 | 27 |
| 4 | 82 | 184 | 32 |
| 5 | 14 | 194 | 42 |
| 6 | 41 | 191 | 35 |
| Mean | | 162 | 21 |

Table 6. Numbers of capelin at maturity stages, November 1975, Div. 2J.

| Age | Maturity | | | | | | % Immature |
|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | |
| | | | | MALE | | | |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 100 |
| 2 | 12 | 48 | 0 | 0 | 0 | 0 | 20 |
| 3 | 0 | 15 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | - |
| 5 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Total | 13 | 64 | 0 | 0 | 0 | 0 | 17 |
| | | | | FEMALE | | | |
| 2 | 11 | 31 | 0 | 0 | 0 | 0 | 26 |
| 3 | 0 | 21 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 6 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| Total | 11 | 62 | 0 | 0 | 0 | 0 | 15 |

Table 7. Sex ratios by age of capelin taken in Div. 2J, November 1975.

| Age | No. of males | No. of females | % Male |
|---|---|---|---|
| 1 | 1 | 0 | 100 |
| 2 | 60 | 42 | 59 |
| 3 | 15 | 21 | 42 |
| 4 | 0 | 6 | 0 |
| 5 | 1 | 1 | 50 |
| 6 | 0 | 3 | 0 |
| Total | 77 | 73 | 51 |

Table 8. Extent of capelin feeding in November 1975 in Div. 2J, expressed as percentage of fish at each degree of stomach fullness.

| | Degree of stomach fullness | | | | | |
|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 |
| Male | 79 | 12 | 8 | 1 | 0 | 0 |
| Female | 80 | 16 | 3 | 1 | 0 | 0 |