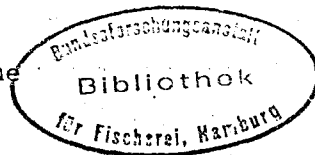


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International Council for the
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PRELIMINARY OBSERVATION ON THE DISTRIBUTION, ABUNDANCE, SURVIVAL AND DRIFT
OF EGGS AND LARVAL STAGES OF COD AND PLAICE IN THE WEST CENTRAL NORTH SEA
IN 1976

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INTRODUCTION

In 1976 a series of plankton and young fish surveys were undertaken in the west central North Sea between the north Norfolk coast and latitude 56°N and the east coast of England and longitude 2°E. The surveys were designed to study the intensities of the spawnings of commercially important fish near the east coast of England from distributions of their eggs and larvae; to estimate abundance and mortality in the egg and larval stages, to determine the speed and direction of larval drift to the nursery grounds and to study the ecology of young fish in the nursery areas.

METHODS

On each cruise plankton and young fish were collected on a grid of stations (Figure 1) using the Lowestoft multipurpose plankton sampler, a changing net sampler, a neuston net, a franc trawl and the international young fish trawl. Chlorophyll 'a', phaeopigments, nitrate, nitrite, phosphate, silicate, temperature, salinity and transparency measurements were made either continuously by monitoring with electrically recording instruments, water taken from 4 m depth using a pump, or from analyses of samples taken at the plankton stations, from various depths using Hansen water bottles. Sea bed drifters were released on each cruise at selected stations near six buoyed current meter rigs which were maintained throughout this series of surveys to provide information on residual drift through this area of sea. Young fish collections were made as they recruited to the inshore nursery areas at selected beaches using beam trawls, franc trawls and push nets.

The plankton and young fish are still being counted from these collections but preliminary observations are possible for the spring spawnings of cod and plaice from counts of cod and plaice eggs and larvae taken on the first six cruises between January and April 1976, and from the results of national and international 0-group surveys conducted in June and September 1976.

RESULTS

Plaice and cod spawned in this area of sea between January and April in the deep water north of Flamborough Head. Distributions of 3-day-old (stage 1) eggs of the plaice and cod from the first six cruises in 1976 illustrate the main centres of spawning for these two species (Figures 2 and 3) and indicate that the spawning centres moved in a north-westerly direction as the season progressed. Larvae which hatched from these eggs also tended to drift to the north-west initially and then to the west or south-west to coastal nursery areas. The pattern has been deduced by examining patches of developing eggs and larvae on successive cruises and the final distributions of 0-group fish in their nursery areas (Figures 4 and 5) and is consistent with the residual drift measured from current meters and sea bed drifter returns. The residual drift was towards the north or north-west in winter and early spring in most of the water column and, in late spring and summer, offshore at the surface above the thermocline and onshore below the thermocline (Ramster, 1977).

Production of plaice and cod eggs and larvae were measured and seasonal mortality curves constructed for the egg stages following the techniques described for plaice and cod in the Southern Bight (Harding and Talbot 1973, Harding *et al* 1974). The total number of eggs spawned was calculated for both species from the intercepts of the regression lines of \log_e numbers produced for each development stage plotted against the average age. This procedure gave estimates of 1.06×10^{13} cod eggs and 3.39×10^{12} plaice eggs. The mortality rate per day (Z) was estimated from the slope of these regressions at 0.14 for cod eggs and 0.04 for plaice eggs respectively, equivalent to 85% and 45% mortality between spawning and hatching (Figure 6a and b).

These are the first estimates of cod egg production from the Flarborough spawning grounds and indicate that the spawning is of the same order of magnitude as that which occurs at the Texel spawning ground in the Southern Bight, and which ranged from 1.93×10^{13} to 1.16×10^{13} eggs spawned between the years 1968 and 1971. The mortality in eggs between spawning and hatching was about 10% lower at Flarborough than that measured in the Texel egg patches.

One previous assessment of the plaice spawnings at Flarborough was made from egg surveys in 1949. Since no measurement of mortality was available for that year this assessment was based on the production of stage 1 eggs and estimated at 0.39×10^{12} , which was approximately one tenth of the production of the plaice spawning in the Southern Bight in 1949 (Simpson 1959). In 1976 the number of stage 1 eggs produced at Flarborough was 3.09×10^{12} which is almost ten times the 1949 estimate and equivalent to the production in the main plaice egg spawning in the Southern Bight in 1971. This increased production estimate at Flarborough is partly due to the more extensive survey grid used in 1976, but is also consistent with the overall increase in plaice egg production in the central North Sea in recent years (Bannister *et al.*, 1974).

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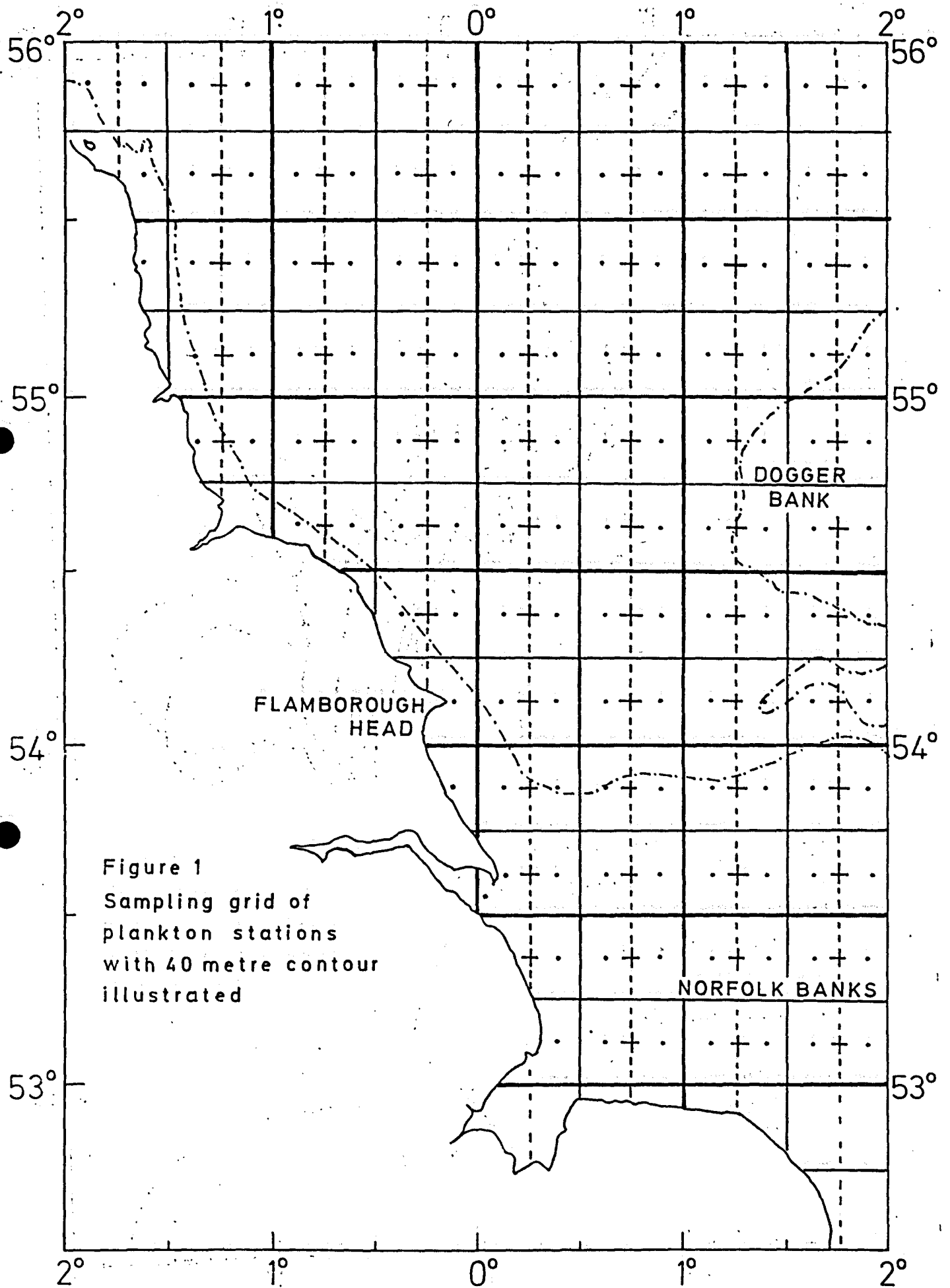
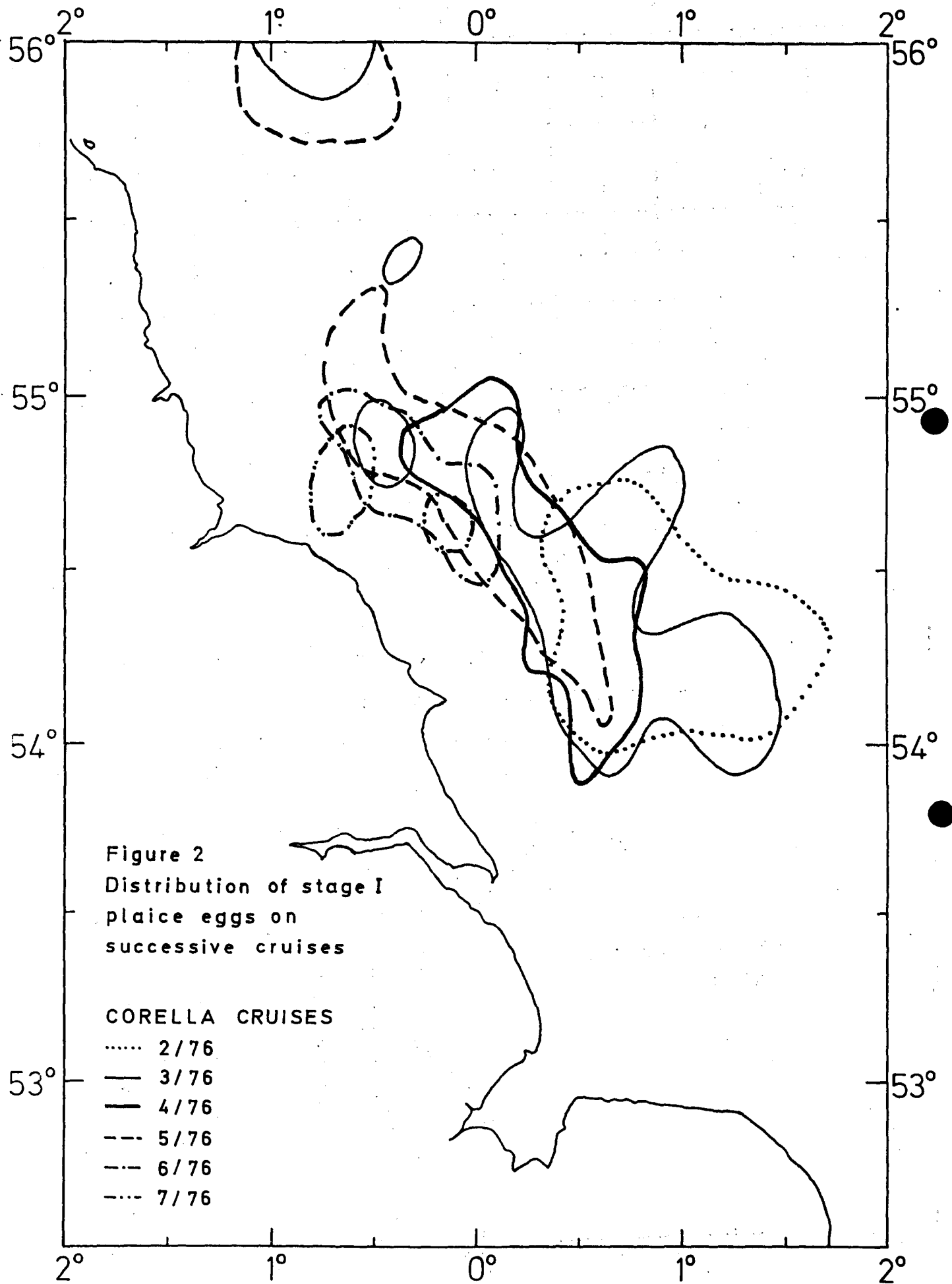


Figure 1
Sampling grid of
plankton stations
with 40 metre contour
illustrated



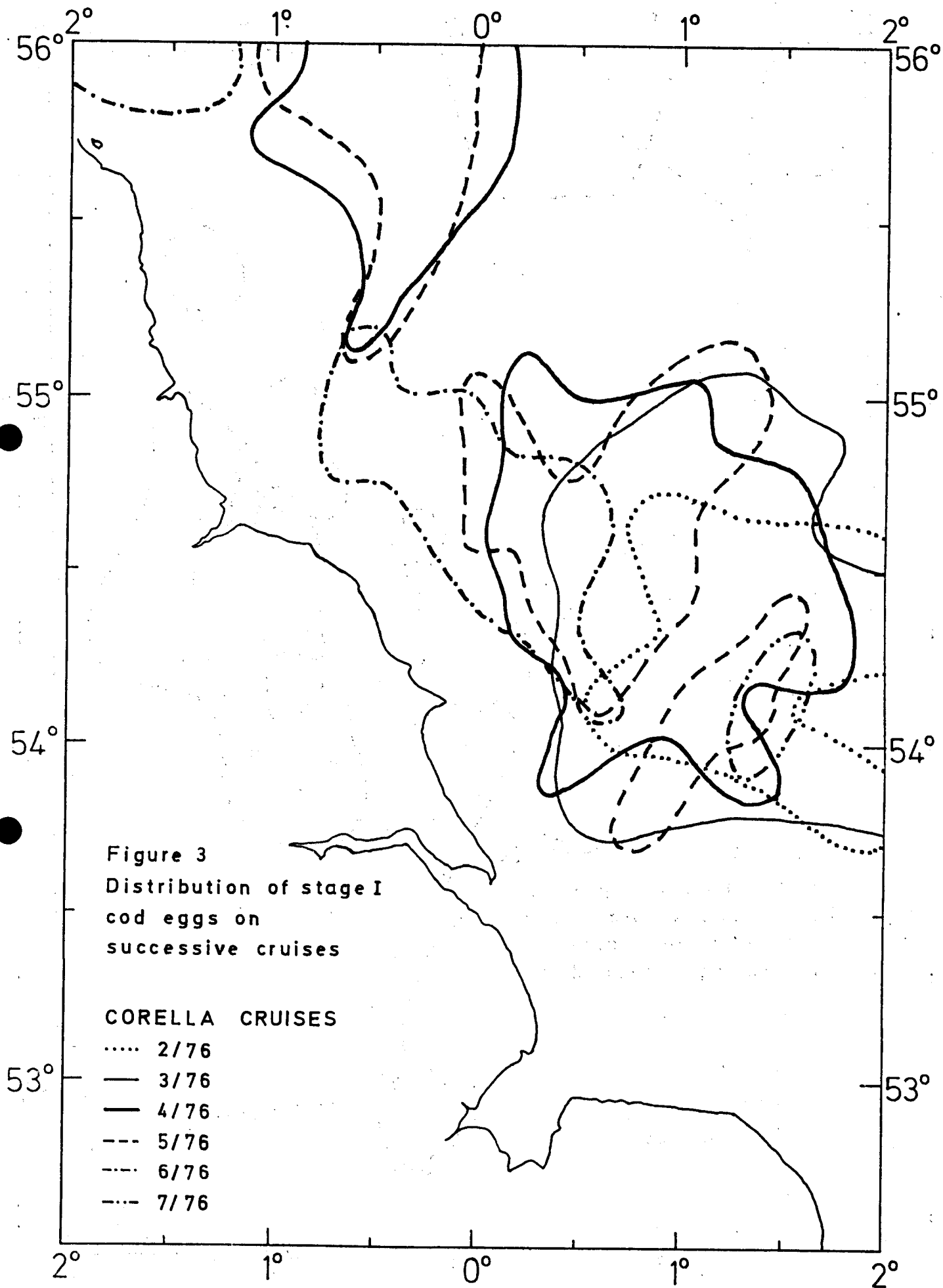
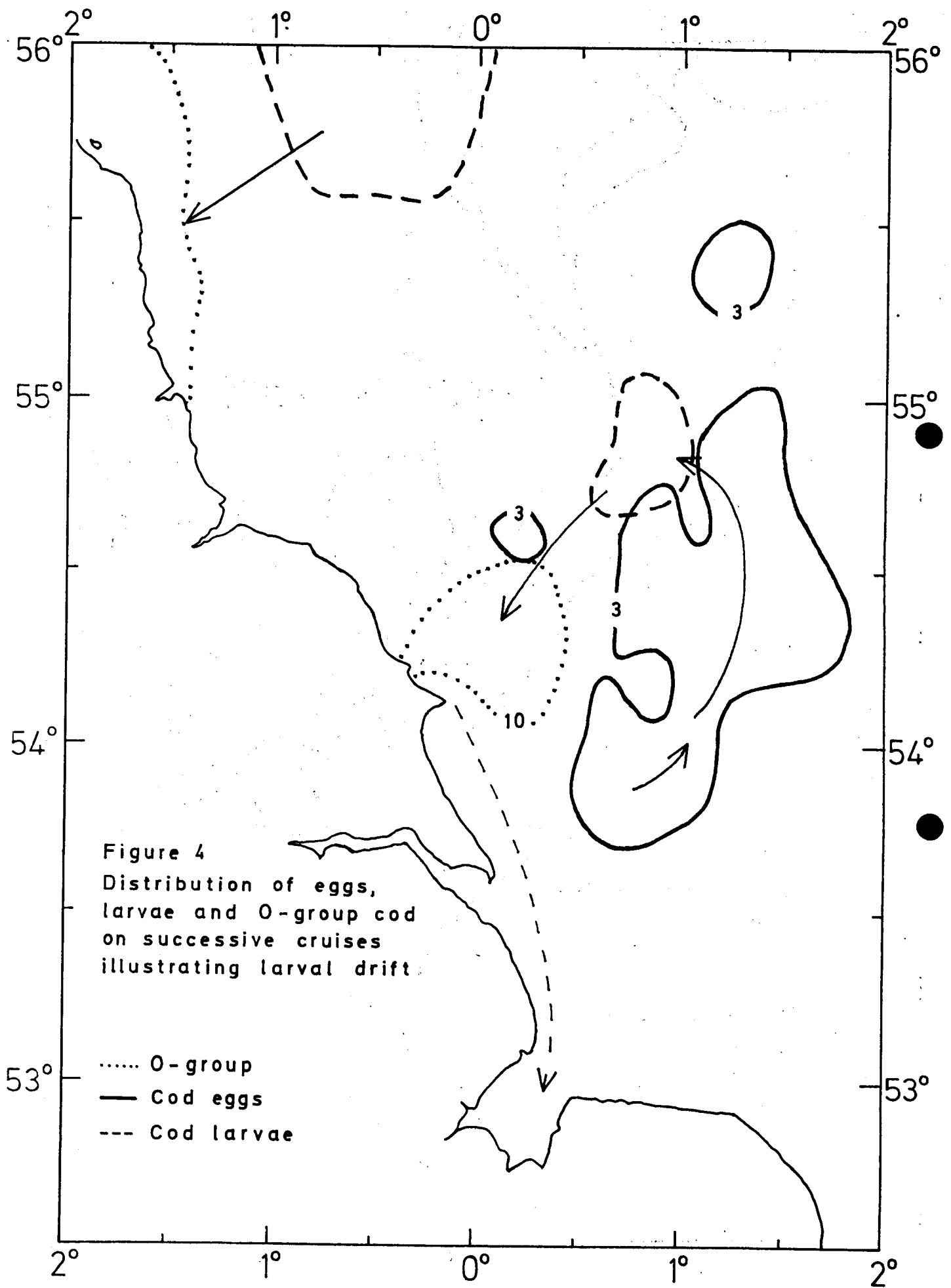


Figure 3
 Distribution of stage I
 cod eggs on
 successive cruises

CORELLA CRUISES

- 2/76
- 3/76
- 4/76
- 5/76
- 6/76
- - - - 7/76



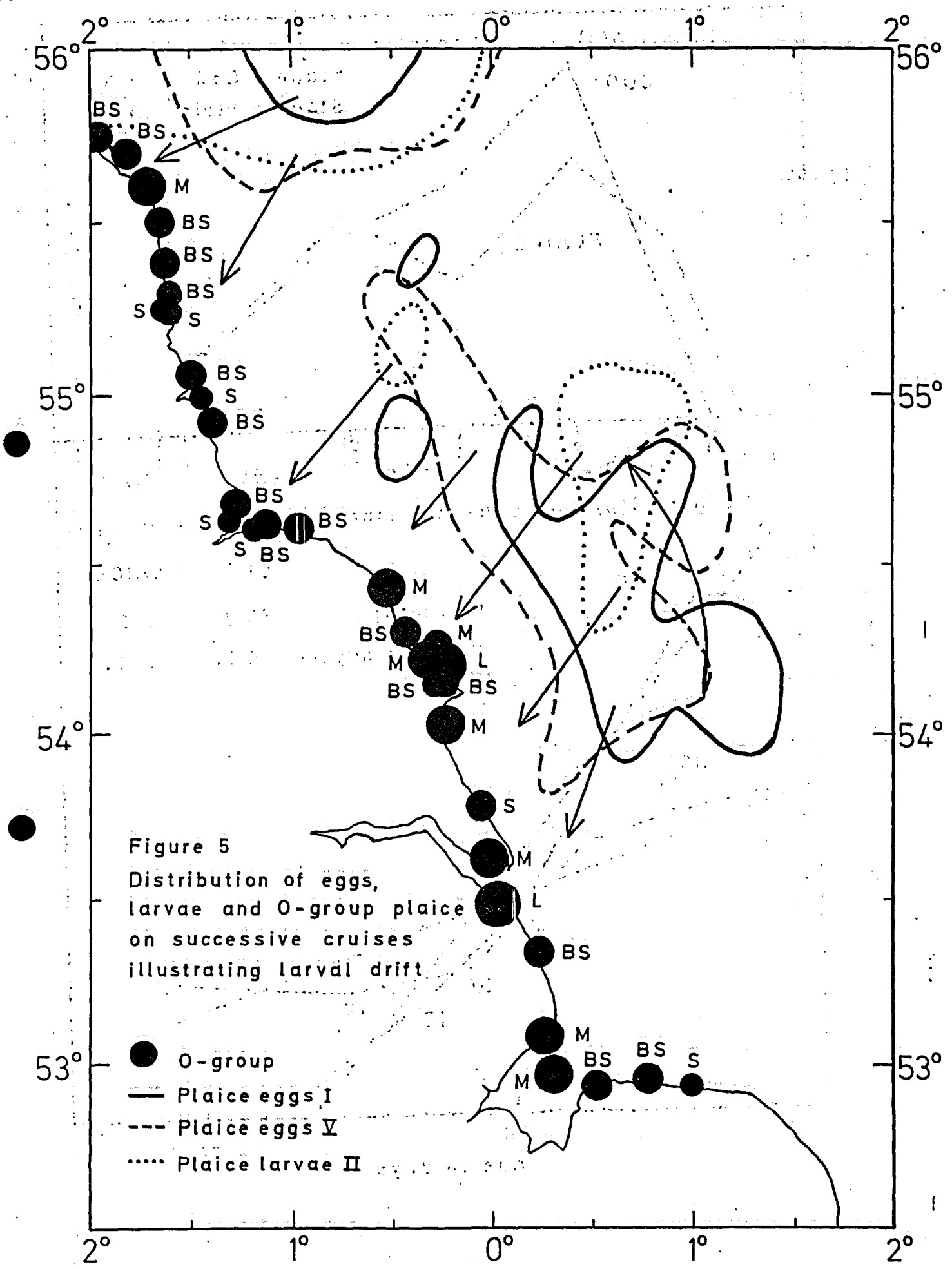


Figure 5
 Distribution of eggs,
 larvae and O-group plaice
 on successive cruises
 illustrating larval drift

- O-group
- Plaice eggs I
- - - Plaice eggs V
- Plaice larvae II

