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Preliminary Estimate of Short-finned Squid Biomass from the RV Atlant Squid Counting Survey in Subarea 4 during March-May 1981

by

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Abstract

Young short-finned squid survey covering 71014 sq. miles was conducted during 27 March to 4 May, 1981, in the area between the Scotian shelf and the Sargasso Sea waters. An abundance estimate was calculated using the methods of horizontal and vertical interpolation with the time coefficient introduced basing data on different EMT trawl catchability rates during the light and dark hours of the day (Froerman, 1980). The short-finned squid abundance in the survey area is calculated to be between 5.2×10^9 and 17×10^9.

Introduction

It is believed that trawl surveys in spring, when the young short-finned squid are in the area between the continental slope and the Gulf Stream, may permit a method of predicting abundance before the fishing season begins on the continental shelf.

Data on the young short-finned squid were obtained during the cruise (27 March-4 May 1981) of RV Atlant (Froerman et al. 1981) in accordance with NAFO program for 1981. Data (which are at this stage preliminary) from this offshore survey were analyzed to determine an indication of abundance. Since squid were encountered in different water masses at different depths, coefficients were developed to expand the estimation to the total area surveyed. It is recognized that the method of estimating abundance requires further refinement, but this provides a reasonable method of estimation. The authors make a deliberate attempt to underestimate abundance here.

The results from the RTM Belogorsk cruise 1979, suggested that young squid migrate from the offshore areas onto the shelf in spring (Fedulov and Froerman, 1980). It can be considered, therefore, that the young squid abundance in the offshore area determines their subsequent abundance on the shelf waters.

Materials and Methods

Counting survey was conducted during the period from 23 March to 4 May and covered the area of 71014

sq. miles (Fig. 1). To calculate Illex abundance the data were collected from 45 EMT stations with tows made at 50, 100, 200, 300 and 500 m depths. Since the trawl catchability varied considerably, depending on the time of the day, a time coefficient was introduced based on the data collected at all the stations where Illex illecebrosus was caught (Table 1). For this coefficient calculations average numbers of squid caught at each depth were taken for three time intervals of the day (12.00-1900, 1900-0400, 0400-12.00). These coefficients show how much the day EMT catches (12.00-19.00 and 04.00-12.00) were lower than the night ones. The accuracy levels of the coefficients were not calculated.

Table 1. The trawl catchability coefficients for two time intervals of the day

Time of day[2]	Depth, m				
	50[1]	100	200	300	500
12.00-19.00	-	2.5	2.2	2.1	1.8
04.00-12.00	-	4.4	1.3	1.3	1.1

[1] All 50 m tows were made during the dark hours.
[2] Time corresponds to the local time.

Tow duration at each depth stratum was 15 minutes. The trawl was made to sink down to the pre-determined depth and was retreived almost vertically by decreasing the speed during these operations. The purpose of decreasing the speed was to minimize the probability of catching squid at other than the specified stratum. The start time of the tow was when the hydroacoustic apparatus recorded that the trawl had opened. The trawl vertical opening and horizontal spread were 6.5 m and 8.6 m, respectively. Each haul covered an area of approximately 0.003 sq. miles.

The abundance of squid was calculated per station, with each station having sets at strata in the water column from surface down to 500 m, and a time coefficient being applied for catches from each depth stratum. Methods of calculation using vertical and horizontal interpolations are described in detail by Froerman (1980). The actual numbers of squid caught at all depths were tabulated in a paper by Froerman et al. (1981).

Results and Discussion

According to the vertical interpolation a minimum abundance estimate at a station is 54 specimens and a maximum one 2411 specimens. The survey area was subdivided by horizontal interpolation into four strata (Fig. 1). The area where Illex were encountered is bounded by the Scotian shelf waters to the north and by the Gulf Stream and the Sargasso Sea waters to the south.

The abundance of squid in the survey area ranged between 5.2×10^9 and 17.0×10^9 (Table 2).

Table 2. Results of horizontal interpolation of the shortfinned squid abundance based on the data obtained during counting survey aboard the RV Atlant in April 1981

Stratum N	No. of squid at 0.003 sq. m. within the layer 0-500 m	Stratum area (sq. m.)	No. of squid within a stratum (specimens)
1	0-100	2679	0 - 0.0893×10^9
2	101-500	55431	1.8662×10^9 - 9.2385×10^9
3	501-1000	6076	1.0147×10^9 - 2.0253×10^9
4	1001-2500	6828	2.2783×10^9 - 5.69×10^9
1-4		71014	5.1592×10^9 - 17.043×10^9

If we assume apriori that total mortality rate for squid recruits does not exceed 50% from the time of the survey to their July-September residency on the shelf, these estimations may be projected to an abundance range of 2.6×10^9 and 8.5×10^9. Since the squid weight during this period ranges from 190 g to 270 g and averages approximately 225 g, the biomass of short-finned squid during July to September may be in the scale between 585 thousand tons and 1.9 million tons.

When methods of survey are further developed and refined this type of survey will permit us to project abundance levels into the fishing season.

References

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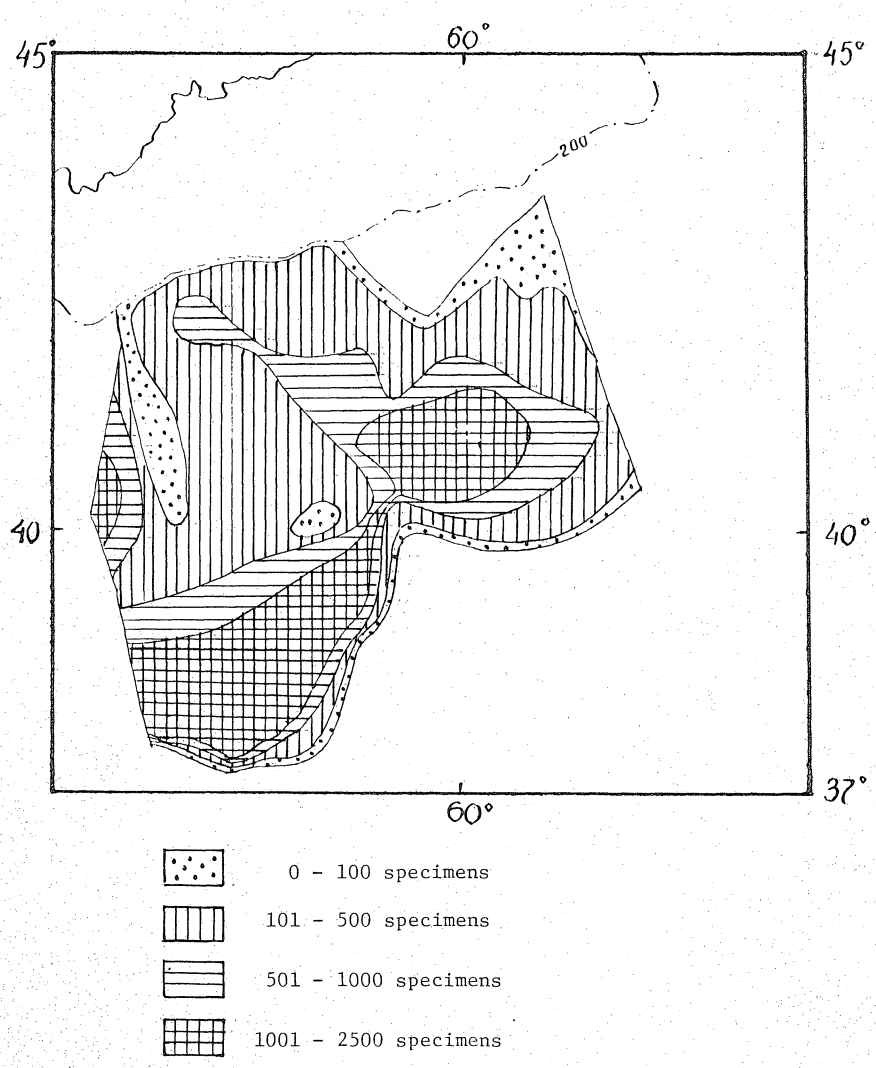

Fig. 1. Distribution of short-finned squid abundance during the period from 27 March to 4 May 1981.