

Changes on horse mackerel (*Trachurus trachurus*) catch distribution in the Northeast Atlantic

by

Borges, M.F.¹; Silva, A.¹; Abaunza, P.²; Eltink, A.³; Lucio, P.⁴; Walsh, M.⁵; Poulard, J.C.⁶
Casey, J.⁷; Iversen, S.; Skagen, D.⁸; Sanchez, F.⁹

- ¹ Instituto de Investigação das Pescas e do Mar, Avenida de Brasília, 1400 Lisboa
Portugal
- ² Instituto Español de Oceanografía, Centro Costero de La Coruña, Apartado 130, 15080, La
Coruña, Spain
- ³ Netherlands Institute for Fisheries Research, RIVO, P.O. Box, 1970AB, Ijmuiden, the
Netherlands
- ⁴ Instituto de Investigación y Tecnología para la Pesca, Oceanografía y Alimentación, AZTI,
48395 Sukarrieta, Vizcaya, Basque Country, Spain
- ⁵ SOAFD Marine Laboratory, P.O. Box 101, Victoria Rd, Aberdeen AB1 8DB, Scotland, U.K.
- ⁶ IFREMER, Centre de Nantes, Rue de l'Île d' Yeu BP 1049 44037 Nantes Cedex 01, France
- ⁷ MAFF Fisheries Laboratory Lowestoft, Suffolk NR33 OHT, England
- ⁸ Institute of Marine Research, Postboks 1870-Nordnes, 5204 Bergen, Norway
- ⁹ Instituto Español de Oceanografía, Centro Oceanográfico de Santander. Apto. 240 39080
Santander, Spain

Abstract

The distributions of international commercial catch data were mapped by ICES rectangle and quarter from 1983-1994. These indicate a northward expansion of horse mackerel distribution in the Northeast Atlantic since 1987. The spatial variability of the yearclass abundance of horse mackerel over the European shelf and shelf edge is investigated using international bottom trawl survey data. The aim is to determine if the northward expansion of horse mackerel distribution is due to the extremely strong 1982 yearclass. How the changes in oceanographic conditions since 1989 may relate to the fish northward expansion is also discussed.

Keywords: Horse mackerel, *Trachurus trachurus* L, distribution changes, shelf edge, Northeast Atlantic.

Introduction

The Western horse mackerel wintering-spawning and feeding migrations have been described by Macer (1977), Eaton (1983) and Anon. (1991). Nevertheless, doubts persist about on what extent adult horse mackerel of south Biscay and Iberian Peninsula are joining the adult massive northward feeding migration.

Spawning takes place along the shelf edge off the Iberia Peninsula, the Bay of Biscay and the Celtic Sea, commencing earlier in the south (autumn/winter) and progressing northwards in spring/summer (Anon., 1993).

The nursery areas correspond to the continental shelves of the same regions, confined southwards of 56 00'N latitude. After spawning the adults migrate northwards along the shelf edge and come back south also along the shelf edge (Borges, *et al.* 1995).

Under SEFOS project a striking result came out for this species: a northward shift in the distribution of horse mackerel in the last decade is evident from (Borges, *et al.* 1995) results.

The present paper investigates in detail if the northward expansion of the horse mackerel distribution was due to the extremely strong 1982 yearclass.

Material and Methods

Horse mackerel commercial catch data, was supplied by Portugal, Spain, France, Scotland, the Netherlands and Norway by month and ICES rectangle in a common agreed format under the SEFOS project for 1983, 1986, 1989, 1992, 1994. A database was build in Access Windows database management and the data exported through an application to be mapped by quarter and ICES rectangle using Mapviewer/Win software. The map of the Northeast Atlantic from 36 00' - 64 30' N. Latitude and 08 00' E - 18 00'W Longitude was supplied by the Hydrographic Institute, Lisbon, participant of the SEFOS project.

A database of bottom trawl survey from the fourth quarter was also created in a common format under the SEFOS project. Number of fish per hour by length class and sampling station is available from Portugal, Spain, France, Scotland, the Netherlands and Norway for the period 1990-1994. As non SEFOS participant England made available to the SEFOS project horse mackerel survey data under a special contract.

Length distributions were converted to age distributions using the Portuguese, Spanish age length keys, from the corresponded survey. The Netherlands supplied the age length keys by area and quarter from commercial sampling and these were applied to the survey data of each area survey from France, the Netherlands, Scotland, England and Norway.

Abundance indices by sampling station by age group were computed and mapped. Data on the central and southern North Sea was not considered under the present SEFOS project.

Results

Figure 1 presents the distribution of commercial catches by quarter in 1989 which illustrates the general pattern of the distribution of commercial catches along the year.

In the first and second quarters the fishery takes place mainly around the Iberian Peninsula, in the Bay of Biscay, in the English Channel and along the shelf edge of the Celtic Sea and west of Ireland. In the third and fourth quarter the fishery takes place at northern latitudes and high catches are taken along the shelf edge north of Ireland, west and north of Scotland and off the Norwegian coast.

Figure 2 shows that a northward expansion of the fishery is evident in the period 1983-1992. The areas west and north of Scotland and especially the shelf edge of Norway became the main fishing grounds of horse mackerel in the second half of the year.

The Norwegian horse mackerel abundance indices from the bottom trawl surveys are available from 1991 to 1994. These indicate that the horse mackerel arriving in the Norwegian area are almost entirely from the 1982 yearclass.

The 1982 yearclass distribution over the European shelf during the fourth quarter is shown in Figures 3-5, bottom trawl surveys. The 1982 yearclass distribution can be compared as age-group 10 in 1992, age group 11 in 1993, and age group 12 in 1994 survey data during the fourth quarter.

Discussion

The northward expansion of horse mackerel distribution might be due to the 1982 extremely strong yearclass. As fish get larger they can swim faster. This might explain the increase in time of the horse mackerel catches in the Norwegian Sea.

The fishery commenced in the Norwegian Sea since 1987-1989. This huge 1982 yearclass had to find other productive sites to feed than the usual sites which is indicated by a reduced growth of not only the 1982 yearclass, but also other yearclasses (Anon. 1993).

Changes in oceanographic conditions which were reported to occur since 1989 in this area (Anon. 1990) might also have stimulated the northward expansion of horse mackerel.

Investigations on the surface temperature anomalies during this period from satellite images are planned to be done under the SEFOS project.

References

Anon., 1991. Report of the Working Group on the Assessment of the Stocks of Sardine, Horse Mackerel and Anchovy. ICES CM 1991/Assess: 22, 138 p.

Anon., 1993. Report of the Mackerel/Horse Mackerel Egg Production Workshop. ICES CM 1993/H:4, 142 p.

Borges, M.F., Silva, A., Porteiro, C., Abaunza, P., Lucio, P., Eltink, A., Walsh, M., Poulard, J.C., Iversen, S., 1995. Distribution and Migration of Horse Mackerel. ICES CM 1995/H: 18 Poster.

Eaton, D.R., 1983. Scad in the North-east Atlantic. Laboratory Leaflet MAFF Directorate Lowestoft 56, 20 p.

Macer, C.T. 1977. Some aspects of the biology of the horse mackerel (*Trachurus trachurus* L) in waters around Britain. J. Fish Biol., 10: 51-62.

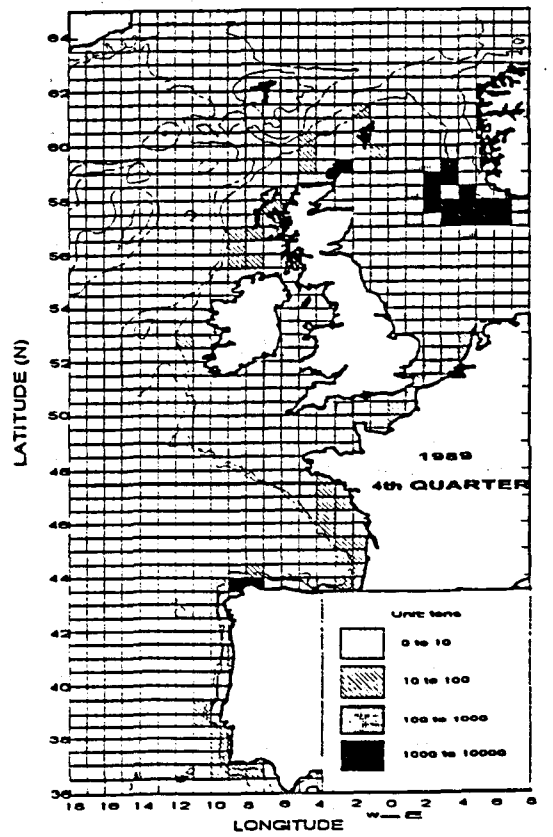
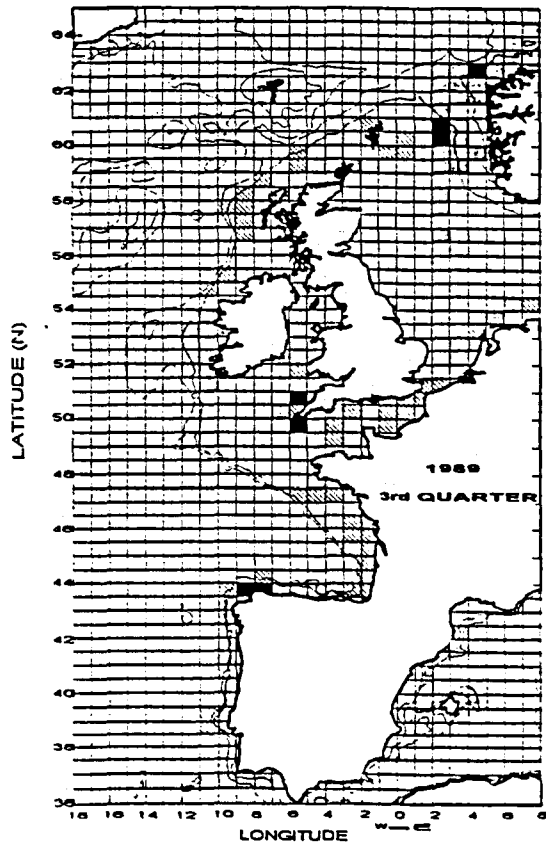
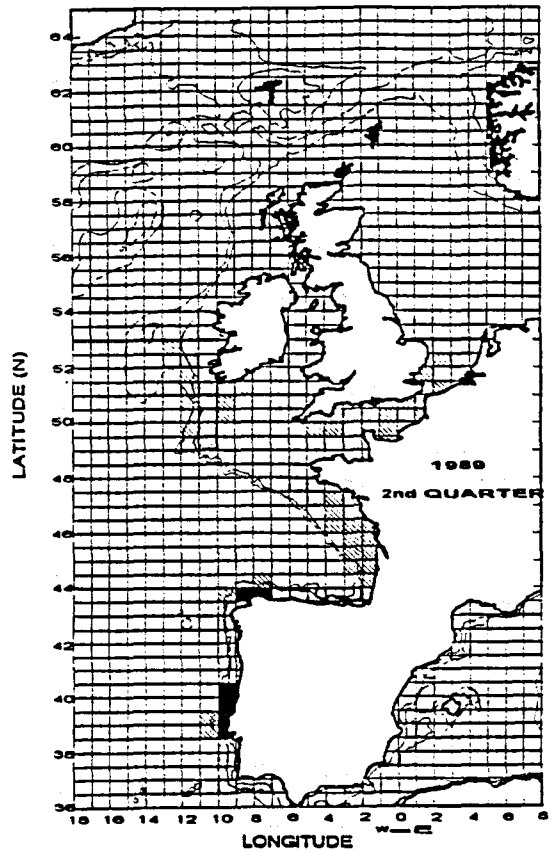
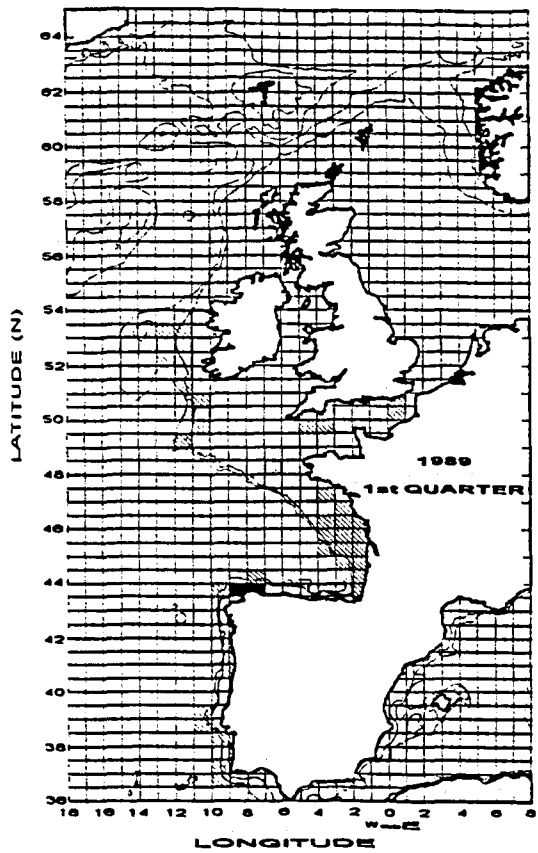


Figure 1 - Distribution of commercial catches by quarter in 1989.

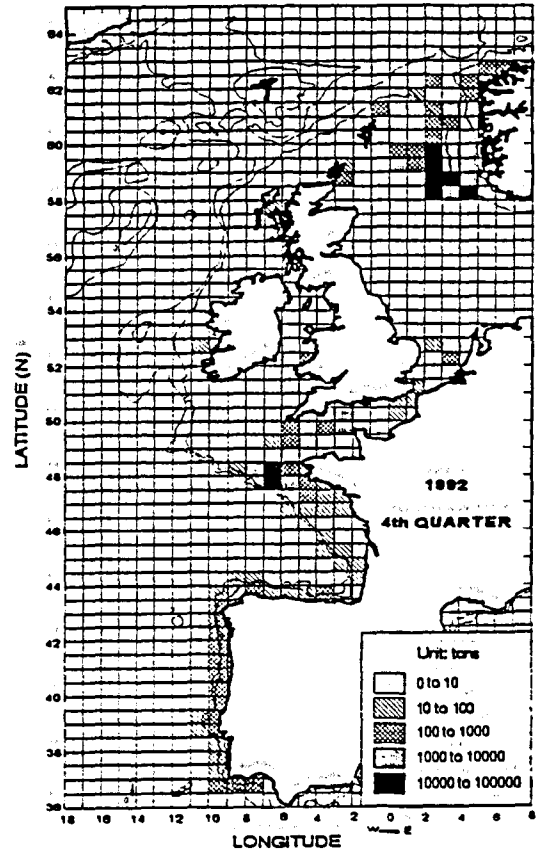
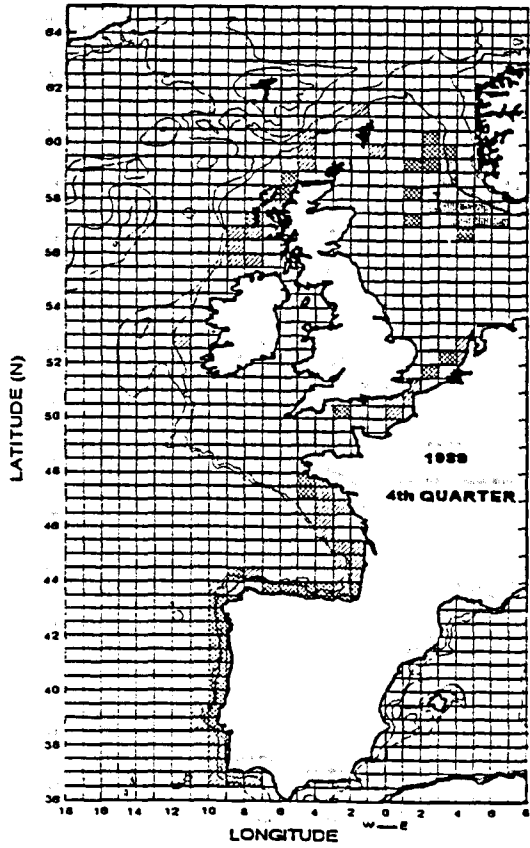
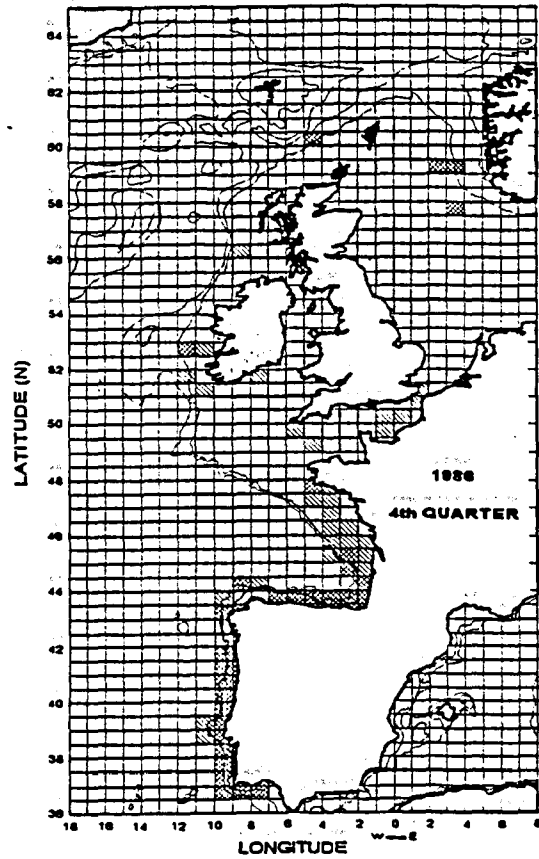
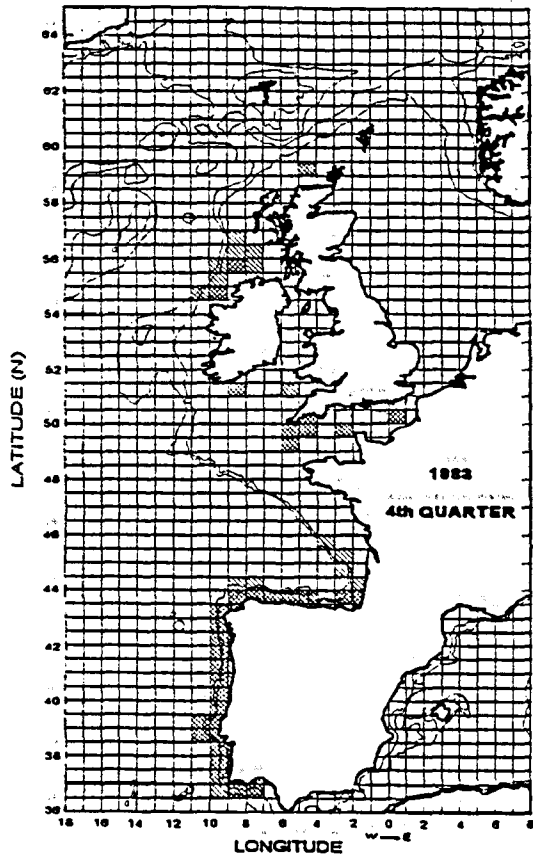


Figure 2 - Distribution of commercial catches in the 4th quarter of 1983, 1986, 1989 and 1992.

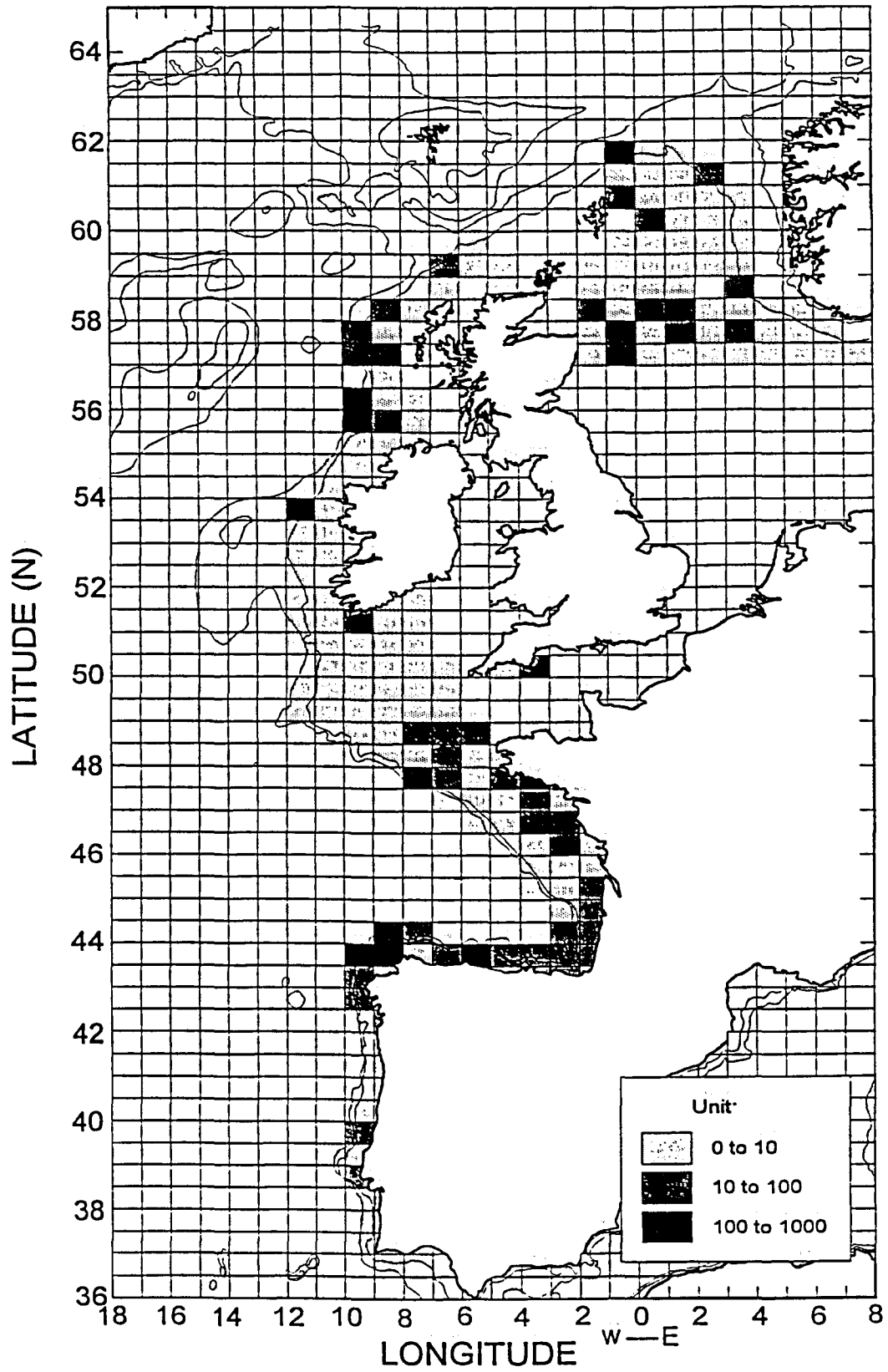


Figure 3.- Distribution of the 1982 yearclass at age 10, during the fourth quarter 1992, from bottom trawl surveys.

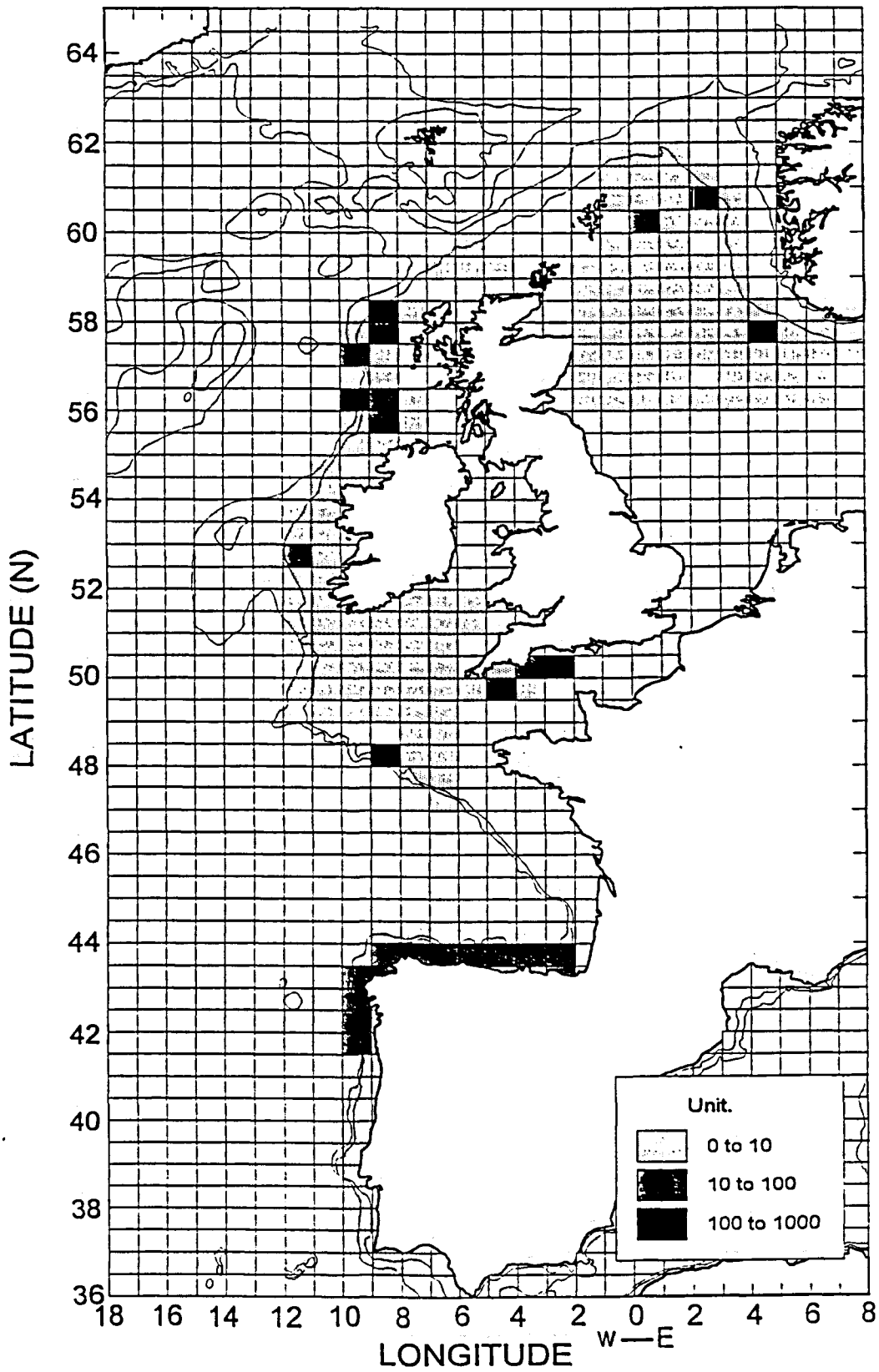


Figure 4.- Distribution of the 1982 yearclass at age 11, during the fourth quarter 1993, from bottom trawl surveys.

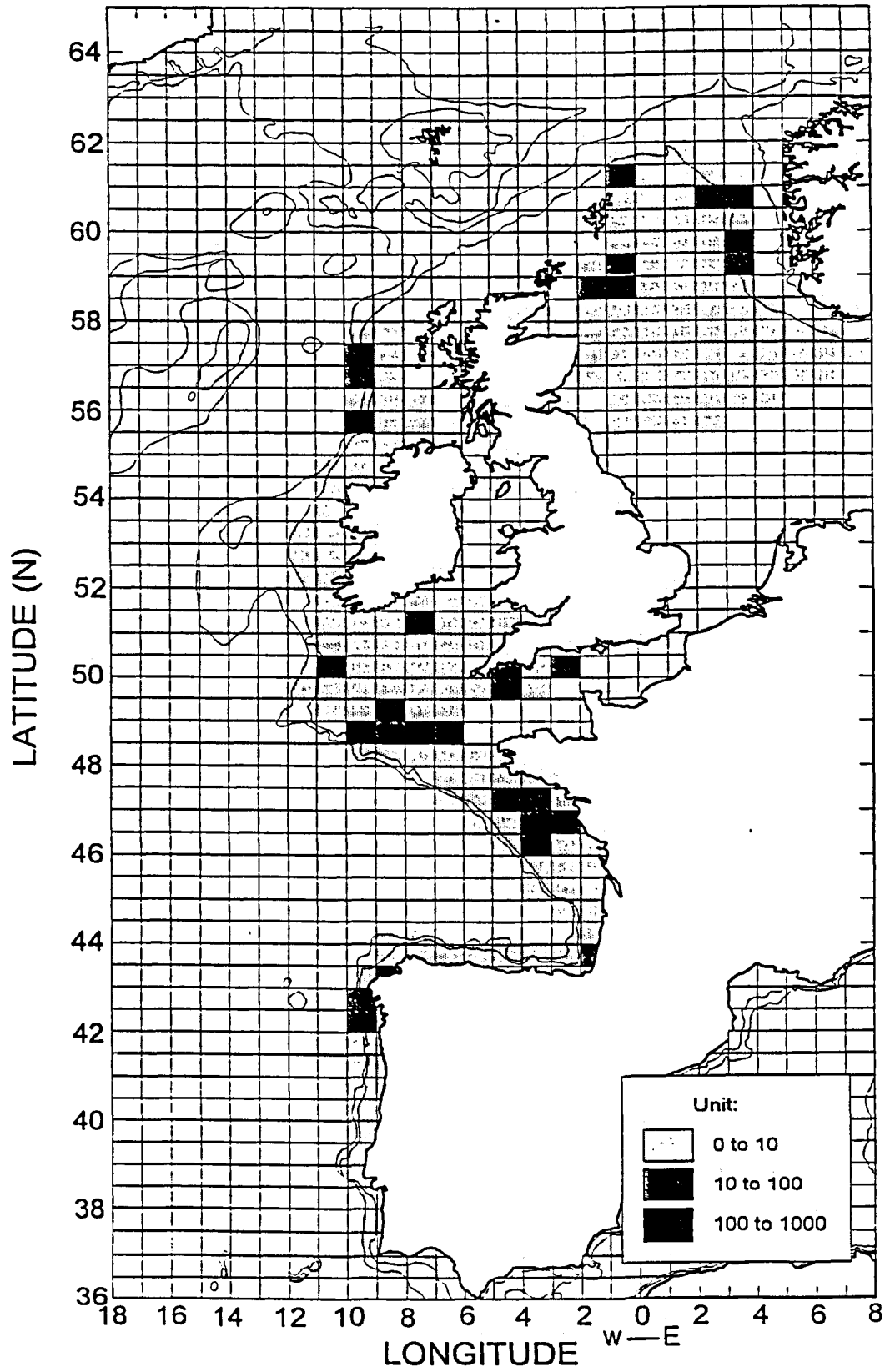


Figure 5.- Distribution of the 1982 yearclass at age 12, during the fourth quarter 1994, from bottom trawl surveys.