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A study of the spawning and nursery areas  
of soles along the Belgian coast.

by

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INTRODUCTION.

The sole fishery is the most important fishery in Belgium as regards its commercial value. Although this fishery is carried out on various sole stocks (Bristol Channel, English Channel, Irish Sea) the North Sea sole landings constitute about 51 % of the total Belgian sole landings in the last three years. This percentage was much higher during the period 1959-1963 (89 %) and during the period 1964-1969 (70 %). The two reasons for the decline in the North Sea sole population have been published in the Flatfish Working Group Report (Anon., 1970) viz. the quadrupled fishing effort and the absence of strong year-classes after 1963.

As the Belgian coast is a well known spawning area for the Southern North Sea sole population, the aim of the present investigations was to determine the densities of sole eggs and larvae as well as the juvenile and the mature soles on the Belgian coast. The results of this study can be interpreted as an index of the strength for the year-classes 1970, 1971, 1972 and 1973 in the Southern North Sea.

MATERIAL AND METHODS.

The densities of the soles on the Belgian coast were determined by means of monthly samplings of research vessel catches on fixed stations with otter trawl shrimp gear (mesh size 18 mm).

The soles were grouped in the following length classes :  
0-group : 0-13 cm ; I-group : 13-19 cm ; II-group : 20-23 cm and  
III- and older group : 24 cm.

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The eggs and larvae sampling was carried out by means of the Dutch type Gulf Sampler.

## RESULTS.

### a. Sole densities.

It is a common fact that during the spring large concentrations of mature soles are found along the Belgian coast (Gilis, 1961). This is reflected in the high proportion of the April-May-June catches in fishing rectangle G1 as given in table 1.

Table 1 - The amount of sole catches in April, May and June in fishing rectangle G1 in relation to the total catch.

Year	Percentage to the total catch in		
	April	May	June
1966	16.7	23.1	10.6
1967	22.9	20.7	10.5
1968	32.7	24.9	7.3
1969	29.7	23.8	5.9
1970	15.5	38.1	9.9
1971	21.9	21.1	6.4
1972	20.0	15.0	5.2
Mean	22.8	23.8	8.0

The importance of the Belgian coast as spawning area and as nursery ground can also be derived from figure 1. The highest concentrations of 0-groups, born during the spring, are found in the research vessel catches in the autumn of the same year. Considerable fluctuations in the strength of the year-classes of soles appear from year to year (De Veen, 1965). From figure 1 the year-class 1971 could originally be classified as a good year-class and this was also true for the Dutch coast (Anon., 1971). For unknown reasons up to now an important natural mortality caused such a reduction in the numbers that the strength of this year-class had in 1972 to be reviewed as moderate. On the other hand the year-class 1970 could be classified as moderate and the year-class 1972 as poor.

The distribution of the 0-groups for the year-classes 1970, 1971 and 1972 along the Belgian coast is expressed in figure 2.

First of all there is an apparent difference in strength for the three year-classes as already mentioned. Secondly, although a rather homogeneous distribution of the 0-groups between all the Banks was observed, a slightly higher density seemed to occur on the Ostend Bank.

#### b. Eggs and larvae production.

In order to obtain better estimates of the strength of the sole year-classes and of the factors governing the success or failure of the spawning process, investigations were carried out in 1972 and 1973 concerning the distribution of eggs and larvae of soles. The figures 3, 4, 5 and 6 demonstrate the results of this sampling.

From the figures 3 and 5 it is clear that the sole eggs are mostly located near the shore and especially on the Belgian-French border. In this area densities up to 2,811 and 1,655 eggs/1,000 m<sup>2</sup> are found.

The same phenomenon occurs when observing the sole larvae as expressed in the figures 4 and 6. Nevertheless a drift seems to take place in NE direction under the influence of the ENE currents on the Belgian coast (Leloup, 1966). A maximum density of 66 sole larvae/1,000 m<sup>2</sup> was obtained in 1973. This drift must be the reason for the rather homogeneous distribution of the 0-group.

There is on the other hand a good relationship between the location of mature soles during the spawning period and the presence of the sole plancton.

The evolution in time of the densities of sole eggs and larvae for the year 1973 is given in figures 7 and 8. From these figures it is obvious that the spawning period occurs during a rather limited period, namely during April and the month May. This is confirmed by earlier studies (Zijlstra, 1961).

#### CONCLUSIONS.

The Belgian coast may be considered is a spawning and a nursery area for part of the sole population of the Southern North Sea.

From the data obtained during the period studied no important year-classes have been observed. For this reason a further decrease in the Southern North Sea sole landings may be expected for at least the next two years.

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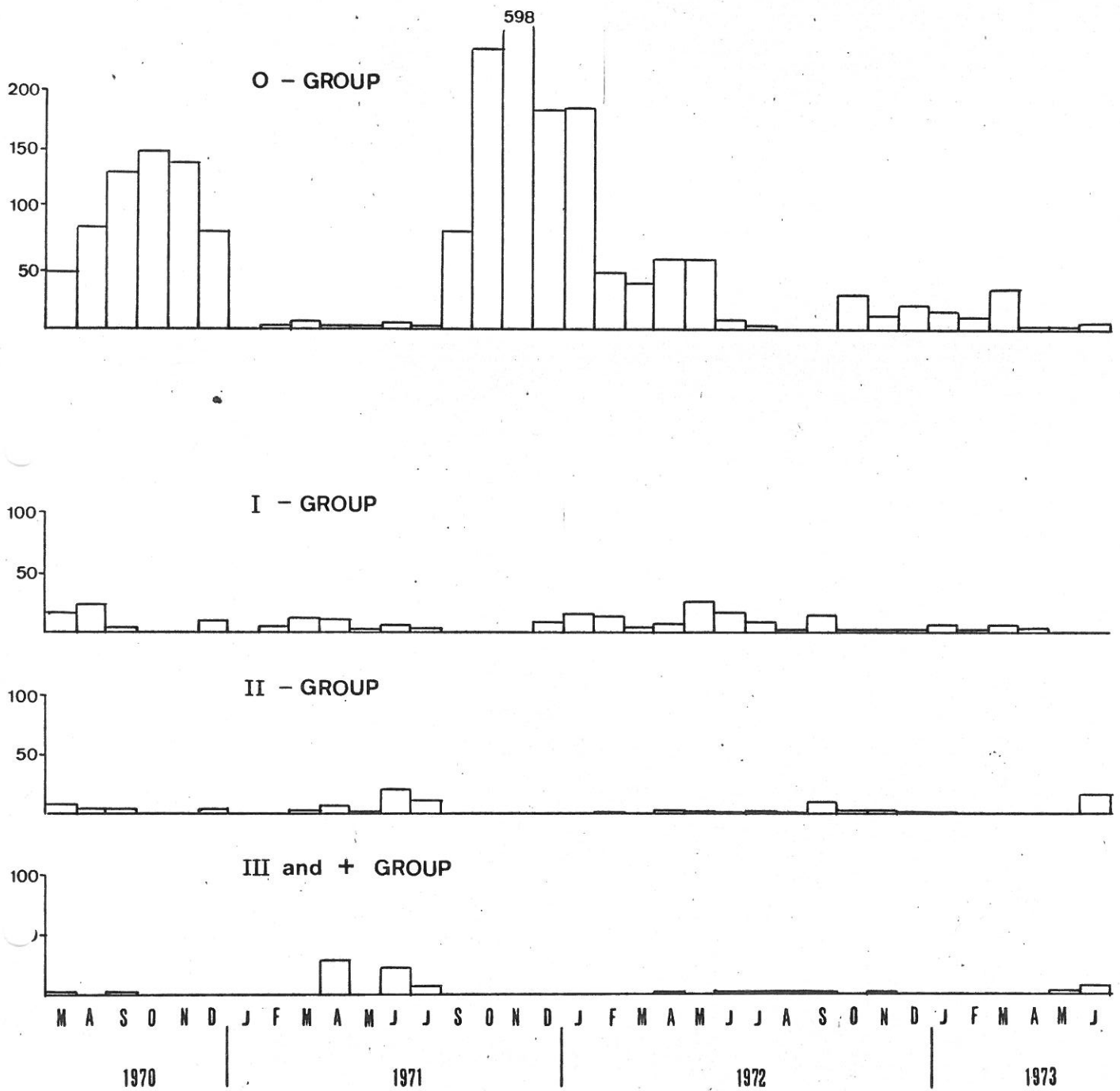


Figure 1 - The monthly densities of the O-, I-, II-, III- and older groups of sole during the period May 1970 - June 1973 along the Belgian coast.

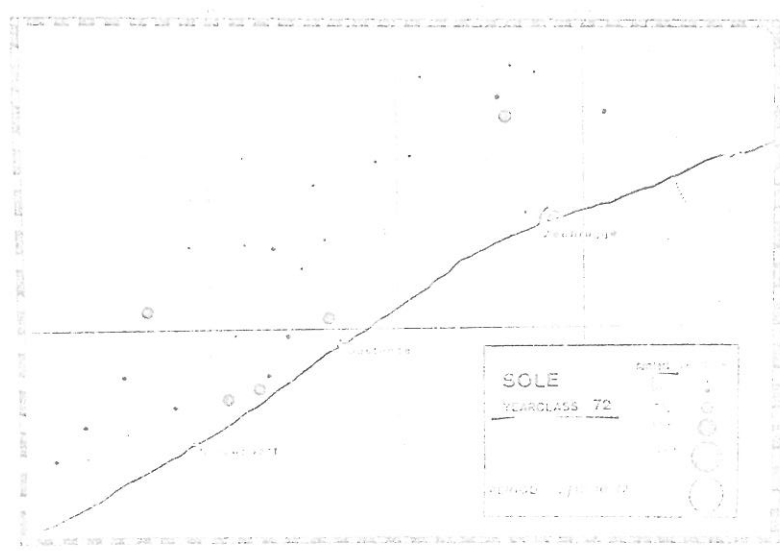
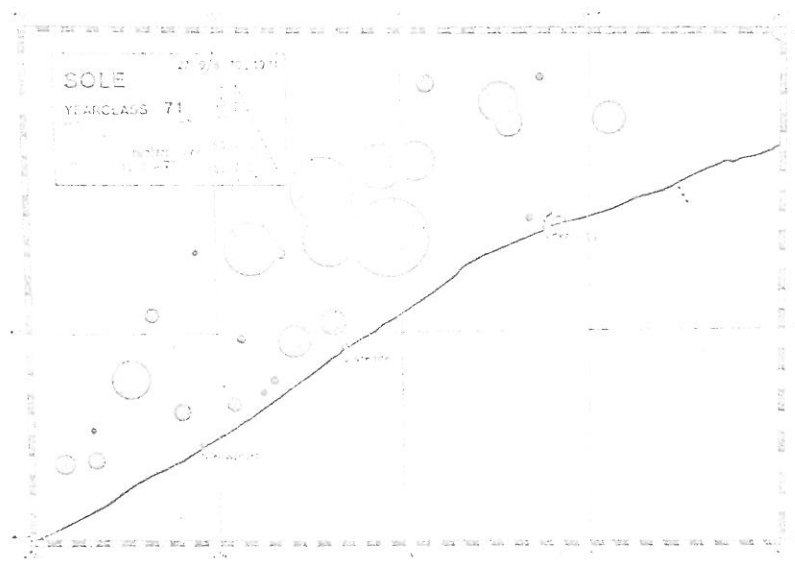
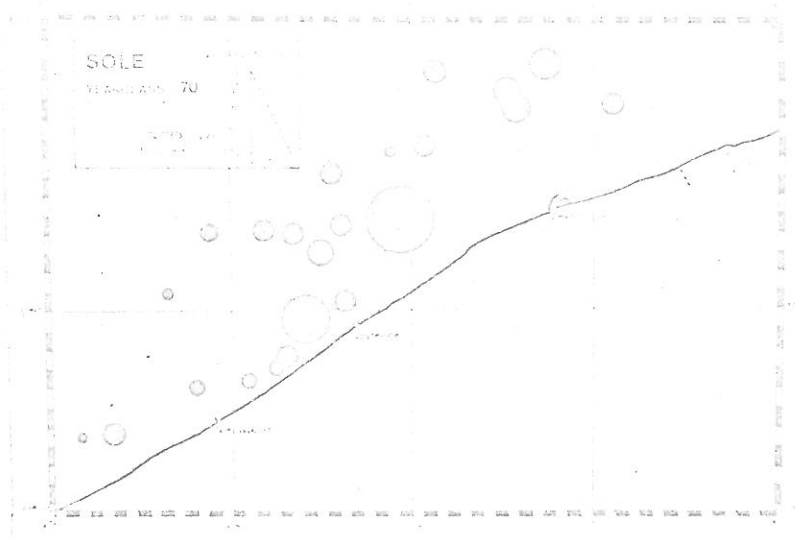


Figure 2 - The densities of the year classes 1970, 1971 and 1972 along the Belgian coast.

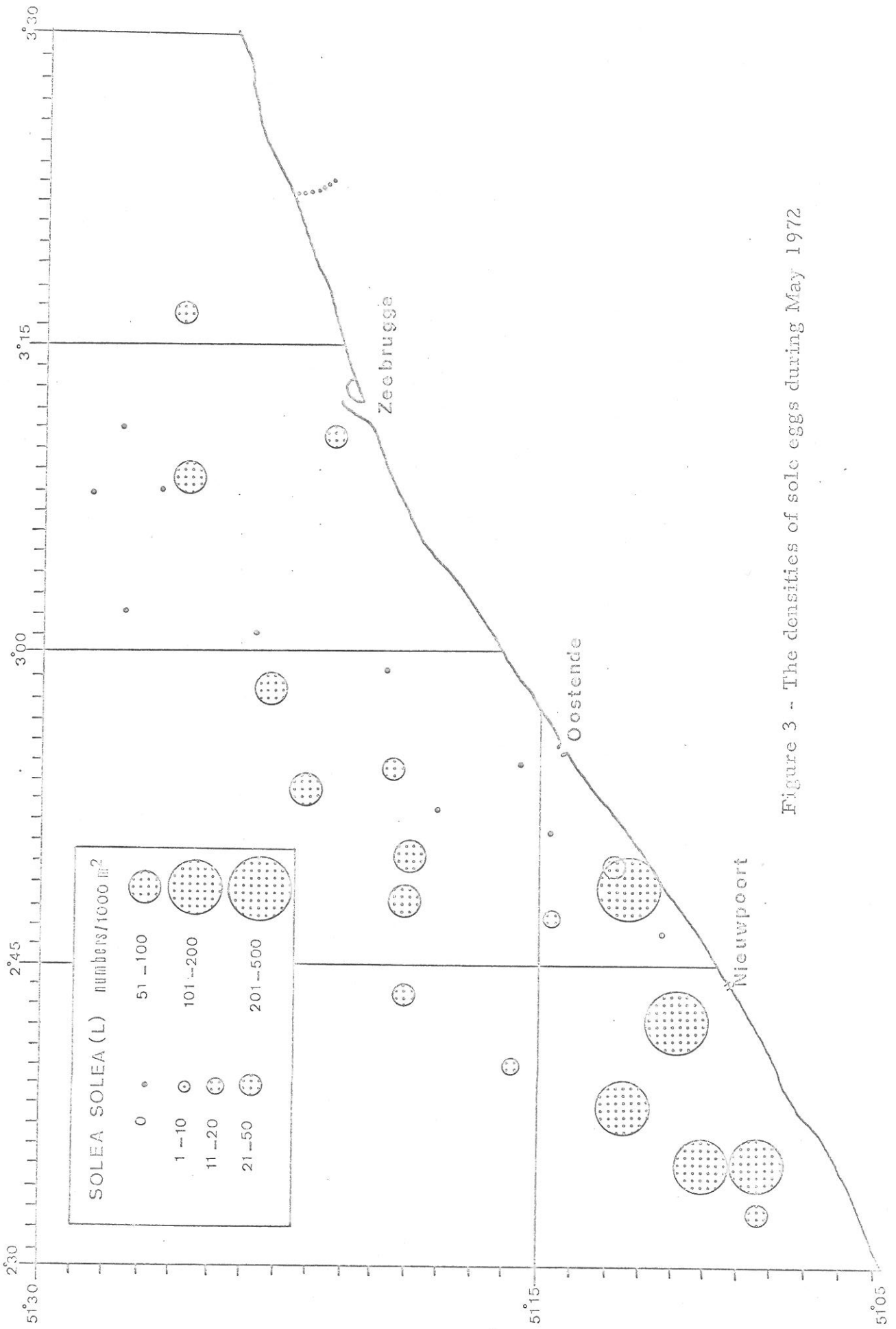


Figure 3 - The densities of sole eggs during May 1972

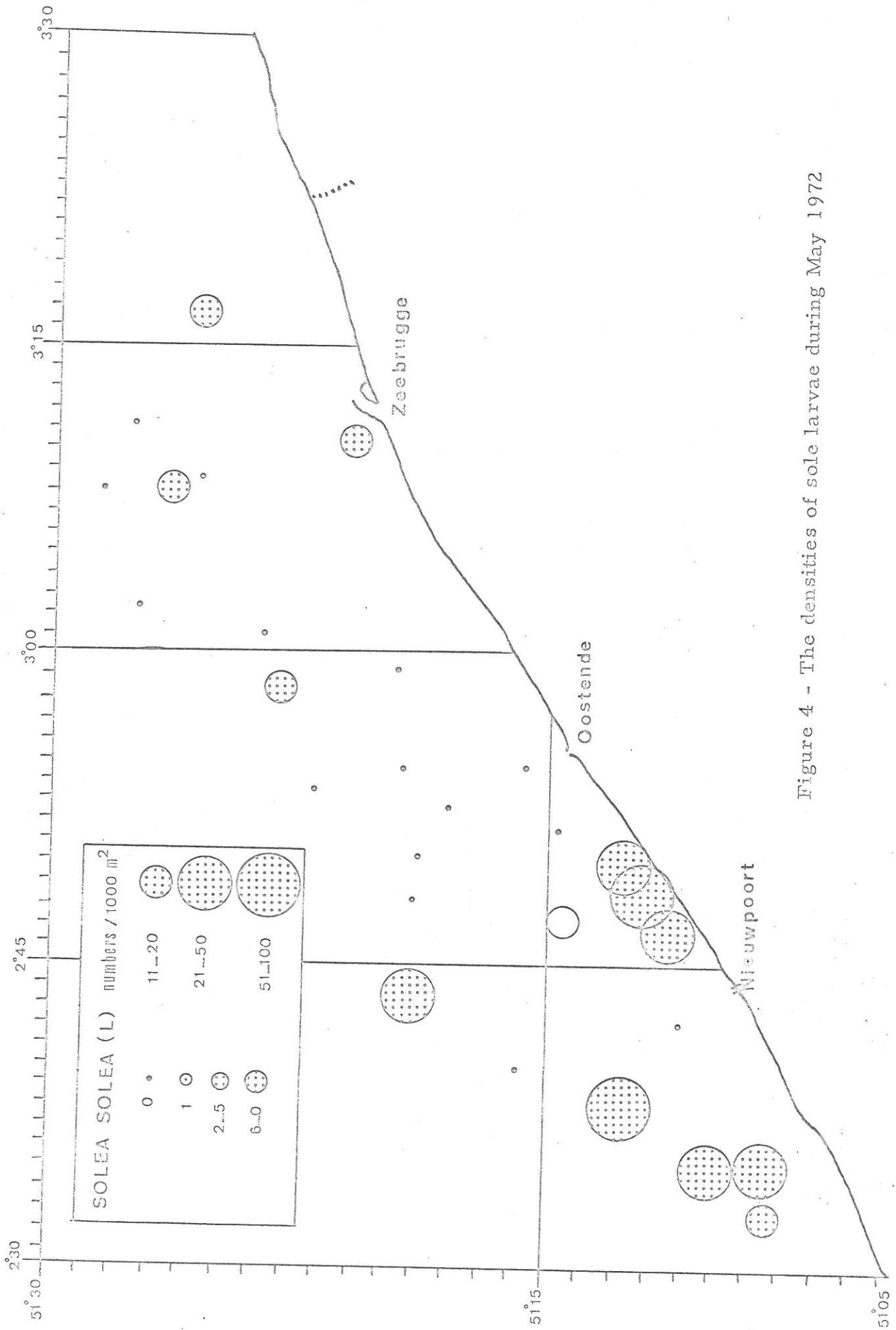


Figure 4 - The densities of sole larvae during May 1972



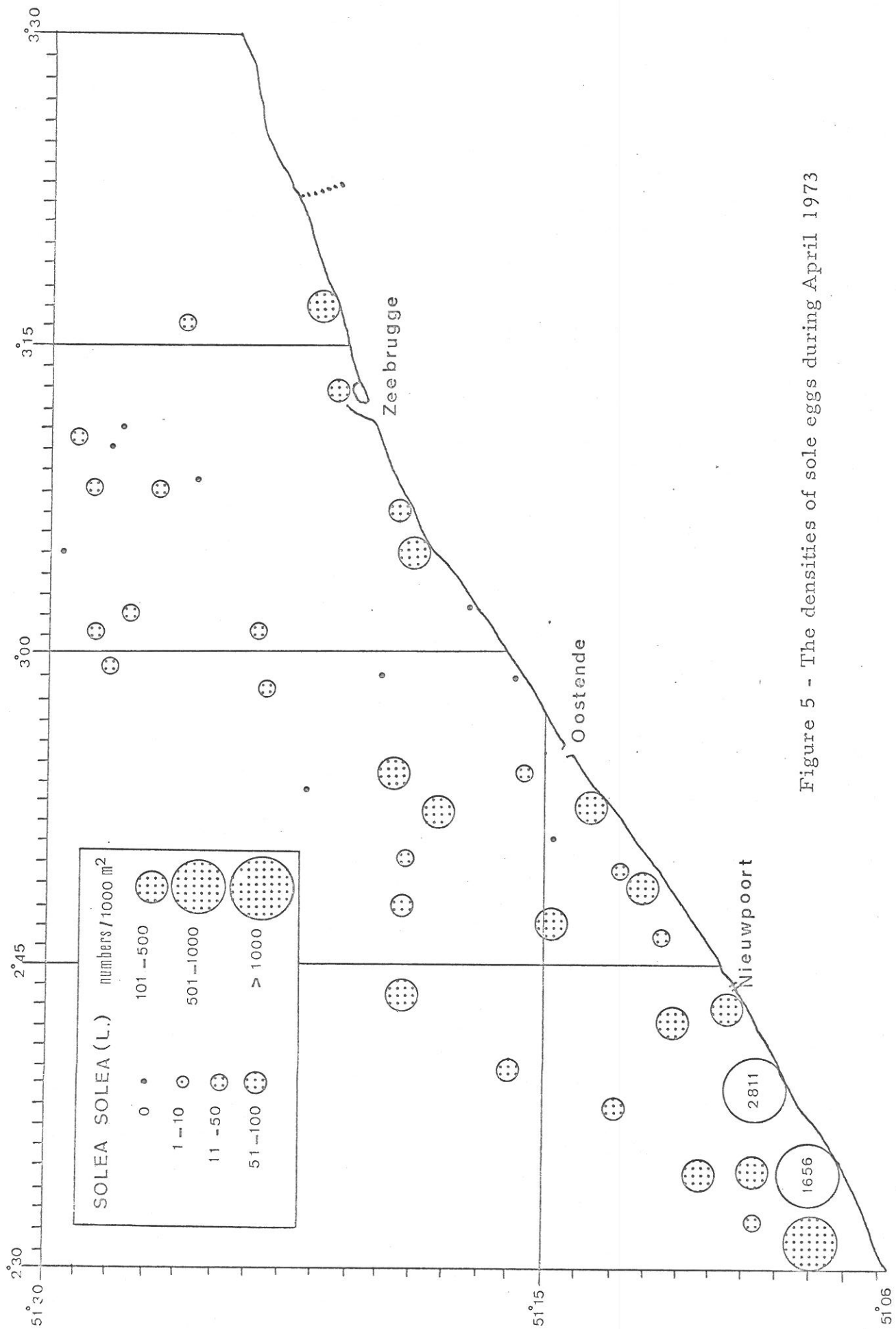


Figure 5 - The densities of sole eggs during April 1973

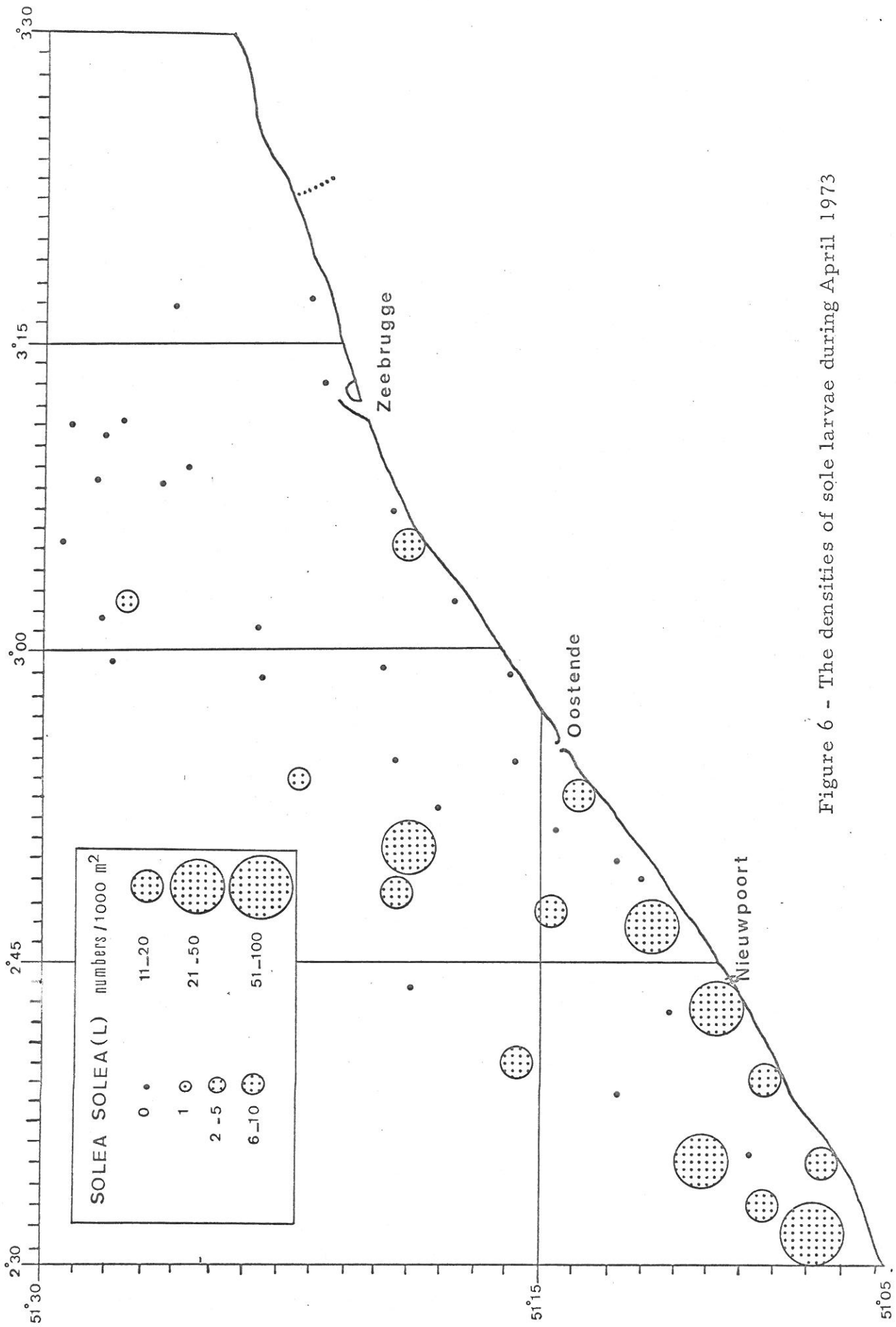


Figure 6 - The densities of sole larvae during April 1973

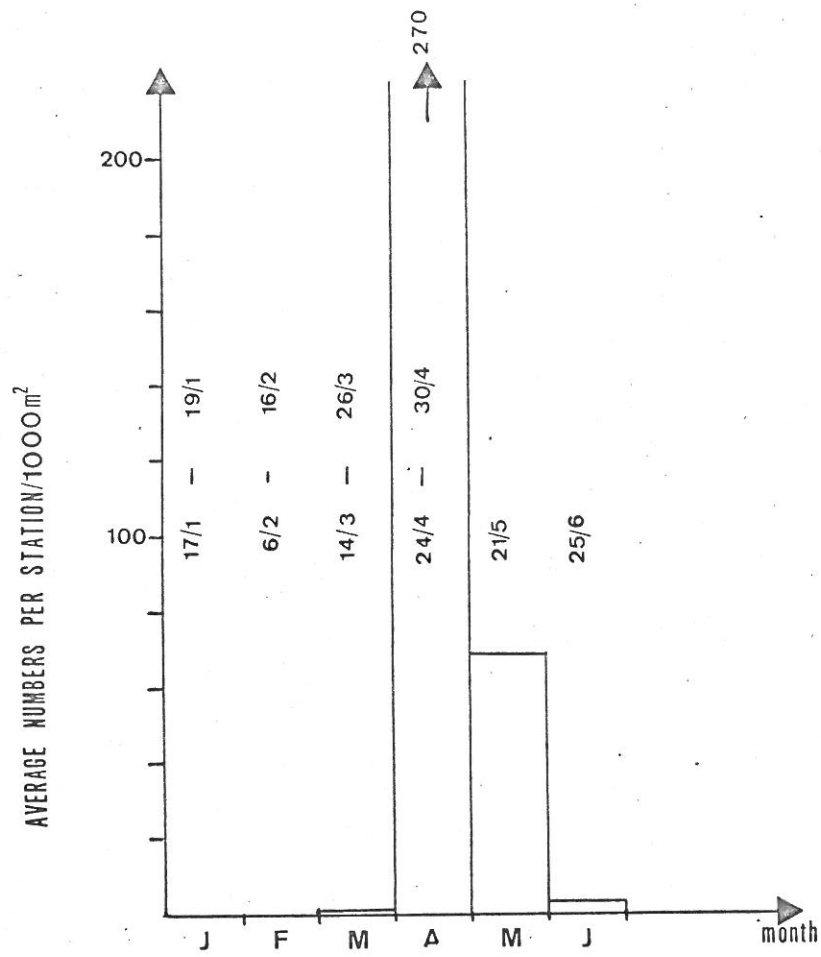


Figure.7 Distribution of sole eggs

during the period 1/1/73-30/6/73

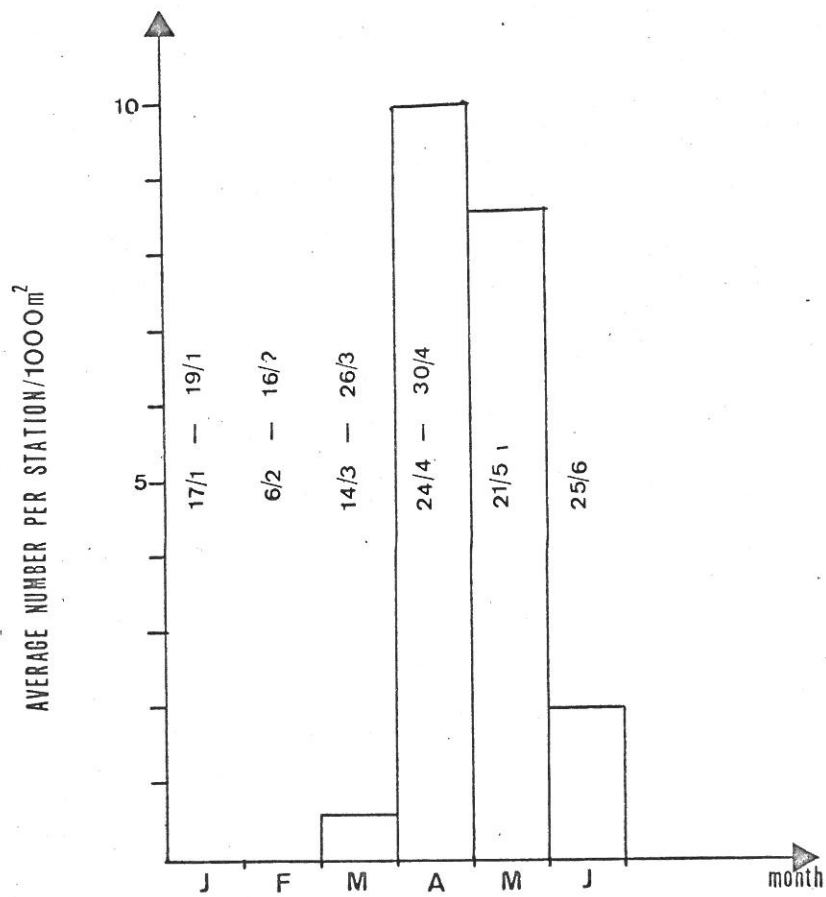


Figure.8 Distribution of sole larvae

during the period 1/1/73 - 30/6/73