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The Continuous Plankton Recorder Survey: plankton in the ICNAF Area in 1973

by

G.A. Robinson, J.M. Colebrook and G.A. Cooper
Institute for Marine Environmental Research, Edinburgh, Scotland

INTRODUCTION

The survey by the Continuous Plankton Recorder was continued in 1973 on the same basis as in other years. It was financed by the U.K. Natural Environment Research Council. This report is the third in a series describing the distribution and abundance of the plankton each year in the ICNAF area (Robinson, Colebrook and Cooper, 1973 and 1974). Results from other areas of the north Atlantic have been published every year since 1946 in Annales Biologiques of ICES and a bibliography of the Continuous Plankton Recorder Survey is given in Edinburgh, Oceanographic Laboratory (1973).

METHODS

Continuous Plankton Recorders are towed at a depth of 10m by merchant ships, Ocean Weather Ships and Coast Guard Cutters of the United States Navy once in each month, when possible, along a number of standard routes (Figure 1). The rolls of silk are cut into sections representing 10 miles of tow and alternate sections, bearing the plankton from 3 cubic metres of water, are analysed. The methods of analysis have been described by Rae (1952) and Colebrook (1960). The area of the survey has been subdivided into a grid of rectangles (each 1^{o} of latitude by 2^{o} of longitude) which are then grouped into larger areas (in this paper these larger areas correspond with ICNAF sub-areas 1-5). For each month, in each ICNAF area, the mean number of each organism per Recorder sample has been calculated. The results for a selected few are shown in Figures 2-5 in which the data for 1973 are presented as histograms; gaps in the baseline indicate that there was no sampling in sub-areas 1 and 2 in March, sub-area 3 in September and November, sub-area 4 in March, April, July, September, November and December and sub-area 5 in January,

February, March, April, July, September, November and December. Route Nb was discontinued in July 1973 when Ocean Weather Station DELTA was abandoned while the D and E routes were affected more than usual by changes in shipping schedules.

A measure of the normal seasonal cycle is provided by line graphs of the average numbers per sample during the period 1959-1972. Both the monthly means for 1973 and the long-term means were calculated from logarithmic transformations of the original counts; the scales in the diagrams are given from back-transformations of the results. Information from other areas and for species not illustrated here will be supplied on application to the Director, Oceanographic Laboratory, Institute for Marine Environmental Research, Craighall Road, Edinburgh, EH6 4RQ., Scotland.

RESULTS

Figure 2 (left) shows an estimate of the phytoplankton obtained from a visual assessment of the green coloration of the filtering silk. It was below average in every month in sub-area 1 although the spring peak occurred at the usual time. It was scarce in the first half of the year in sub-area 2 but was particularly abundant in October and December; numbers were low in April in sub-area 3 but above average in May and June; sampling was poor in sub-areas 4 and 5 but the standing crop was much above average in both sub-areas in May and October.

Total Copepods (Figure 2, right) were above average from April to July in sub-area 1 and May to July in sub-area 2 (no sampling in April). Numbers were low in sub-area 3 except in June and August; they were unusually abundant in sub-area 4 in January and February and sub-area 5 in October.

Calanus finmarchicus is the most abundant copepod in the north western Atlantic Ocean. Numbers of copepodite stages V-VI of C. finmarchicus (Figure 3, left) were above the long-term mean in sub-area 1 from April to August and in sub-area 2 in February and May but close to the long-term mean in other months in these two areas. They were below average in sub-area 3. from January to May and in July but above average in sub-area 4 when samples were taken in the first half of the year (January, February, May and June).

Copepodite stages I-IV of C. finmarchicus (Figure 3 right) were close to the long term average until July in subarea 1 and unusually abundant in sub-area 2 in June and July. Numbers were low in all months in the other sub-areas except for June and August in sub-area 3 and October in sub-area 5. Of the other copepods (not illustrated here) Euchaeta norvegica was abundant in sub-area 1 in June and

July, sub-area 2 in August and sub-area 3 in all months sampled from April to December. Temora longicornis (in sub-area 3) and Pseudocalanus elongatus (in sub-areas 4 and 5) were scarce although they are normally abundant in these areas.

Euphausiacea (Figure 4, left) were above average in sub-area 1, particularly in April, June, July and November, and also in sub-area 2 in June and October as well as sub-area 3 in August and October.

Young stages of Sebastes (Figure 4, right) were unusually abundant in May in sub-areas 2 and 3, June in sub-area 4, and especially so in July in sub-area 1. Young stages of Ammodytidae (Figure 5) were numerous in June in sub-area 4 but were not found elsewhere. Young stages of Clupeidae (Figure 5) were scarce in sub-areas 3 and 4, while larvae of Mallotus villosus (Figure 5) occurred in January only in sub-area 3 following high numbers there in November and December 1972.

ACKNOWLEDGEMENTS

We acknowledge gratefully the assistance of the Captains and crews of many vessels which towed Continuous Plankton Recorders; the survey would be impossible without their willing co-operation. The plankton samples have been analysed by the staff of the Oceanographic Laboratory.

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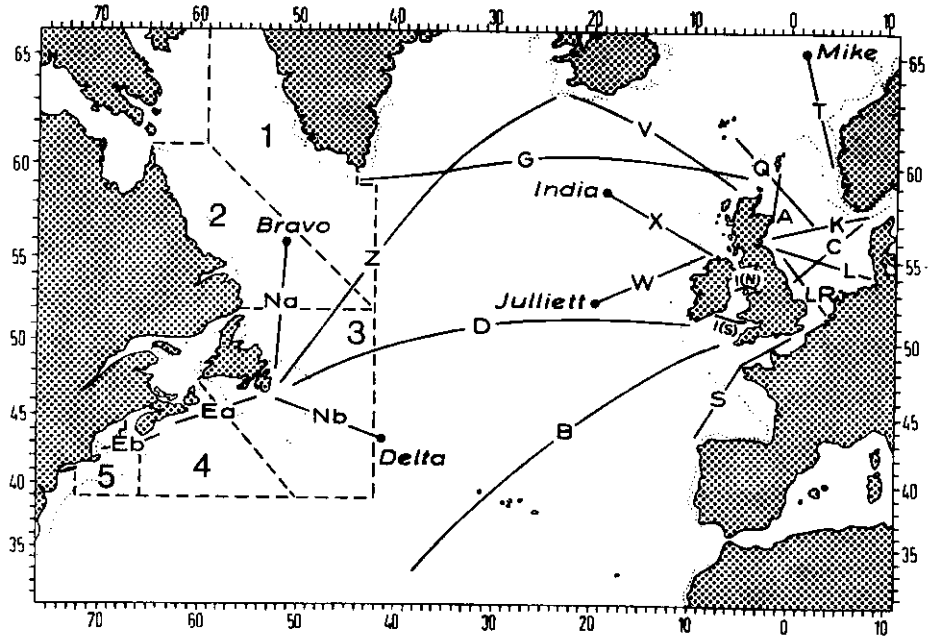

Fig. 1. The Continuous Plankton Recorder Survey during 1973. The routes are identified by code letters and the Ocean Weather Stations by their international names. The boundaries of ICNAF Subareas 1-5 are outlined.

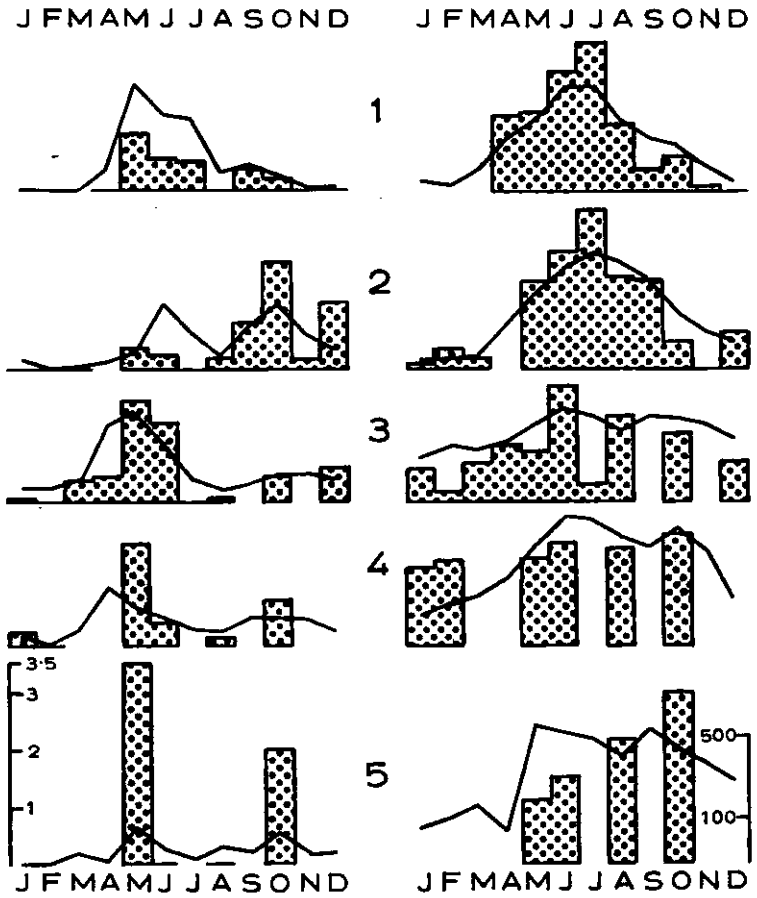

Fig. 2. Histograms showing average numbers per Recorder sample of phytoplankton (left) and total copepods (right) in ICNAF Subareas 1-5 in 1973. The line graphs show the mean value of the period 1959-1972. For further details, see text.

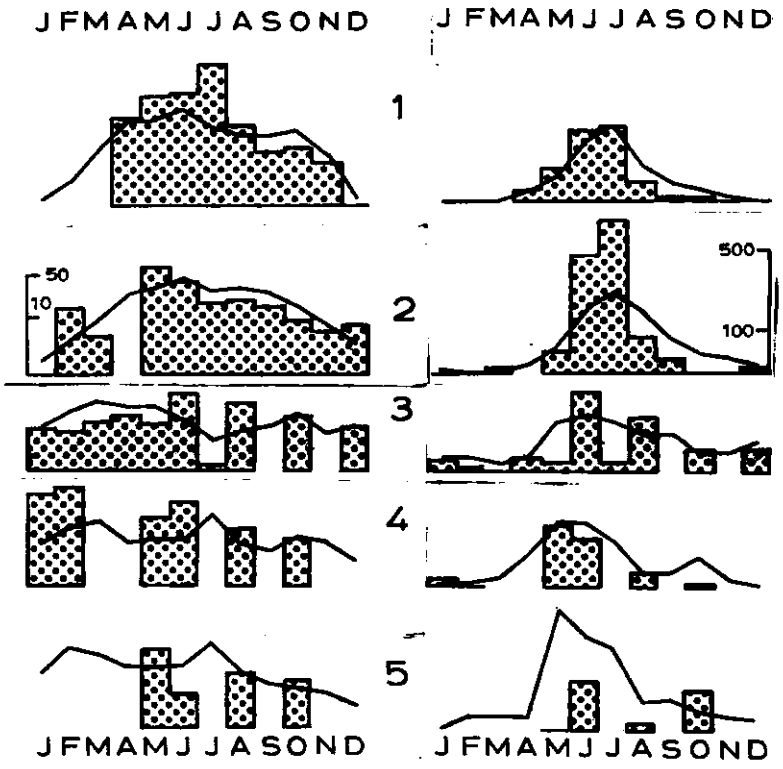

Fig. 3. Histograms showing average numbers of copepodite stages V-VI of *Calanus finmarchicus* (left) and stages I-IV of *C. finmarchicus* (right) in ICNAF Subareas 1-5 in 1973. The line graphs show the mean values for the period 1959-1972. For further details, see text.

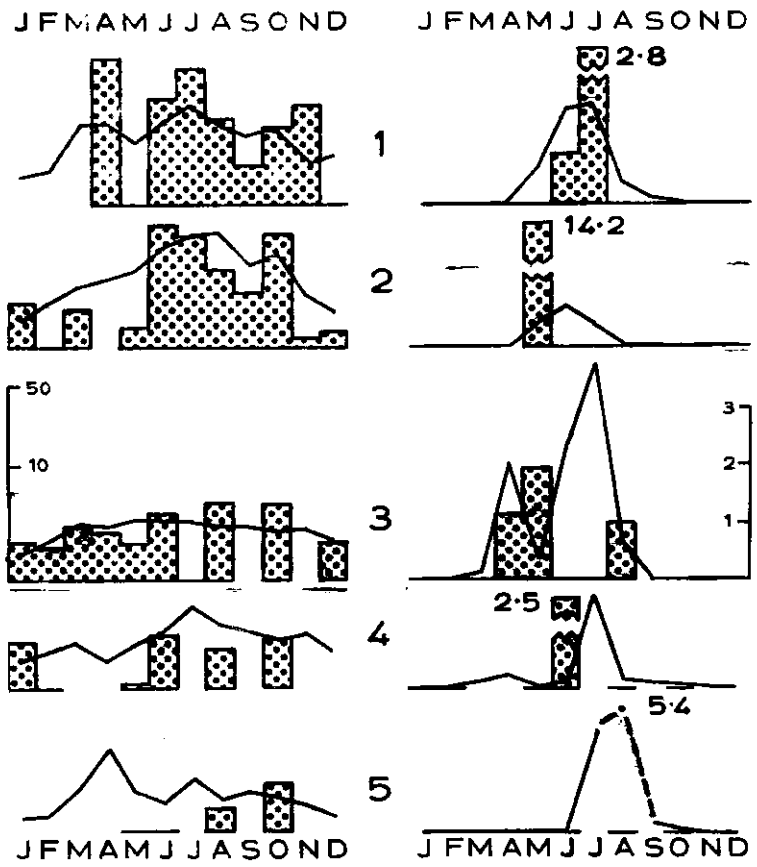

Fig. 4. Histograms showing average numbers per Recorder sample of Euphausiacea (left) and young stages of *Sebastes* spp.* (right) in the ICNAF Subareas 1-5 in 1973. The line graphs show the mean values for the period 1959-1972. For further details, see text.

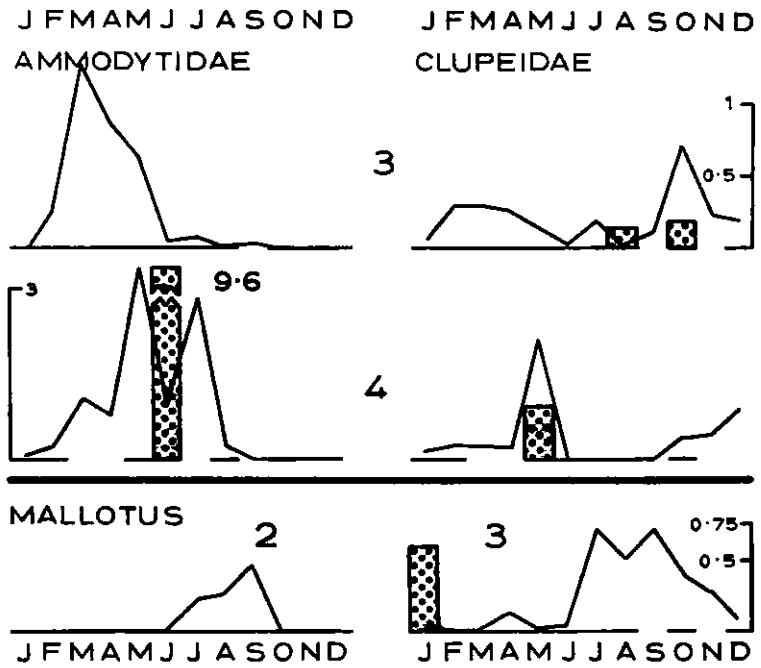

Fig. 5. Histograms showing average numbers per Recorder samples* of young stages of Ammodytidae* in Subareas 3 and 4, Clupeidae* in Subareas 3 and 4, and *Mallotus villosus** in Subareas 2 and 3. The line graphs show the mean value for the period 1959-1971. For further details, see text.

* The numbers of young fish have been multiplied by ten in the figures.