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MATHEMATICAL MODEL OF THE
POLLUTION IN THE NORTH SEA

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A STUDY OF THE DISTRIBUTION OF SOLE (Solea solea L.) EGGS AND LARVAE ALONG THE BELGIAN COAST.

A. SMAGGE and J. VAN DE VELDE
Rijksstation voor Zeevisserij, Oostende

1. Introduction.

The Belgian coast is known as an important spawning and nursery area for a part of the Southern Bight sole population.

In 1972 and 1973 the density and distribution of sole plancton was already studied in order to determine the strength of the year-classes (De Clerck R. en Van de Velde J. 1973).

The aim of this investigation was to estimate the strength of the sole year-class 1974 by means of the number of sole eggs and larvae during the spawning season along the Belgian coast.

2. Material and methods.

The densities of the sole eggs and larvae along the Belgian coast were determined by means of the Dutch type Gulf Sampler on 43 stations (figure 1).

The sampling procedure is listed in the following table :

	Coastal stations	Dumping stations	Complementary stations
Emount	17	14	17
Date of sampling	21-1/25-1	21-1/25-1	1-4/9-4
	13-2/18-2	13-2/18-2	
	11-3/15-3	11-3/15-3	
	1-4/ 9-4	1-4/ 9-4	
	2-5/20-5	2-5/20-5	
	5-6/27-6	5-6/27-6	
	16-7/19-7	16-7/19-7	

During the sampling the physical parameters temperature and salinity were determined as they have an influence on the fry (de Veen J.F. 1967 - '69 - '70, De Clerck R. 1974).

3. Results and discussion.

a) Physical parameters.

The temperature and salinity are illustrated on figure 2. The temperature-curve shows a rather homogeneous rising. The salinity-curve varies between 35,3°/$_{oo}$ and 33,7°/$_{oo}$.

b) Egg distribution.

The spawning time of soles is dependent of the latitude and the temperature (I.C.E.S. 1965, De Clerck R. 1974). On the Belgian coast spawning occurs generally from March to June but the exact spawning peak varies from year to year in accordance to the season temperature. The spawning peak observed in 1974 was already situated in April (figure 3)(Ehrenbaum E. 1964, Muus B.J. 1964, Zijlstra J.J. 1968, Wheeler A. 1969, De Clerck R. en Van de Velde J. 1973) due to the relative high temperature of the sea-water (figure 2).

The beginning of the spawning coincides with temperatures above the 5° C (Muus B.J. 1964, Arbault S. et Boutin N. 1967, de Veen J.F. 1967).

Soles spawns generally very close to the continental coast (Muus B.J. 1964, Arbault S. et Boutin N. 1967, Zijlstra J.J. 1968, de Veen J.F. 1969). This is confirmed on figure 4 as the highest concentrations of sole eggs were found in the coastal stations. The most important spawning area was situated in the vicinity of the Belgian-French border in accordance to the earlier results (De Clerck R. en Van de Velde 1973). A maximum of 3,337 eggs/1,000 m^2 was obtained.

c. Larvae distribution.

The maximum concentration of sole larvae was obtained in the middle of May (figure 5). This was about three weeks after the egg peak. The same results were obtained in 1973 (Van de Velde J. 1973).

The distribution of the larvae is given in figures 6 and 7. The density never exceeded 50 larvae/1,000 m^2.

The fact that the number of larvae was substantially inferior to the number of eggs could be due to partly a high natural mortality and partly the adoptation from pelagic to bentic life at a length of 15-18 mm (Wheeler A. 1969).

4. Conclusion.

The densities of sole eggs and larvae in 1974 show no important differences with those observed in 1972 and 1973. For this reason it can be assumed that the recruitment of the 1974 year-class will not enlarge considerably the stock size of the Southern Bight sole population.

5. References.

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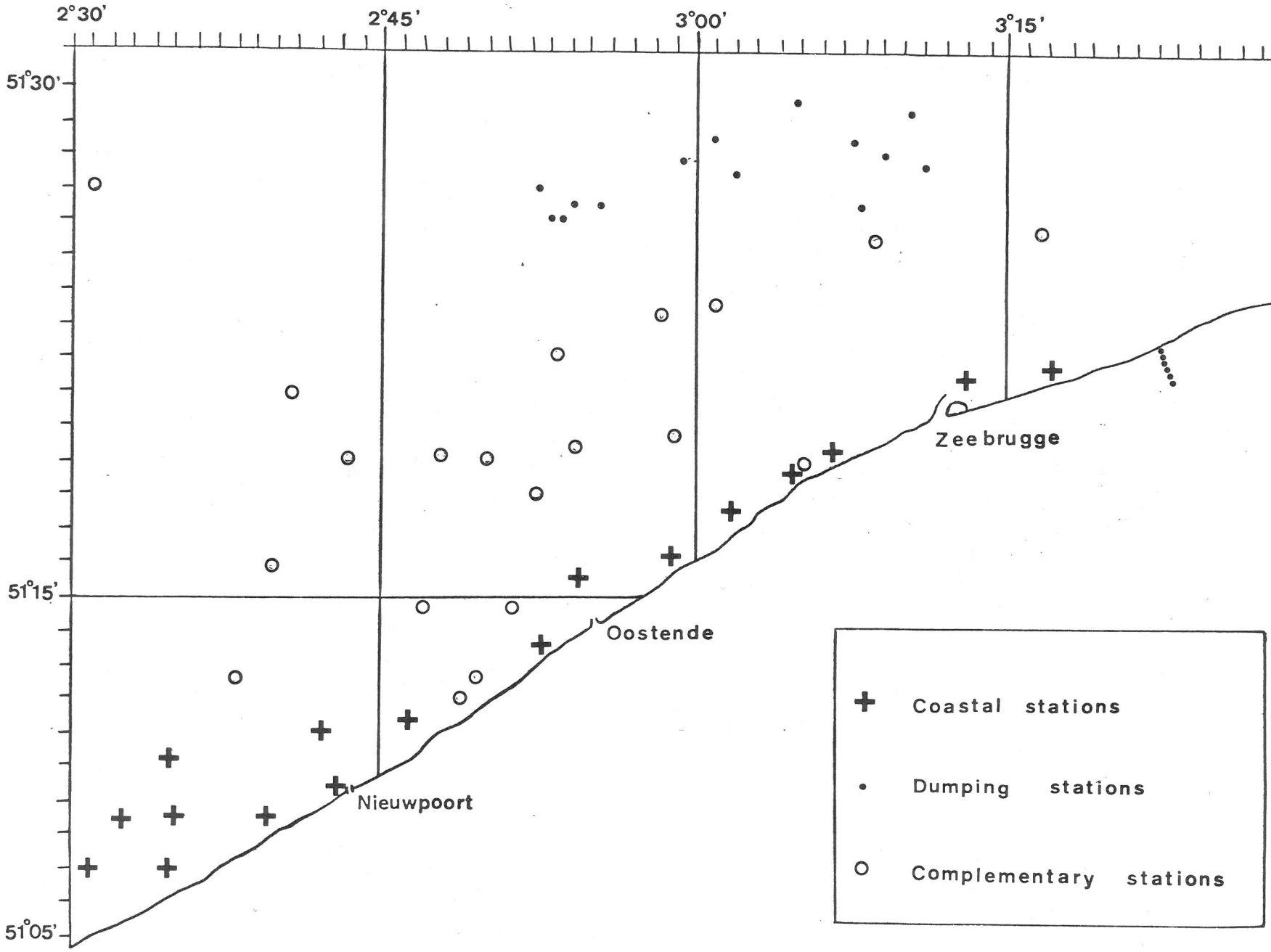
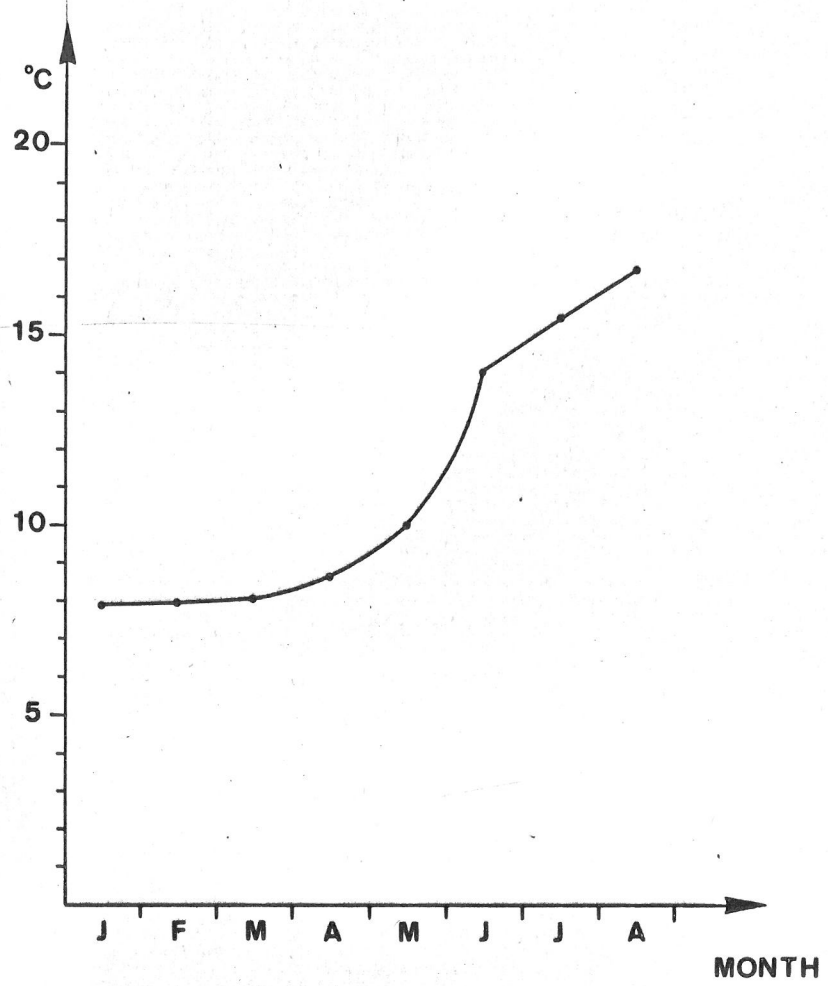
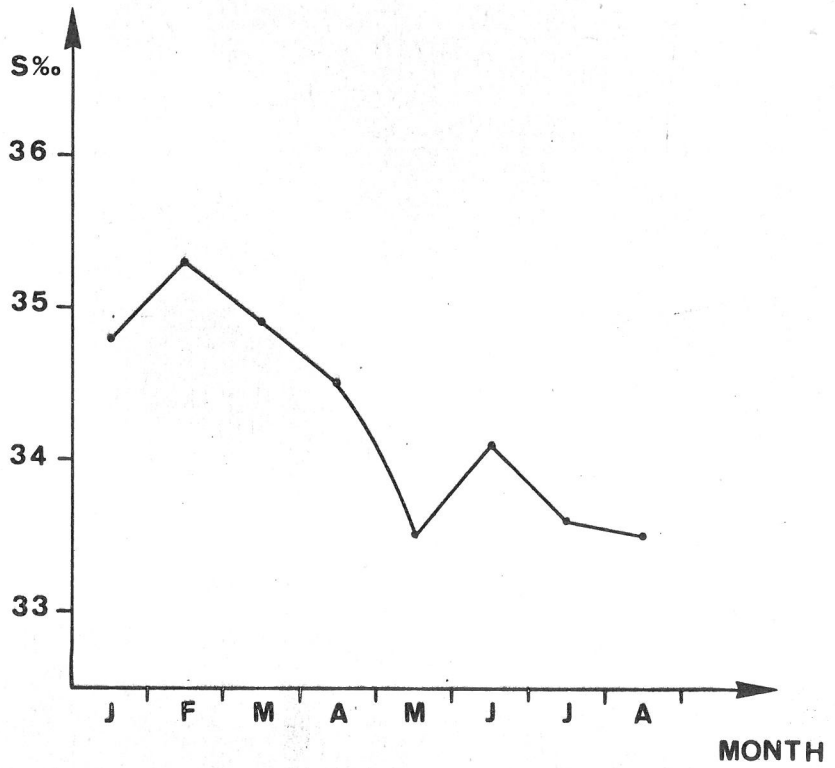


Fig. 1 Position of the stations sampled in 1974.

Fig 2 Average temperature and salinity of the surface sea-water (West-Hinder).





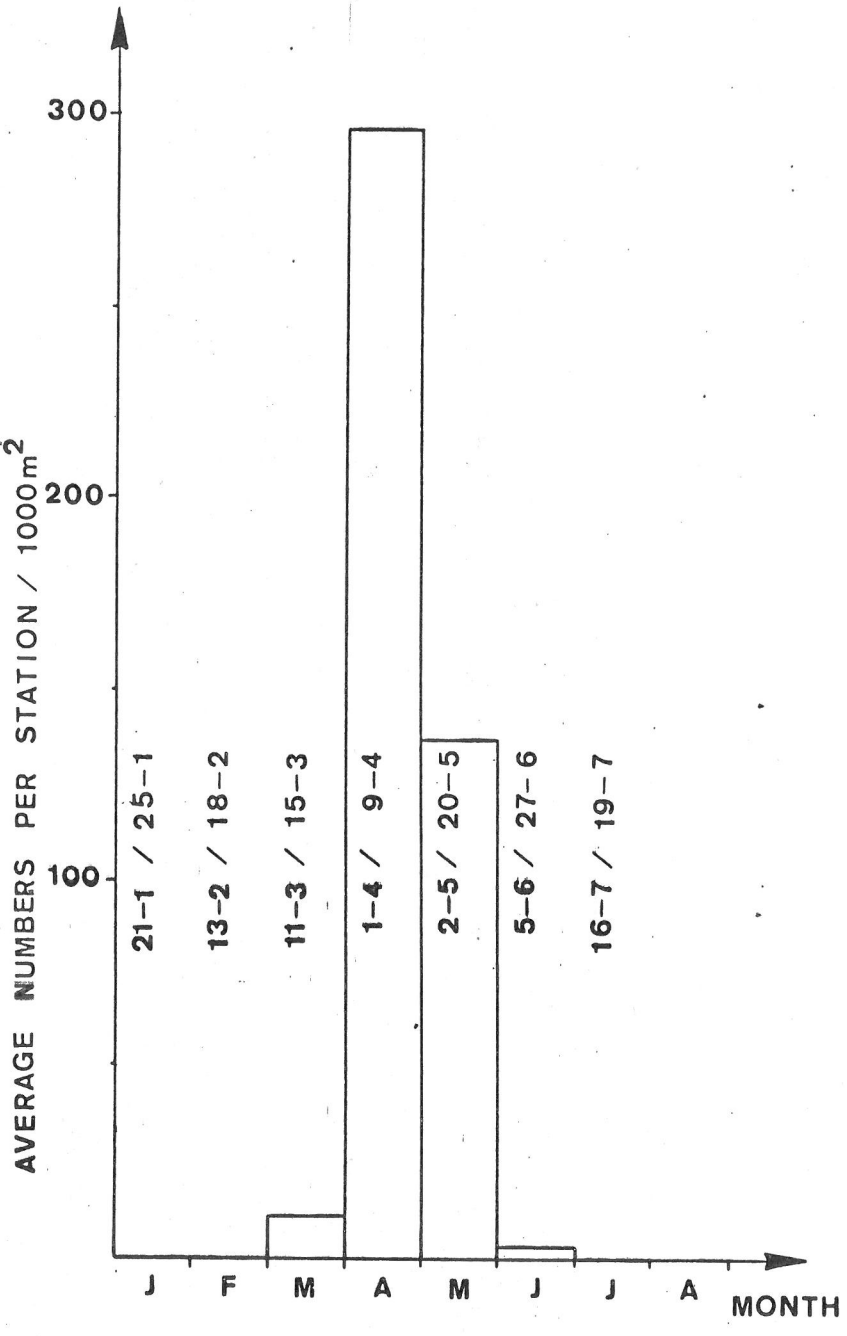


Fig. 3 Distribution of sole eggs during the period 1-1-74 / 30-7-74.

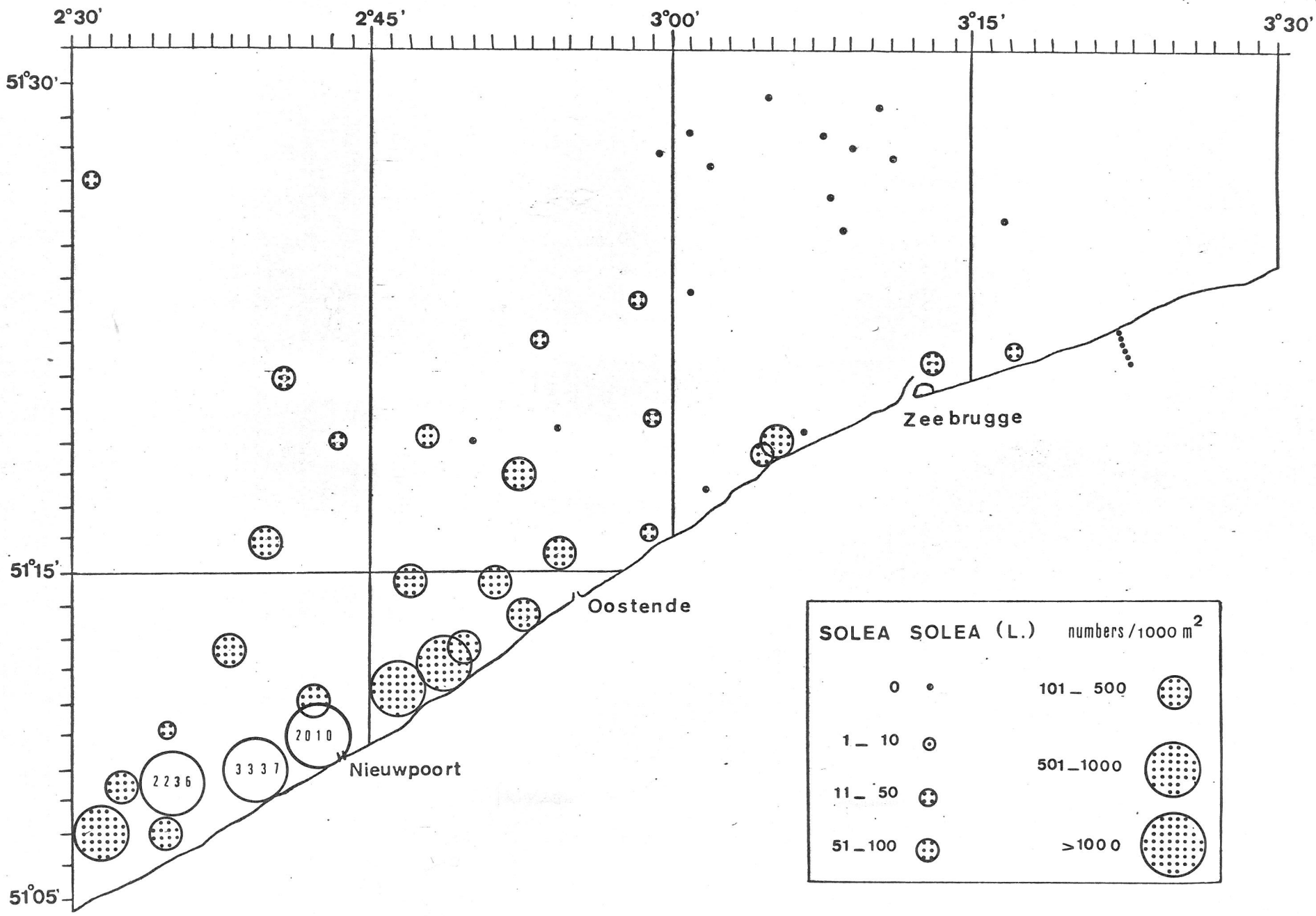


Fig. 4 The densities of sole eggs during April 1974.

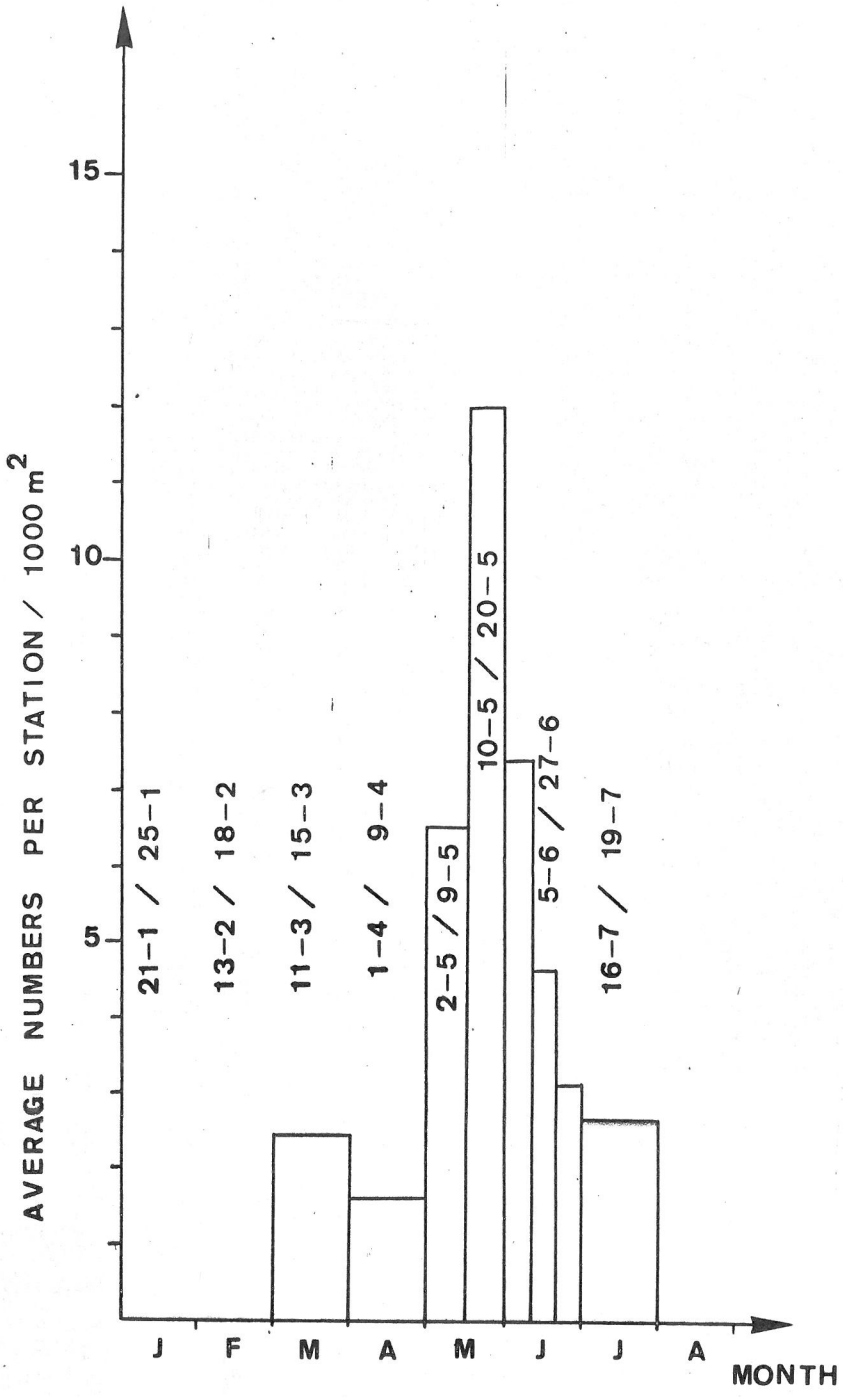


Fig. 5 Distribution of sole larvae during the period 1-1-74 / 30-7-74.

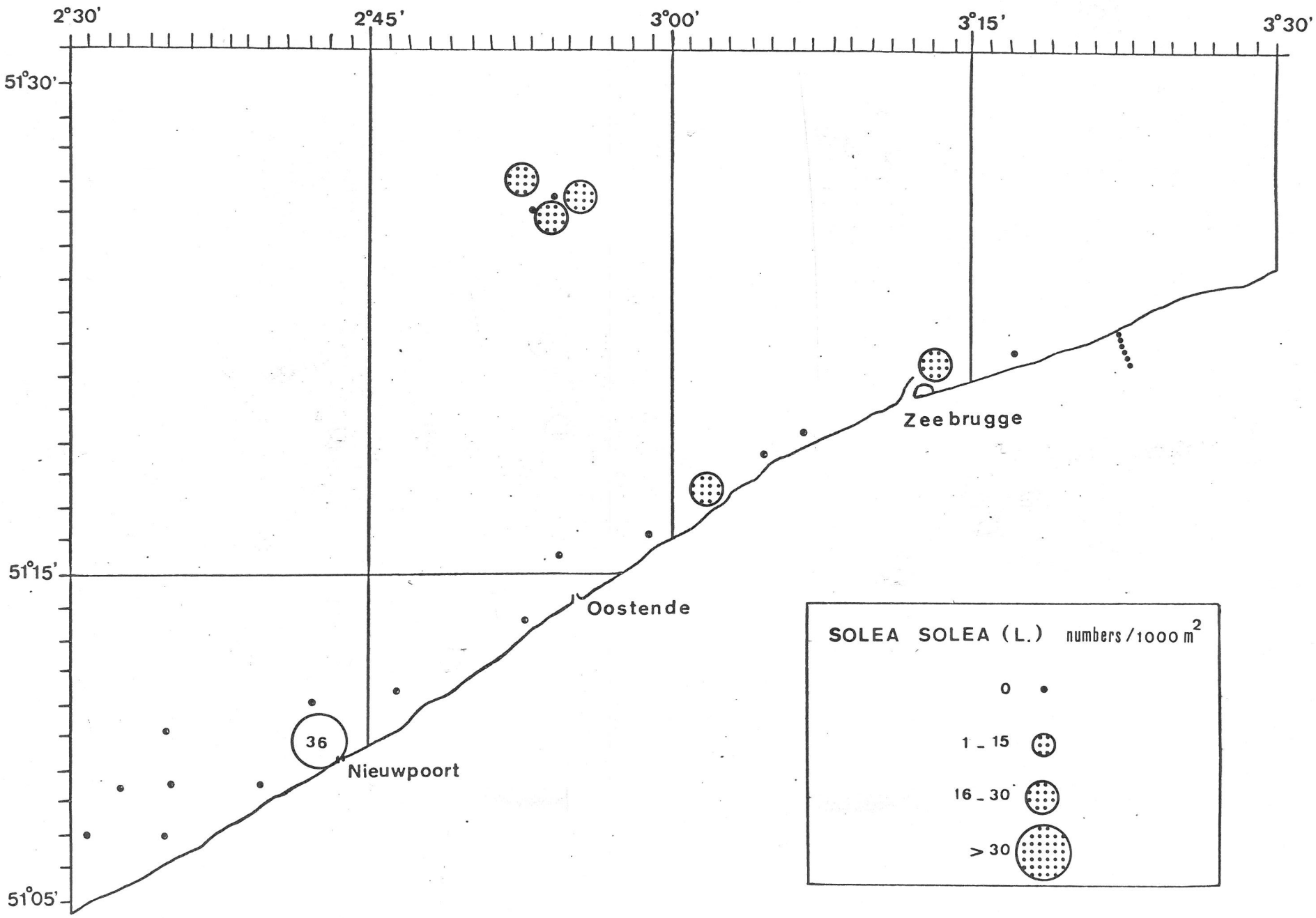


Fig. 6 The densities of sole larvae from 2 to 9 May 1974.

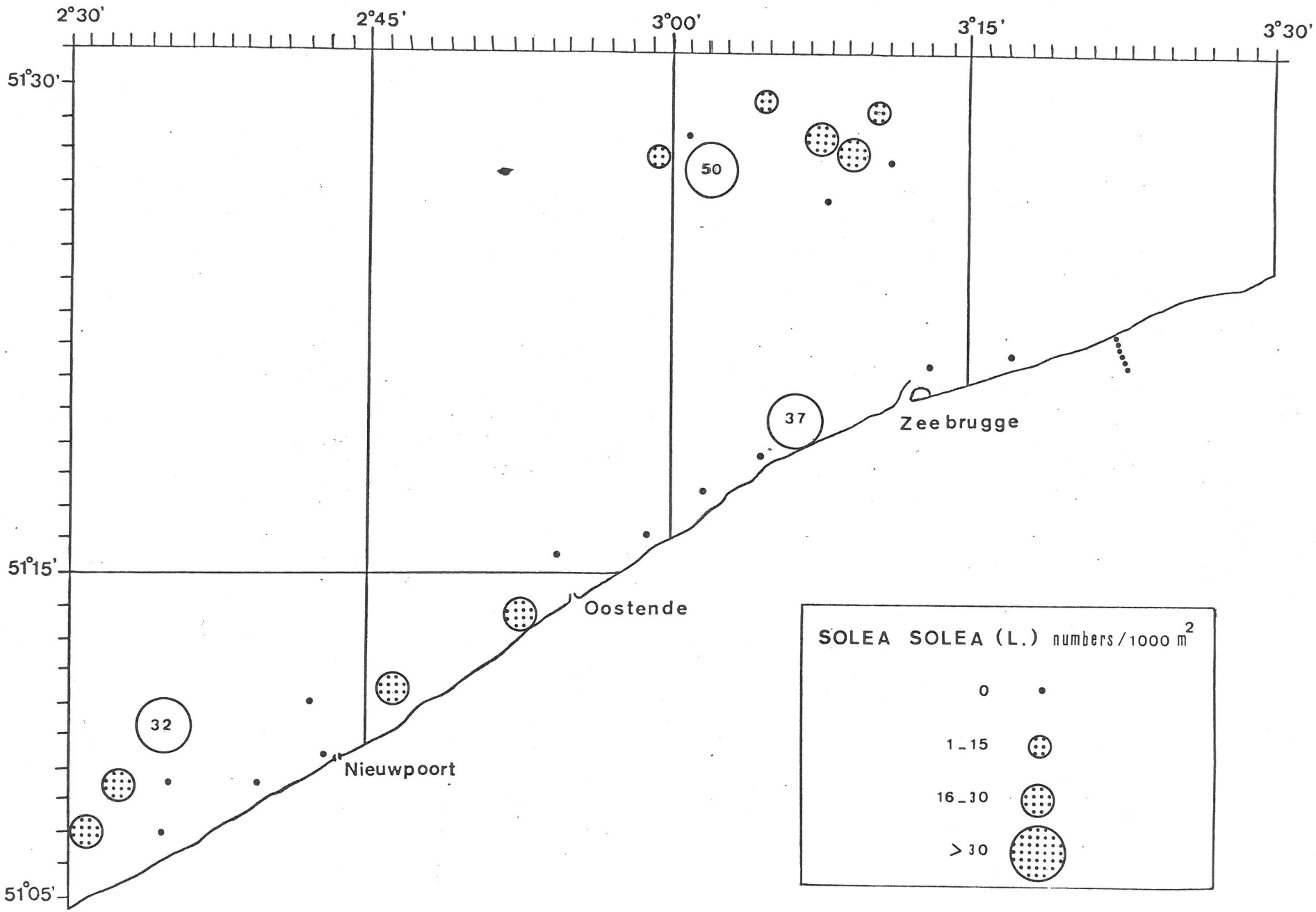


Fig. 7 The densities of sole larvae from 10 to 20 May 1974.