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The Continuous Plankton Recorder Survey: Plankton in the ICNAF Area in 1977

by

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INTRODUCTION

The survey with Continuous Plankton Recorders (Hardy, 1939) was continued in 1977 on the same basis as in other years. Samples have been taken in the western Atlantic since 1959 and annual reports on the plankton in the ICNAF area have been published every year since 1971; further reports on the plankton of the north Atlantic and North Sea are published every year in Annales Biologiques of ICES.

METHODS

Continuous Plankton Recorders are towed at a depth of 10m by merchant ships and Ocean Weather Ships, once in each month, when possible, along a number of standard routes (Figure 1). Results from routes MA, MB and MC, which are operated by scientists of the US National Marine Fisheries Service at Narragansett, Rhode Island, are not included here. The rolls of silk are cut into sections, each representing 10 miles of tow and alternate sections, bearing the plankton from 3 m<sup>3</sup> of water, are analysed. The methods of analysis have been described by Rae (1952) and Colebrook (1960) and automated data processing procedures by Colebrook (1975). The area of the survey has been subdivided into a grid of rectangles, each of 1° of latitude and 2° of longitude; these rectangles were grouped into larger areas corresponding with ICNAF areas 1-5. In 1977 Recorders were towed 1005 miles in sub-area 1 (no sampling in January, February and May), 1421 miles in sub-area 2

(no sampling in January, February, April and May), 4324 miles in sub-area 3 (no sampling in May, July and October), 80 miles in sub-area 4 and 130 miles in sub-area 5 (sampling in May only in sub-areas 4 and 5).

The results for a few of the commonest species in the best sampled area (3) are given in Figure 2 and comments made about results from other areas. For each month, the mean number of each organism per Recorder sample (of 3 m<sup>3</sup>) for each sub-area has been calculated. The data for 1977 are presented as histograms (gaps in the baseline indicate that there was no sampling in May, July and October); these can be compared with the average seasonal cycles for the period 1961 to 1976 which are provided by line graphs. Both the monthly means for 1977 and the long-term means were calculated from logarithmic transformations of the original counts.

#### RESULTS

An estimate of phytoplankton was obtained from a visual assessment of the green coloration of the filtering silk; in sub-area 3 (Figure 2A), numbers were below average in spring but there were rich crops in September and November (no sampling in October); phytoplankton was scarce in sub-area 1 but numbers were above average in sub-area 2 in July, October and November. Thalassiosira spp. (Figure 2B) were below the long-term mean for most months in all areas except for sub-area 2 in October when they were abundant together with Chaetoceros spp. and Thalassiothrix longissima.

In sub-area 3 numbers of copepods (Figure 2C) were below average in every month of the year except June; in sub-area 1, maximum numbers were found about a month later than usual (July and August) and in sub-area 2 numbers were high in June and July and late in the year in October and November. Numbers of copepodite stages I-IV of Calanus finmarchicus were close to the long-term mean in sub-area 3 (Figure 2 D); they were above average in every month in which samples were taken in sub-area 1 and in June, July, October and November in sub-area 2. The adult stages were abundant from March to September and again in December in sub-area 3 (Figure 2 E); numbers were much above average in April and

August in sub-area 1 and in October in sub-area 2. The numbers of Euchaeta norvegica were calculated from night samples only as this species carries out vigorous, diurnal vertical migrations. Numbers were above average for most months in sub-area 3 (Figure 2 F); they were abundant late in the year, September and November, in sub-area 1 and in July in sub-area 2.

Numbers of Euphausiacea (mostly Thysanoessa longicaudata) were above the long term mean in the first three months of the year but below average from April onwards in sub-area 3 (Figure 2 G); they were abundant in April, July and August in sub-area 1 and in July in sub-area 2.

Sebastes spp. (Figure 2H) were not found in samples taken in the ICNAF area in 1977.

#### CONCLUSIONS

Phytoplankton was scarce in spring and maximum numbers were found from September to November in sub-areas 2 and 3. Copepods were abundant in sub-areas 1 and 2 but below average in sub-area 3.

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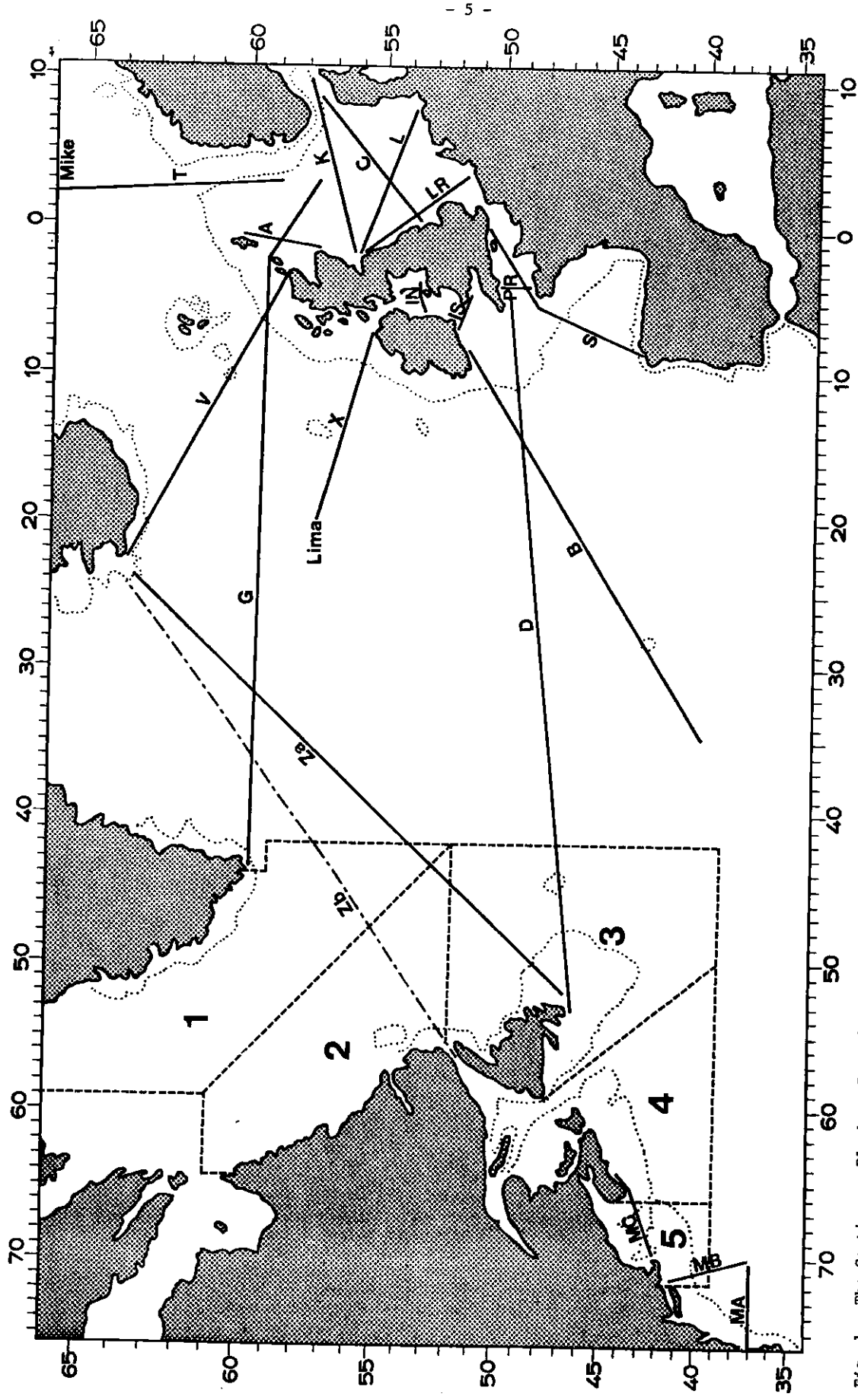


Fig. 1. The Continuous Plankton Recorder Survey during 1977. The routes are identified by code letters and Ocean Weather Stations by their international names. The Z route takes a more northerly track in summer and autumn (Zb). The boundaries of ICNAP Areas 1-5 are outlined.

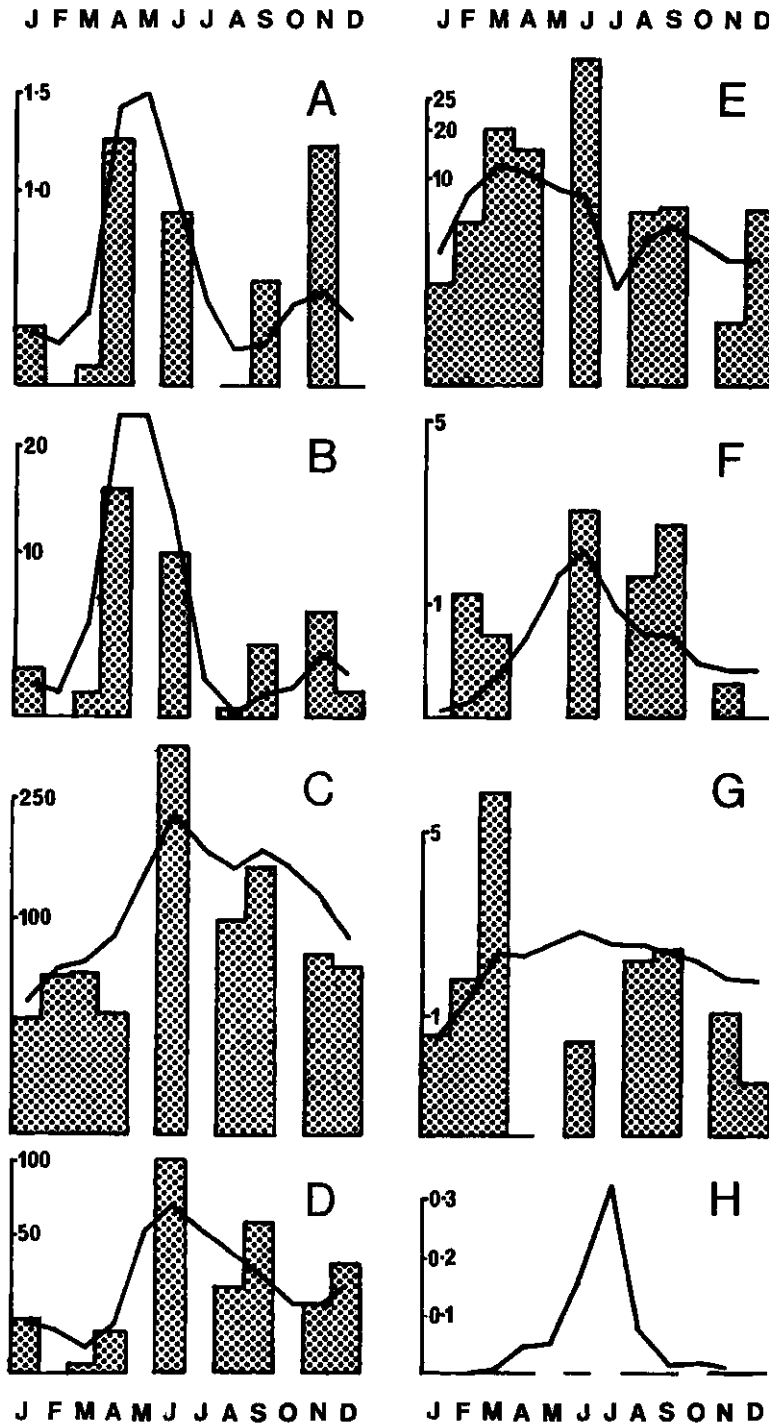


Fig. 2. Histograms showing average numbers per Recorder sample of (A) phytoplankton, (B) *Thalassiosira* spp., (C) Total copepods, (D) *Calanus finmarchicus*, stages I-IV, (E) *C. finmarchicus* stages V-VI, (F) *Euchaeta norvegica*, (G) Euphausiacea and (H) *Sebastes* spp. The line graphs show the mean values for the period 1961 to 1976. The numbers of *Thalassiosira* spp. are given in thousands per sample.