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Biomass Estiamtes of Capelin in Divisions 2J and 3K, 1978

by

E. Valdés, A. Marí
Centro de Investigaciones Pesqueras
Havana, Cuba

and

R. Domínguez
Flota Cubana de Pesca
Havana, Cuba

1. Abstract

The catch and effort data of the cuban commercial fleet which operated in Division 2J (September) and 3K (September-November) during 1978 were employed to estimate the biomass of the capelin stock from Divisions above mentioned. The areal expansion method was used.

Very low abundance levels during the September-November period were found, ranging from 1 701 to 77 210 tons. for Division 3K, and being of only 429 tons. for Division 2J.

A transformation was applied to the catch per unit of area data in order to normalize its distribution and use these transformed values in calculating the monthly biomass. After computing the value of the slope of the existing linear relationship between the mean and variance of data serie, the log and inverse transformations were found to be the most appropiate to normalize the data.

2. Introduction

During 1978 the cuban fishing fleet conducted a directed capelin fishery in Divisions 2J and 3K (Figs. 1-2), obtaining very low catch rates in comparison with the ones from 1977.

In the present paper the biomass of capelin from former Divisions is assessed in order to have an aproximate estimate of the size of this stock.

In 1977, some assessments on this species were made (Bakanev, V.S. and A.S. Seliverstov, 1978; Miller, D.S., J.E. Carscadden and B. Bennet, 1978) using acoustic and photogrammetric methods, being considered the estimates as minimal due to the not covering of the entire area of capelin distribution (as one of the reasons).

The areal expansion method was already used to assess the capelin stock from Divisions 2J and 3K during the September-October period, 1977 (Marí et. al. MS 1978).

The fact of working with data from commercial fisheries only and to operate the fleet in a part of the species distribution makes results less exact and precise.

3. Materials and Methods

For calculating the monthly biomass, the catch and effort data of the type of vessel Tacsa 95 (over 2 000 gross metric tons) which operated in Divisions 2J and 3K during the September-November period, 1978, were used. A total of 97 trawls, from which 94 corresponded to Division 3K and 3 to Division 2J were analized. For each trawl, position, duration and catch were registered.

In Division 3K fishing was concentrated in northeast of Newfoundland, while in Division 2J fishing was limited to one quadriole (Figs. 1-2).

The fishing gears employed in trawling operations were the pelagic nets models 80/416 and 76/336, whose technique characteristics are as follows:

Gear name or number	80/416	76/336
Head rope length	80 m	76.0 m
Foot rope length	80 "	76.0 "
Wingspread	60-64 "	65-70 "
Lenght of bridles	120 "	100 "
Area of doors	8 m^2	8 m^2

A catchability coefficient q equal to 1 was used in all months.

The areal expansion method employed and also the steps followed for calculating the biomass are described in the paper by Marí et. al. (1978). Once the monthly catches per unit of area for each trawl were determined, normalization

of these data was accomplished. For this purpose, Taylor's power law which establishes the existing relationship between the variance (S^2) of a population and its mean ($\bar{X}$) was considered, i.e.:

$$S^2 = a \bar{X}^b \quad (1)$$

and

$$\log S^2 = \log a + b \log \bar{X} \quad (2)$$

For each group of the monthly catch per unit of area values, the slope (b) was calculated, and as a result, the most appropiate transformations normalizing the data according to the month were the log and inverse. After transforming data according to methodology described by Buesa and Pérez (MS 1978), a confidence interval (using a 95 % level of confidence) for each of the monthly mean catches per unit of area was calculated (table 1).

Table 1.- Estimates of mean catch per unit of area for months and divisions.

Month	Division	Mean catch per unit of area and confidence interval
September	3K	8.71± 2.10
October	2J	2.43
October	3K	35.64±10.41
November	3K	3.24±2.57

4. Results and Discussion

A maximum value of biomass of 77 210 tons for Division 3K in October was found, and a value of 1 701 and 1 915 tons for September and November respectively was obtained. On the other hand, a value of 429 tons for Division 2J in October was estimated, being this month the only in which fishing took place in this Division (table 2).

In general, very low catch rates were obtained by the cuban commercial vessels during 1978 if they are compared with the ones of 1977 in the same period (Domínguez, pers. comm.).

This situation, together with the fact of having the fleet fished in a limited portion of the species distribution area, provoked that very low estimates of biomass were obtained. These values are below the ones calculated by Marí et. al.

(MS 1978, op. cit.) for the months of September and October 1977, using the same commercial fleet (see table 2). It should be noted that the number of trawls and the fleet distribution area was smaller (in general) in 1978 than in 1977.

Table 2.- Monthly estimates of the biomass for the capelin in Div. 2J and 3K.

Year	Month	Division	No. of tows	Area (hectare)10^6	Biomass (M.T.)
1977*	September	2J	75	1.7	152 356
	October	2J	35	1.4	107 635
	October	3K	81	1.9	133 766
1978	September	3K	15	0.2	1 701
	October	2J	3	0.2	429
	October	3K	58	2.2	77 210
	November	3K	21	0.6	1 915

* Taken from Marí et. al. (MS 1978).

5. References

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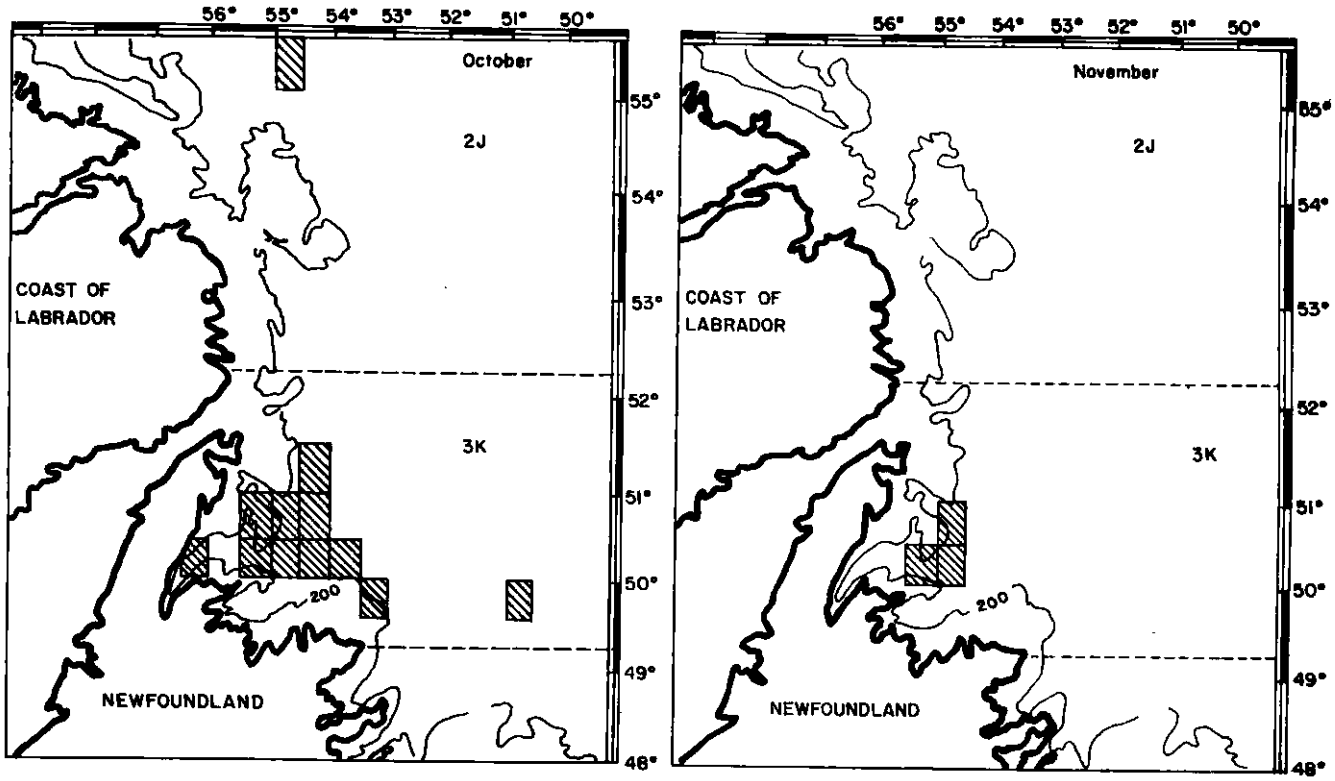

Fig. 1 - Fishing areas in subarea 3 during 1978.

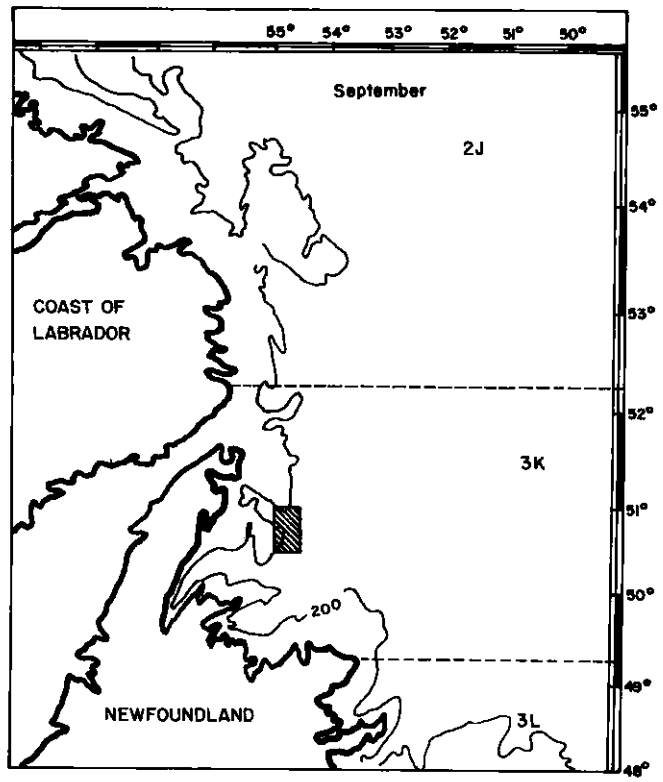

Fig. 2 - Fishing area during september 1978.