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REPORT OF THE
INTERNATIONAL BOTTOM TRAWL SURVEY WORKING
GROUP

Santander, Spain
3 - 7 March 1997

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International Council for the Exploration of the Sea

Conseil International pour l'Exploration de la Mer

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1 TERMS OF REFERENCE AND PARTICIPATION

At the ICES Annual Science Conference in Reykjavik it was decided that the International Bottom Trawl Survey Working Group should meet in Santander, Spain, from 3-7 March 1997 to:

- a) propose further coordination of quarter 4 bottom trawl surveys in Sub-areas VI, VII, VIII and Division IXa;
- b) consider the standardisation of these surveys;
- c) propose a depth and area/latitude stratified station grid;
- d) describe specific modifications of the IBTS to include specifications for the western and southern surveys;
- e) modify the Manual for the IBTS to include specifications for the western and southern surveys;
- f) evaluate the progress made on establishing a common database as specified at the last meeting of the Working Group.

Later, the following was added to the terms of reference:

- g) review the ICES survey data validation/verification program and plan for its use in relation to future and earlier surveys

The meeting was attended by:

Trevor Boon	UK (England)
Fátima Cardador	Portugal
Paul Connolly	Ireland
Jørgen Dalskov	Denmark
Siegfried Ehrich	Germany
Guus Eltink	Netherlands
Henk Heessen (chairman)	Netherlands
Johan Modin	Sweden
Philippe Moguedet	France
Andrew Newton	UK (Scotland)
Kevin Peach	UK (Scotland)
Javier Pereiro	Spain
Jean-Charles Poulard	France
Dave Reid	UK (Scotland)
Francisco Sánchez	Spain
Ignacio Sobrino	Spain
Odd Smedstad	Norway
Henrik Sparholt	ICES Secretariat

2 INTRODUCTION

Originally the International Bottom Trawl Survey Working Group co-ordinated surveys in the North Sea, the Skagerrak and the Kattegat, until 1990 during quarter 1 but since then in all 4 quarters. The routine for this co-ordination is now well established. Since 1994 the remit of this working group has been extended to include the work of the Study Group on the Co-ordination of Bottom Trawl Surveys in Sub-areas VI, VII, and VIII and Division IXa. This meeting focused specifically on the surveys in these areas.

At the meeting there was a member from each national institute which conducts a bottom trawl survey in this extended area. The only exception was the Department of Northern Ireland (DANI) which surveys part of VIIa. With such a good level of attendance some very encouraging progress was made towards co-ordinating these surveys. For practical reasons it was decided to split the present surveys in two area-groups: surveys in the western and in the southern areas. It was agreed to focus on quarter 4 where there is presently the more extensive effort. A co-ordinator was appointed for each group - P. Connolly for the Western Area and F. Sánchez for the Southern Area. Areas of over-lap between adjacent surveys were agreed where comparative fishing will be carried out to establish catch conversion factors between the various gears which are used. Also some experiments have been planned to compare catch rates of the Baka and Campelen trawls with those of the standard GOV trawl.

The ICES computer programme for checking exchange data files was demonstrated. Survey data will, from now on, be checked at the institute of origin before submission to ICES. This should save substantial time and effort over the original arrangement.

Four working documents (see Literature) were prepared for this meeting.

3 SURVEYS IN THE WESTERN AND SOUTHERN AREAS

3.1 Western area

3.1.1 Scottish Surveys

Quarter 1 Groundfish Survey in ICES Division VIa (SGF6a)

This survey began in its present format in 1981, normally occurs in March and is targeted towards the fishing grounds on the continental shelf to the west of Scotland that are exploited by Scottish fishermen. The gear deployed is the 36/47 GOV trawl fitted with heavy ground gear 'C' (Figure 1 in appendix XI in the Manual for the International Bottom Trawl Surveys - revision V) and a 20 mm internal liner. All catches are treated in accordance with the practices established in the North Sea. The survey is stratified by ICES rectangle, with the basic aim of performing at least one 60 minute tow in those rectangles which overlie the shelf as far south as 55 °N. Trawling is restricted to a maximum depth of 200 metres. There are four rectangles which are not currently sampled, as suitable fishing grounds have not been discovered. See Figure 3.1.

The target species are cod, haddock, whiting, saithe and herring and length and age frequencies are constructed for these species. All other fish species encountered are also sampled for at least length frequencies. Indices of abundance at age are calculated for all the target species and these data are used at the Northern Shelf Assessment Working Group and the Herring Assessment Working Group. The demersal indices are based on all the hauls sampled and are constructed by producing an initial index for each internal Scottish sampling area, weighting this index by the number of valid hauls in the area and finally amalgamating these indices to produce an overall West Coast Index for each species. The herring index is calculated by using a subset of the available data (see Figure 3.2) and calculating the number of two ringers for this particular area.

In 1996 the survey was extended into the northern Irish Sea and a total of nine one hour tows were made in this region; the survey will continue in this region for the foreseeable future but some adjustments will be made to the actual fishing positions based on the 1996 experiences.

The indices obtained from this survey are valuable for demersal stock assessment purposes and present indications are that this survey has a secure, long-term future.

Quarter 3 Rockall Survey (SGF6b)

This survey, which is targeted at Rockall Plateau, began in 1985. For the first three years commercial vessels were chartered, a different vessel in each year, but since 1988 the surveys have been performed by FRV *Scotia*. The survey is conducted during the first 14 days of September using a 48' Aberdeen trawl fitted with a 70 mm codend and an external cover of 35 mm. There are approximately 45 fixed stations on the Rockall, Byrony and Empress of Britain Banks (see Figure 3.3) and each station is surveyed by deploying the gear for one hour. Trawling is restricted to depths of less than 200 metres. All fish species in the catches are sampled for length, and target species (haddock, cod and saithe) are also sampled for age. Indices of abundance at age are constructed for all the target species by producing numbers at age per 10 hours fishing for the entire Rockall Plateau. The haddock index is used in the Northern Shelf Assessment Working Group.

If time permits additional hauls are made to survey the squid population which exists in close proximity to the Rockall outcrop.

The intention is to maintain this survey as a long-term data series.

Quarter 4 Scottish Mackerel Recruit Survey (SMR)

The Scottish Mackerel Recruit Survey has been carried out since 1985 in the area west of the British Isles between 51 and 61°N and bounded by the 200 m contour and the coast. It has generally not included the area of the Minch and the north channel from the Irish Sea (see Figure 3.4).

The survey is carried out using a 36/47 GOV trawl fitted with heavy ground gear. Between 50 and 55 one hour tows are carried out on fixed stations stratified by rectangle (1 tow per rectangle). The target species for the survey has been (up to and including 1995) mackerel, specifically fish in their first and second winters ("recruits").

The survey has usually been carried out in collaboration with RIVO-DLO (Netherlands) and in some years IFREMER (France) and CEFAS (England).

Historically only mackerel data have been used from this survey. A database (numbers caught per hour by rectangle) is maintained in Aberdeen for this survey and associated surveys as appropriate. These data are combined with mackerel data from western and North Sea IBTS surveys in the first quarter to produce a mackerel recruitment index for use in the VPA (Mackerel, Horse Mackerel, Anchovy and Sardine Assessment Working Group).

In recent years there has been a discrepancy between the index derived from these surveys and the VPA derived recruitment index. This has resulted in a temporary removal of the index from the assessment. However, the discrepancy is believed to result from a recent, more northerly distribution of recruits. This is believed to affect swimming speed (in relation to water temperature) and hence catchability. Recent work involving the application of Generalised Additive Models (GAM) to the problem, suggests that suitable corrections can be made and that the index will once again be usable in the assessment.

The recruit distributions have also been used in research applications, particularly in the EU funded project SEFOS (Shelf Edge Fisheries and Oceanography Study), where the results were used as validation data to test transport model simulations. Similar studies, but extended to a combined biological/physical model are currently the subject of a new proposal to the EU.

3.1.2 Irish Surveys

The Marine Institute's Fisheries Research Centre (FRC) conducts three bottom trawl surveys in the western waters as part of the FRC's fish stocks monitoring programme. The main objectives of the survey programme are to provide indices of abundance to the ICES Northern Shelf and Southern Shelf Working Groups, to map the distribution of fish species and to identify nursery areas for commercial species.

The West and South Coast Recruit Survey (WSCRS) commenced in 1992 and is carried out each year on the same chartered commercial vessel using a dual purpose otter trawl fitted with a 20 mm cod end liner. The survey extends over ICES Divisions VIa, VIIb, VIIj and VIIg and covers 21 ICES rectangles. The tow duration is 30 minutes. The objective of the programme is to map the distribution of nursery areas using data from 74 fixed station positions, trawled in quarter 3, along the west and south coast of Ireland.

The West Coast Groundfish Survey (WCGS) commenced in 1990 and 71 fixed trawls are fished in quarter 4, from the Stanton Bank (56°50' N 7°40'W) to the Fastnet Rock (51°50'N 10°5'W). The survey extends over ICES areas VIa, VIIb and VIIj and covers 27 ICES rectangles. The target species are cod, whiting, haddock, plaice, megrim, monk, herring and mackerel. Two chartered commercial vessels are used and the gear is a standard commercial trawl fitted with rockhopper gear and 20 mm codend liner. The tow duration is approximately one hour. The survey is divided into two parts. Part A (34 trawls) commenced in 1990 and stretches from the Stanton Bank south to Galway Bay. The survey was expanded in 1993 to include Part B (36 trawls) which covers the area from Galway Bay south to the Fastnet Rock.

The Irish Sea Recruit Survey (ISRS) commenced in 1983 and 28 fixed stations are fished on the gadoid nursery grounds of the north-western Irish Sea. The target species are cod, whiting, haddock and plaice. The survey is carried out on the Irish research vessel RV *Lough Beltra* each June and September using a three bridle butterfly trawl fitted with a 20 mm cod end liner. The survey will cease in 1997 and a new survey (ISCSGS) will

commence on the new Irish research vessel RV *Celtic Voyager*. The new survey design will trawl 50 fixed stations in ICES Divisions VIIa and VIIg (18 ICES rectangles).

3.1.3 French surveys in the Eastern Channel and the Celtic Sea

The French Groundfish Survey in the Eastern Channel (Division VIIId) (FCG) started in 1988. The survey is carried out each year in October to study the distribution of commercial species and to obtain abundance indices by age group for the most important species.

The gear used is a 20/25 GOV trawl towed by a 25 m vessel. The mesh size in the codend is 20 mm. This gear/vessel combination was chosen to allow trawling in shallow water, especially along the French coast. In this area important nurseries of whiting, plaice and dab are found. Each ICES rectangle is divided into 8 sub rectangles, each 15'x15' in size. Approximately 90 trawl stations are planned, one per sub rectangle. Haul duration is 30 minutes.

The French Groundfish Survey in the Celtic Sea (ICES Divisions VIIf,g,h,j) (EVHOE) was conducted in September-November 1990, May-June 1991 and September-October 1992. It was an extension of the survey carried out in the Bay of Biscay since 1987, and aimed at covering the grounds of the Celtic Sea deeper than 100 metres. The sampling design was systematic, stations were located at the intersection points of a grid of lines 25 nautical miles apart, both in latitude and in longitude.

From 1997, new objectives will be assigned to the EVHOE surveys:

- to determine the distribution and relative abundance of all fish species and selected species of shellfish within the survey area, particularly those of commercial importance;
- to determine the distribution and abundance of pre-recruits of the main commercial species to derive recruitment indices;
- to monitor changes in the populations of commercially important species independent of commercial fisheries data and to monitor changes in species which are currently not of commercial importance;
- to collect data for the determination of biological parameters.

The survey will be carried out annually in October - November with the new RV *Thalassa*, a stern trawler of 74 m and an engine power of 2200 kW. The survey area covers mainly ICES Divisions VIIg,h,j.

The survey area is stratified according to latitude and depth. Three geographical areas are identified in the Celtic Sea and 5 depth zones are used (31-80, 81-120, 121-160, 161-200 and 201-400 m). The 10 strata are divided into units of 25 square nautical miles and a stratified random sampling scheme has been adopted for 1997. The number of hauls per stratum is, to some extent, proportional to the surface of the stratum. The survey is designed to take 85 trawls.

Haul positions are extracted from a database of clear tows from French surveys in the Bay of Biscay and from French, English and Dutch surveys in the Celtic Sea.

A 36/47 GOV trawl is used with a 20 mm mesh codend liner, and a groundrope with 10-20 cm rubber discs. Plane oval trawl doors of 1300 kg are used. Gear geometry is monitored using Scanmar. Haul duration is 30 minutes and towing speed is 4 knots. Fishing is mainly restricted to daylight hours. Presently, no Exocet kite is used.

Catch weights and catch numbers are recorded for all species, all finfish and a selection of shellfish are measured. Salinity and temperature by depth are recorded at the end of each fishing station.

3.1.4 English survey (CSGF)

During the late 1970's the Western mackerel stock fishery was expanding and concern for over-exploitation increasing. The Celtic Sea and Western Approaches Groundfish Survey was started, in 1981, with the aim of investigating the distribution, biology and pre-recruit abundance of this mackerel stock. These objectives were almost immediately extended to all species which could be adequately sampled with a bottom trawl. While mackerel were the primary target the survey covered all or part of the western continental shelf from the northern North Sea to the north coast of Spain. Later, as objectives changed, the area shrunk in stages to its present

boundaries: 47°30'N to 52°30'N and 3°W to 12°W. This has been the standard area since 1987. In the early years a March/April and December survey was carried out each year but since 1989 only the spring (quarter 1) survey has been conducted.

The current objectives of this survey are:

1. to determine the abundance and distribution of fish within the survey area;
2. to determine the abundance and distribution of the pre-recruits of the commercial species with a view to deriving recruitment indices;
3. to monitor changes in the stocks of commercial fish species independently of commercial fisheries data, and to monitor stock changes for species not currently of commercial interest;
4. to collect data for the determination of biological parameters for the more important species;
5. to supplement the shore-based sampling programme.

The trawl used for this survey is a modified Portuguese High-headline Trawl with 350 mm rubber bobbins, a bunt tickler chain and a 20 mm codend liner. Standard hauls are of 60 minutes duration. The average dimensions when the gear is fishing are 4.4 m of headline height and 82 m of door spread. The trawl is fished at fixed station positions and these positions are allocated by area (division lines at 48°45'N and 50°15'N) and depth strata (<90, 90-114, 115-139, 140-179, >180 m). Station log data, weight and length data for all species and additional biological data for selected species are collected and stored in the survey database.

3.2 Southern area

3.2.1 French survey in the Bay of Biscay

The French Survey in the Bay of Biscay (ICES Divisions VIIIa,b) (EVHOE) began in 1987. The survey area was limited to 48°30' N in the north and to the northern margin of Gouf de Cap Breton in the south. The survey was usually conducted in quarter 4 (October - November): from 1987 to 1990, in 1992, 1994 and 1995. In some years the survey was carried out in quarter 2 (May - June): 1988 and 1991.

As explained in section 3.1.3, from 1997 onwards, new objectives were assigned to the EVHOE surveys. The sampling design was modified to take these new objectives into account. The survey area is stratified according to latitude and depth. Two geographical areas are identified and 6 depth zones are used (<31, 31-80, 81-120, 121-160, 161-200 and 201-400 m).

The 12 strata are divided into units of 25 square nautical miles and a stratified random sampling scheme has been adopted for 1997. Per survey 80 hauls are planned to be made, the number of hauls per stratum is, to some extent, proportional to the surface of the stratum. Haul positions are extracted from a clear tow database from French surveys.

General information on this survey (gear, haul duration etc.) is given in Section 3.1.3.

3.2.2 Spanish surveys along the North Spanish coast

The Spanish Groundfish Survey in the Cantabrian Sea and off Galicia (SPGFN) covers ICES Division VIIIc and the northern part of IXa. Two series of surveys have been conducted, one during spring (April-May) starting in 1984, and the other during autumn (September-October) starting in 1980. The spring series ended in 1988 and the autumn one was continued. The survey area has been stratified according to depth and geographical criteria and a stratified random sampling scheme has been adopted. Three depth strata have been used (30-100, 101-200, 201-500 m) and 5 geographic sectors (Figure 3.5). The number of hauls per stratum is proportional to the trawlable surface and, in accordance with the days available, the approximate coverage is one haul per 50 nm², which is approximately 20 hauls per ICES rectangle, and 120 hauls per survey. All surveys are carried out with the Spanish RV *Cornide de Saavedra*. This stern trawler was transformed in 1984 from its original 56 m and 990 GRT to 67 m and 1133 GRT at present.

The survey gear is a Baka trawl 44/60 (a gear which is commonly used in the Spanish fleet) with a 43.6 m footrope and a 60.1 m headline. In the most recent survey headline height and wingend spread were measured using Scanmar. Values of 1.9 m and 22.0 m were obtained respectively. Up to 1985, a codend cover of 20 mm mesh was used, since then, a 20 mm mesh codend liner has been adopted. Trawling is carried out during daylight

only. Starting time of a haul is defined as the moment when the winches are stopped and the end of a haul is defined as the start of pull back. Haul duration was one hour in all surveys before 1984. This was reduced to 30 minutes thereafter. Towing is carried out at a speed of 3 knots.

Following the recommendation of the Study Group on Bottom Trawl Surveys in Sub-areas VI, VII and VIII and Division IXa (ICES 1991), the Baka trawl was calibrated in 1992 with the standard 36/47 GOV trawl fished by RV *Thalassa*. Catch efficiency and conversion factors for the different species were obtained (Sánchez, Poulard and de la Gandara 1994; ICES 1994).

The main objectives of the survey are :

- to estimate the relative abundance of the main fish populations;
- to describe the spatial distribution pattern of all species;
- to estimate the year class strength of selected species (mainly hake);
- to collect data for the determination of biological parameters, including feeding and growth.

The target species are: hake, blue whiting, megrim, monk, horse mackerel and *Nephrops*.

Data on each haul, and the number and weight of all species caught are stored in a data base, as well as the length distributions of all fish species and of the commercially important invertebrates. A software package was developed to process all data on board (files in dBase III format) and which also allows the extraction of data in IBTS exchange format. Salinity and temperature by depth are recorded at the end of each fishing station using a CTD probe.

3.2.3 Portuguese surveys

The Portuguese Bottom Trawl Survey (PGF) is conducted since 1979 two or three times a year (late winter, summer and autumn), with the RV *Noruega*, covering Portuguese waters in Division IXa. The main objective of these surveys is to estimate abundance indices and to study the distribution pattern of the most important commercial species: hake, horse mackerel, blue whiting, mackerel, Spanish mackerel, megrim and monk.

A stratified random sampling design based on depth and latitude was adopted since the June 1979 survey, until the 1989 survey in July. In 1989 the ICES Working Group on Methods of Fish Stock Assessment (ICES 1990) discussed the different survey methods for obtaining indices to tune the VPA. As a result it was decided that a fixed station design would be more appropriate to obtain time series data of abundance. Since October 1989, therefore, a fixed station design has been adopted with 97 planned stations spread over 12 sectors (Figure 3.6). The survey area extends from 41°20' N to 36°30' N and covers a depth range of 20 to 750 metres. Each sector is subdivided into 4 depth ranges: 20-100, 101-200, 201-500 and 501-750 m. Each survey has a total duration of 30 days with an average of 25 fishing days.

Fishing takes place during daylight with a haul duration of one hour and a mean speed of 3.5 knots. Salinity and temperature by depth are recorded at the end of each fishing station. The methodology of these surveys is described in Borges *et al.* (1991) and in ICES (1991).

The Portuguese RV *Noruega* is a stern trawler with a length of 47.5 m, 1500 hp and 495 GRT. The survey gear is a Norwegian Campelen trawl with a 20 mm codend mesh size, and rollers in the groundrope. The presence of rollers in the groundrope facilitates to fish in difficult grounds. The species distributed close to the bottom, however, such as megrim, monk and crustaceans, are not adequately sampled.

Catch weights and catch numbers are collected for all species of fish, cephalopods and crustaceans. Length composition data are collected for all species and biological parameters are collected for the main fish species (hake, horse mackerel, mackerel, Spanish mackerel, blue whiting, megrim and monk) and for some crustacean species (*Nephrops*, red shrimp and deep water rose shrimp).

A relational database was created in 1990 under the FAR project MA1203 "Estimation of the abundance and study of the distribution pattern of hake, horse mackerel, mackerel, monk and megrim in ICES Div. IXa (Portuguese waters)" to manage the fishing database named "Cruzdem". The software initially adopted was Rbase but at present Access software is used. Data concerning fishing stations, catch composition by species in weight, in number and by length are recorded since 1990. Biological information is recorded for the main fish

species (Cardador *et al.*, 1995). Historical data for the main fish species (catches in weight, in number and by length) for the surveys in the period 1979-1989 are also stored in the database.

During the first year of the above project a "Survey Manual" (an internal IPIMAR publication) was prepared. The manual is regularly updated and contains guidelines for the fishing method, for sampling and for the collection of oceanographic data. A description is given of the methods which are applied to sample the catch of each haul (depending on the level of diversity and amount of species caught), the minimum number of individuals to be measured and weighted by length group, identification of maturity stages, the number of otoliths to be collected by length group. The manual also includes forms to be filled in during each tow in order to check data and samples and to improve the input of the data in the database.

3.2.4 Spanish survey in the Bay of Cadiz

The Spanish Survey in the Bay of Cadiz (SPGFS) began in 1993 and was carried out during the first quarter in 1993, 1994, 1995 and 1997, and during the second quarter in 1996. The area covered forms part of the shelf and slope waters off the Gulf of Cádiz, between the meridian of 7° 20' W, or the Spanish-Portuguese border, the parallel 36° 15' N and the isobaths of 15 and 700 m. Its coastal limit is at a distance of 6 miles offshore (Figure 3.5).

The shelf and slope waters are divided into 5 depth strata (15-30, 31-100, 101-200, 201-500 and 501-700 m). A stratified random sampling design, proportional to the area sampled, was designed with a haul duration of one hour and a fishing speed of 3 knots. A Baka 44/60 bottom trawl was used with a codend of 20 mm mesh size. All surveys are carried out with the Spanish RV *Cornide de Saavedra*.

The gear, coverage, fishing method and the data processing are described in Section 3.2.2.

The main objectives of the surveys are:

- to estimate the relative abundance of the main fish, crustacean and cephalopod populations;
- to describe the spatial distribution pattern of all species;
- to collect data for the determination of biological parameters.

The target species in this survey are: hake, wedge sole (*Dicologlossa cuneata*), horse mackerel, Spanish mackerel (*Scomber japonicus*), Sparidae, prawn (*Penaeus kerathurus*), shrimp (*Parapenaeus longirostris*), octopus (*Octopus vulgaris* and *Eledone moschata*) and cuttle fish (*Sepia officinalis*).

3.3 Evaluation of demersal resources of southwestern Europe from standardised groundfish surveys (SESITS)

Objectives and outline

SESITS is an EU funded research project which will be carried out in 1997 and 1998 to evaluate the demersal fish and shellfish resources of southwestern Europe. IEO (Spain), IPIMAR (Portugal) and IFREMER (France) participate in the project which is coordinated by IEO.

Assessments of the main demersal stocks exploited in the southwestern part of Europe (ICES Sub-Areas VII, VIII, and IX) are conducted by the ICES Working Group on the Southern Shelf Demersal Stocks (SSDS) using analytical models (XSA). When conducting these assessments abundance indices from bottom trawl surveys are used to tune the VPA. Since many years surveys are carried out in this area, by Portugal in Division IXa, by Spain in Divisions IXa and VIIIc and by France in Divisions VIIIa,b and Divisions VIIg,h,j. The ICES SSDS Working Group has pointed out difficulties to use these indices in the case of stocks which are distributed over the whole area (for example hake), due to some discrepancies in the indices estimated from the individual surveys.

On the other hand, the IBTS WG (ICES 1996a) pointed at the lack of coordination and standardisation of these surveys, and recommended the establishment of an ICES database for the bottom trawl surveys in the western and southern areas. The IBTS WG also stressed the need to continue surveys during the fourth quarter of the year, since they form the most consistent series in this area.

The main objectives of the SESITS project are therefore:

- 1) to standardise the methodology of the bottom trawl surveys in the area;
- 2) to estimate abundance indices for the target species (see below), and analyse their spatio-temporal variability and in some cases the possible effects of the hydrographic parameters (for example for hake);
- 3) to maintain and standardise the survey data base;
- 4) to assure the continuation of three series of surveys in the autumn.

The target species are those demersal species which are of common and major interest for the three countries involved: hake, megrim, monk, horse mackerel and Norway lobster (*Nephrops*). Other species should also be taken into account, but are considered as species of secondary importance when conducting the analysis.

The total area covered includes ICES Divisions VIIg,h,j, VIIIa,b,c and IXa, corresponding to the Atlantic waters from the western English Channel to the Strait of Gibraltar (Figure 3.7). As recommended by the IBTS WG the different surveys will be conducted in each area in the same period, quarter 4, which is the main recruitment period for the target species (such as hake and horse mackerel).

Special attention will be given to the necessary standardisation of the survey methodology. As recommended by the IBTS WG, estimation of the catchabilities of the different sampling gears (Campelen, Baka and GOV) is planned, through overlap of the different survey areas (Portugal/Spain in Division IXa, Spain/France in Divisions VIIIb,c). Catchability conversion factors will be estimated. It is expected that combination of the results from the different national surveys will be possible. The creation of a common data base in standardised format is considered. Due to the importance of environmental factors for recruitment and distribution processes of the demersal resources, hydrographic data will be recorded simultaneously. The relationship between hydrographic circumstances and spatio-temporal variability in the distribution of the target species will be analysed.

The project includes two different experiments which are focused on the standardisation of the methods used.

Gear calibrations

Spain and Portugal will estimate the catch power of the standard 36/47 GOV trawl. Intercalibration experiences combining *Cornide/Baka - Cornide/GOV* and *Noruega/Campelen - Noruega/GOV* will be conducted. These experiences will be carried out in April 1997, repeating a sufficient number of hauls (30 paired) with the same ship using both gears. The decision to keep the old gears or to change to the GOV will be based on the outcome of these experiments. If the results are acceptable each country will adopt the same gear in the first 1997 autumn survey.

Overlapping areas

Intercalibration of the different surveys will be obtained by overlapping areas and sampling the same stations of adjacent countries (Portugal/Spain and Spain/France): the same stations will be fished by two different vessels. It is expected that conversion coefficients will be obtained for each species.

This part of the program will be as follows:

country	area of overlap	days	hauls	quarter	year
France & Spain	VIIIb,c (Bay of Biscay)	10	30	4	1997
Spain & Portugal	IXa (southern overlap)	10	30	4	1997
France & Spain	VIIIb,c (Bay of Biscay)	10	30	4	1998
Spain & Portugal	IXa (northern overlap)	10	30	4	1998

4 STANDARDISATION OF SURVEYS IN THE WESTERN AND SOUTHERN AREAS

4.1 Future survey design for the Western Area

4.1.1 Depth stratification and station grids

The French survey (EVHOE) covers the Bay of Biscay and the Celtic Sea and is stratified according to depth (<31, 31-80, 81-120, 121-160, 161-200 and 201-400 m) (Poulard, 1997 WD). Preliminary analyses demonstrated that these depth strata show an agreement with the fish communities, especially in the Bay of Biscay (Lauroz 1993). The depth strata used in the EVHOE surveys, also correspond quite well with the depth strata derived from a first analysis of Spanish surveys in Division VIIIc in the autumn of 1993-1996 to fit the abundance and distribution of a number of species (Sánchez 1997 WD). Therefore, this Working Group recommends to apply these depth strata as a standard for the whole Western Area. The number of trawl stations should be related to the surface area of each stratum. Furthermore, the Working Group recommends that if possible each ICES rectangle should be sampled. This strategy will enable later analysis, both by depth stratum and by ICES rectangle. Ireland and Scotland, covering ICES Divisions VIa, VIIa,b and part of VIIg,f, will try to work towards a station grid according to the above strategy (see section 4.1.2).

4.1.2 Area coverage

During the meeting it was identified that there was scope to rationalise components of the Scottish and Irish surveys in the last quarter, so that a comprehensive and systematic survey could be established in the Western Area. Details of the new coordinated survey are to be found in section 5.1. Figure 4.1 outlines the survey areas for the three nations involved.

4.1.3 Target species

The various national surveys have a number of target species which are listed in Table 4.3. The table also lists the usage made of the various data derived from the surveys. The contents of the table should be viewed in conjunction with Figures 4.2 - 4.13 which outline the various stock management areas.

4.1.4 Gear

Both France and Scotland will use a 36/47 GOV trawl fitted with a small mesh liner. Ireland are still debating on the type of net that will be purchased for their new vessel. Further details are given in Table 4.1.

The Working Group expresses its concern that France, in the Western and Southern Areas has recently stopped using an Exocet kite, as prescribed for the standard rigging of the GOV-trawl. The Working Group strongly recommends that the Exocet kite be used, to provide the proper high vertical net-opening.

4.1.5 Data handling

The data on mackerel ≤ 20 cm will continue to be passed to the Marine Laboratory in Aberdeen for inclusion in the recruit database and construction of the mackerel recruit index for the mackerel assessment. For the time being indices for cod, haddock and whiting will be prepared separately by Scotland and Ireland for transmission to the Northern Shelf WG. Methods for producing a combined index will be investigated.

4.2 Future survey design for the Southern Area

4.2.1 Depth stratification and station grids

The Southern Area is divided into 20 geographical sectors: 2 in French waters, 5 in Northern Spanish waters, 12 in Portuguese waters and 1 in the Bay of Cadiz.

The survey area covered by France has been stratified according to depth and geographical criteria: 2 geographical areas and 6 depth zones are used (<31, 31-80, 81-120, 121-160, 161-200 and 201-400 m). The resulting 12 strata are divided into units of 25 square nautical miles (5x5) and a stratified random sampling scheme has been adopted for 1997. 80 hauls are planned for the 1997 survey. The number of hauls per stratum is, to some extent, proportional to its surface area.

The depth strata used in surveys in the Northern Spanish waters were analysed in a working document (Sánchez 1997 WD). Log-transformed catch data from autumn 1994, 1995, and 1996, in number per hour per station, were used for 49 selected species. For 7 species the first age classes were distinguished, based on length classes. The analysis was done independently for each of 5 geographical sectors of the continental shelf. The depth

stratification used was 30-100, 101-200 and 201-500 m. Hierarchical clustering with group-average linking was used, and to separate groups in the dendrograms, similarities of less than 70% were adopted.

The results indicate that the criteria for using depth to define strata is highly suitable in the area. In the Cantabrian continental shelf (the only area where hauls deeper than 80 m are carried out) the first stratum (30-100 m) is not homogeneous, since hauls at depths between 40-60 m are different from those of 80-100 m. The 100 m isobath does not seem to correspond to a biological limit, as more important changes occur at 80 and at 120 m. The same holds for the 200 m isobath, since the most important differences are found between 180 and 190 m.

This first analysis shows large discontinuities in the 201-500 m stratum, where there are groupings of stations with less than 70% affinity. It seems more suitable to divide this stratum into at least two sub-strata, with a bathymetric limit at around 300 m. The lack of homogeneity in this stratum is probably due to the strong changes brought about in the area of the continental shelf edge and slope (currents, upwelling, presence of mud or rocky bottoms, canyons, etc.) which affect richness, diversity and dominance. In this respect this region is less uniform in the central area of the continental shelf (Sánchez 1993). Preliminary analyses of this study indicate that the abundance and distribution of the species in autumn is more homogeneous in the depth range of 30-80, 81-120, 121-180, 180-300 m and deeper water.

The depth strata used in the Portuguese groundfish surveys were also analysed in a working document (Cardador 1997 WD). Log transformed catch data from the autumn 1995 survey, in number per hour per station, were used for 12 selected species or species categories (hake, horse mackerel, blue whiting, Norway lobster, *Parapenaeus longirostris* and *Aristeus antennatus*).

The analysis was done by area: North of Lisbon, Southwest and South. To measure the distance between stations dissimilarity matrices were computed using the Bray-Curtis index. Cluster analysis was performed using UPGMA (unweighted pair-group average). The level of dissimilarity was set at an arbitrary level of 60 % dissimilarity to separate groups.

For the area North of Lisbon two main groups of stations were identified corresponding to coastal and non coastal stations. For the areas Southwest and South, three main classes of stations were identified, corresponding to 3 levels of depth: coastal, intermediate and offshore waters. To validate these results, further analyses are needed, including other survey seasons (late winter and summer) and other species. The present depth strata will be maintained until further studies have been done.

4.2.2 Area coverage

French surveys will cover the ICES Divisions VIIIa and b (Bay of Biscay). Spanish surveys will cover the ICES Divisions VIIIc and part of Division IXa (Cantabrian sea, off Galicia and the Gulf of Cadiz). Portuguese surveys will cover Division IXa (only Portuguese waters).

4.2.3 Target species

The various national surveys have a number of target species which are listed in Table 4.3. The table also lists the usage made of the various survey data. The contents of the table should be viewed in conjunction with Figures 4.2 - 4.13 which outlines the various stock management areas.

4.2.4 Gear

The principal differences between the sampling gears used in the southern area are:

country	gear	horizontal opening (m)	vertical opening (m)	haul duration	towing speed	swept area
France	GOV 36/47	22	4*	30	4	81500
Spain	Baka 44/60	20	2	30	3	60000
Portugal	Campelen**	14	4	60	3.5	90800

* no kite used ** with heavy ground gear

In the French surveys the GOV 36/47 bottom trawl is used with a 20 mm mesh codend liner. The trawl gear is deployed with plane oval trawl boards of 1300 kg and a footrope consisting of 10-20 cm rubber discs. No kite is being used.

The WG is concerned about the use of three very different gears. The SESITS project, however, includes two experiments aimed at the standardisation of the gears used in the Spanish, Portuguese and French surveys (see section 3.3).

4.2.5 Data handling

Data collected during these surveys are recorded in different national databases (see Section 3.2). There is an agreement to use the IBTS exchange format when exchanging data. It is expected that in the near future data from these surveys will be stored in a common database at ICES headquarters.

5 COORDINATION OF SURVEYS IN THE WESTERN AND SOUTHERN AREAS

5.1 Western Area

The coordinator of the 4th quarter western IBTS surveys will be Paul Connolly of the Marine Institute's Fisheries Research Centre (FRC) in Dublin.

Six surveys are to be included in the coordinated survey in 1997. These are;

- the Scottish Mackerel Recruit Survey (SMR)
- the Irish West Coast Groundfish Survey (WCGS)
- the Northern Ireland Groundfish Survey (NIGFS)
- the French Bottom Trawl Survey (Biscay & Celtic Sea) (EVHOE)
- the Irish Sea & Celtic Sea Groundfish Survey (ISCSGS)
- the French Bottom Trawl Survey in the Eastern Channel, Div VIIId (FCG)

As components of coordinated western surveys the individual cruises have been altered slightly in coverage (see Figure 4.1).

The objectives of the SMR have now been extended to include all young fish and the survey area will be extended to cover the Minches and North Channel south to 55°N. The value of the coverage east of 4°W for the mackerel index will be investigated and these rectangles may be omitted. The southern limit of the survey will be 53° 30'N.

The coverage of the Irish WCGS will be maintained in the northern part of the area up to 56° 30'N. This will allow an overlap with the SMR and allow comparison of trawl performance. The survey will be extended southwards in order to overlap with the French survey (EVHOE) in Division VIIj. In order to extend the coverage of the survey, effort will also be redirected from heavily fished rectangles into adjacent rectangles which are not fished.

The French survey (EVHOE) will cover the area of the Celtic Sea from 48°N to 51°30'N. This will allow an overlap with the Irish WCGS for trawl comparison to the SW of Ireland.

It is proposed that the two Irish Sea surveys by the Department of Agriculture for Northern Ireland (DANI) and FRC be included in this coordination. The DANI survey NIGFS covers from 53°N to 55°N. The precise coverage of the new FRC survey ISCSGS is to be decided but will cover the bulk of the Irish Sea and extend into the Celtic Sea. It will be designed to overlap with the NIGFS and EVHOE.

The coordinated design does not presently include the area of the western English Channel. This area has been covered (where possible) by the Netherlands mackerel recruit survey (DMRS). This has been discontinued, at least temporarily. The uncovered area, particularly off Cornwall, is a historically important mackerel juvenile area. In 1997 it is hoped that the French EVHOE survey may be able to cover one or two rectangles in this area, with the highest priority to rectangle 28E3.

5.2 Southern Area

The coordinator of the 4th quarter southern IBTS surveys will be Francisco Sánchez of the IEO - Santander.

Ten surveys will be coordinated during 1997-1998, these include:

BAKA - GOV calibration	1	1997
NCT - GOV calibration	1	1997
EVHOE	2	1997/1998
SESIT - north	2	1997/1998
SESIT - south	2	1997/1998
SESITP	2	1997/1998

There will be complete coverage of the area from the Gulf of Cadiz to the northern part of the Bay of Biscay by Spain, France and Portugal. As mentioned above some overlap between survey areas is planned.

For 1997 and 1998, meetings are planned (within the project supported by DG XIV) to analyse the results of the gear comparisons and survey overlap.

6 THE PRESENT STATE AND FUTURE OF THE IBTS IN THE NORTH SEA, SKAGERRAK AND KATTEGAT

The agreed 5-year programme to conduct coordinated quarterly bottom trawl surveys covering the North Sea, Skagerrak and Kattegat was due for completion at the end of 1995. During a meeting of this Working Group in November 1995 (ICES 1996a) early analyses of the data indicated the potential usefulness of quarterly surveys and it was decided to encourage their continuation. The coverage achieved during 1996 is shown in Figure 6.1. Due to various national constraints this high level of survey coverage is proving difficult to maintain during 1997. The actual survey participation for quarter 1 in 1997 and that proposed for quarters 2 to 4 is given in Table 6.1. It can be seen from this information that quarters 2 and 4 will be inadequately covered and even quarter 3 will have insufficient coverage in the southern part of the area.

The design for coordinated surveys in quarters 2 to 4 is such that individual national surveys may construct abundance indices in their own right. However, the additional quarterly surveys have been running for seven years and the extra data from consistent standardised surveys are proving of use to various working groups, e.g. the mackerel data from the 4th quarter IBTS (North Sea) are referred to by the Mackerel Assessment Working Group. For these reasons institutes are encouraged to maintain as high a commitment to the various quarterly surveys as is possible.

In the past, participants have exchanged information about where they have made damage free hauls during the past year. More recently this practice has lapsed but a need was expressed to revive it. The format for exchange is extended to indicate the source of the positional information (see Appendix I). Participants should submit a data file on disk or by E-mail to Lowestoft by 31 March 1997 containing 1996 data and thereafter by 31 December with that years data. The data will be collated and returned as soon as is practicable after these dates.

7 MANUAL

Standard ground gear

The Working group found, that the gear description in the Manual for the International Bottom Trawl Survey (ICES 1996b) may have some potential errors concerning ground gear rigging specifications. At page 7 in the manual, weight at the different sections of the ground gear is shown. These weights differ from those shown in the report from flume-tank experiments made by DIFTA in 1984 (Wileman 1984). There is also a difference in the wire suggested for the ground gear.

It was decided, that IFREMER (Boulogne sur Mer) should be contacted by the Chairman of the WG. If the description in the manual is to be corrected, a new description should be distributed to all IBTS contact persons.

Exchange file specifications

There have been problems concerning some variables in the exchange format. The specifications for record type 1 (HH-records) include a D=day/N=night coding. When data-checking is performed, in some cases a discrepancy was observed between D/N code and the D/N algorithm. ICES has now corrected the D/N algorithm in the checking program.

In record type 2 (HL-record) there is a possibility to report numbers caught per length class by sex. If this option is used, total numbers and total weight caught per hour should also be reported by sex.

There have over the years been certain inconsistencies in the NODC coding. The revised NODC official version has not been updated for the historical data of the IBTS database. Furthermore, the NODC coding may not list all species that need to be registered for the IBTS surveys in the southern and western areas. The Working Group decided that, if a species is not listed in the NODC-code list in the manual, the first step should be to find the species in SAMMAR, List of Codes, Version 1.0 (October 1996) by A. Newton, Marine Laboratory, Aberdeen. If a species is not listed in the manual nor in SAMMAR, the NODC Taxonomic code Version 8.0 (June 1996) from the National Oceanographic Data Centre, Maryland, USA should be used.

At page 50 in the manual maps are shown of the areas used in the calculation of indices. The map for herring is incorrect. In the Report of the Herring Assessment Working Group for the area South of 62°N, ICES CM1995/Assess:13, Figure 2.3.1 shows the standard area and the weighting factor for each rectangle.

Version 5 of the manual is a manual (ICES 1996b) both for the North Sea, Skagerrak and Kattegat and for the Western and Southern areas. At the moment, an EU funded project concerning the surveys in the Southern area is conducted, see section 3.3. In this project one of the objectives is to standardise the surveys and data-exchange format. The Working Group felt, that a revision of the present manual (version 5) first should be done when this project is finished, as the experience gained during the project should be taken into account when revising the manual. It was agreed to postpone the decision on having one manual covering the whole area or having two manuals, one covering the North Sea, Skagerrak and Kattegat and one the Western and Southern areas until the EU project is completed.

8 IBTS DATABASE

Table 8.1 gives the status of the IBTS data from the North Sea and Division IIIa reported to the ICES Secretariat as per 10 March 1997.

The IBTS report for the 1st quarter 1996 is still not produced. This is due to missing whiting age data from one country, as this country has lost its expert in whiting age readings. The Working Group decided that the 1st quarter 1996 report will be produced without these data.

Due to lack of manpower and set priorities in the ICES Secretariat, none of the IBTS reports for quarters 2, 3 and 4 for the years 1991-1996 have yet been produced. However, some of the data have been used in stock assessments of demersal fish in the North Sea and the Skagerrak. The production of these IBTS reports is regarded as essential for a proper evaluation of the quarterly surveys.

The NODC codes used throughout in the database should be consistent. That means that even old IBTS data might need to be recoded for those species or groups of species for which there has been a change in NODC code.

8.1 Checking program

Currently, the ICES Secretariat is using a lot of resources to check and correct (in consultation with the country in question) the IBTS data submitted to ICES. It is envisaged that it would be a quicker and less cumbersome procedure if the checking program used by the Secretariat could be distributed to the participating countries so that they can do the checking themselves.

The IBTS checking program used in the ICES Secretariat to check the data submitted by the countries participating in the survey in the North Sea and Division IIIa, is a COBOL program running under UNIX at an

HP workstation. In order to make the program more 'transportable' it is now compiled under DOS for PCs. A diskette with the necessary compiled files and a one page installation guide (Appendix II) was made available to the Working Group by the ICES Secretariat. This PC version should only be regarded as preliminary, because in order to get the program ready and running at the present meeting, minor parts of the program had to be switched off.

The program was tested on several portable PCs during the meeting and seemed to work in a satisfactory way.

The checking program produces a file containing the errors found in the exchange data file as well as various warnings. The Working Group went through the diagnostics generated from checking a test exchange data set, in order to learn how to interpret the diagnostics.

Some errors were discovered in the checking program:

- the day/night correction is not according to the midpoint in time of the hauls;
- the CARD-RD parameter file seems to be insensitive to the parameters stated. This means that the country code and the year given in this file are not used to check the exchange data;
- a list of missing standard species is not given;
- NODC codes used are not up to date (at least for *Argentina sphyraena* the code was wrong).

The following improvements were suggested:

- the NODC codes should be supplemented by Latin fish names, Rubin codes or English fish names;
- there should be an error message if weight/hour > 0 and no/hour =0;
- if it is vice versa the checking program should only give it as a warning. Such warnings should either be given in a separate file, listed for the 8 standard species, or summed up and the record line numbers in which this problem is found should be given as a sequence of numbers separated by comma's;
- an age-length key should be made for each species for which CA records are given. The key should use aggregated data for the entire area and could be used to spot obvious outliers in the age determination.

As a proper checking program distributed to the countries delivering data to the IBTS data base is expected to increase the efficiency, and save time in the data checking and data exchange process, the finalisation of the checking program should be given high priority. Preferably, the program should be ready by 1 July 1997, so that the 3rd quarter data can be checked by the program.

8.2 Requests and access rights

The Working Group is of the opinion that all requests to ICES for data from the IBTS data base should pass the relevant national IBTS contact person. The only exception should be data needed by ICES WGs in order to fulfil their terms of reference. Such a procedure has been argued for by the present Working Group several times in the past, and the ICES Secretariat is requested to implement this procedure as soon as possible, as long as it is not in conflict with the general guidelines regarding access rights to data in ICES databases adopted by the ICES Delegates.

The suggested procedure will secure a better assistance to those requesting data as far as the aggregation of data needed for a given purpose is concerned, and also the understanding of the potentials and limitations of the data available, and potential pitfalls in the analysis of the data.

Raw data should only be given to scientists within institutes or laboratories closely connected to ICES and only after the receiver has signed the standard form used by the Secretariat.

The chairman of the Working Group will write to the national IBTS contact persons (see Appendix III) specifying the rules for supplying data from the IBTS database. The rules are based on the general rules as specified by the ICES Delegates as well as on the specific rules established by the Working Group. This text should be made in a way that it can also be given to persons requesting IBTS data. The main purpose of this is to inform them about their possibilities to obtain data from the IBTS data base.

The Working Group noted that in two recently agreed UN resolutions about 'responsible' fishing reference is made to public access to basic information. The Working Group, however, was not in a position to evaluate what implications this might have on the rules for access to the IBTS data.

9 OTHER MATTERS

9.1 Haul duration of 30 and 60 minutes

In the Manual for the International Bottom Trawl Survey (ICES 1996b) the specification of the haul duration (record type 1) is mandatory, but it can vary between 5 and 90 minutes. For most countries and vessels the haul duration during the IBTS is fixed at 30 minutes. Only Scotland and Portugal normally use a towing time of 60 minutes.

An experiment (Ehrich 1997 WD) was carried out to indicate possible differences in the catch data standardised to one hour. The statistical comparison of the catch data series based on hauls of 30 and 60 minutes, using the nonparametric U-Test, does not result in significant differences between both haul series.

Nevertheless, relatively bigger catches of haddock and whiting and smaller catches of flatfish species like dab, long rough dab and lemon sole in the 30 minutes haul series are remarkable.

9.2 IBTS data involvement in EU-contracts

The IBTS data series becomes more and more valuable, not only for stock assessment purposes, but also for questions related to the quality of the ecosystem of the North Sea and to the impact of the fishery on the ecosystem.

To enlarge the IBTS data series for the North Sea, Skagerrak and Kattegat and to improve its quality, an EU-project 'Input of historical IBTS data' was started in 1995. The main reason is that the majority of the surveys carried out between 1968 and 1982 within the scope of the former International Young Fish Survey are not yet stored in the IBTS data base.

The Working Group was also informed of an EU funded project in the Baltic Sea, entitled 'Establishing a Baltic International Trawl Survey (BITS) database'. Aims are to collect and enter historic data on research surveys performed by national laboratories around the Baltic Sea. The database will be updated and maintained within the ICES secretariat. The work is monitored by the ICES Working Group on the Baltic International Fish Surveys (BIFS). Important tasks include the evaluation and coordination of national research surveys and quality assurance through agreed manuals.

In the past, the IBTS-surveys were mainly directed to fish and especially to the commercial important species. Since a number of years the non-target fish species have become more and more important and since 1995 an EU-FAIR-project was established for 'Monitoring biodiversity in the North Sea using the IBTS-surveys'. One of the main tasks in this project is to develop the facilities to sample the benthos additionally to fish during these surveys.

For the near future it is planned to prepare a new version of the North Sea Fish Atlas, which will then cover a longer time period and also the quarterly surveys. It will be tried to raise EU-funds for this project.

In addition to the above mentioned projects, which partly aim at improving the quality of the data series, IBTS-data are used in many other ongoing projects.

10 RECOMMENDATIONS

For the IBTS Working Group:

1. It is recommended that depth stratification is applied in the survey design for the northern part of the Western area and that, if possible, all ICES rectangles in this area are sampled.

2. It is recommended that the standard GOV trawl is used wherever possible.

For the Pelagic and Demersal Fish Committees:

1. It is recommended that the quarterly IBTS surveys in the North Sea, Skagerrak and Kattegat be continued.
2. It is recommended that the reports on the quarterly IBTS surveys in the years 1991-1996 be produced as soon as possible.
3. It is recommended that the surveys in the Western Channel be resumed.
4. It is recommended that data from the surveys in the western and southern areas are stored and maintained in a database at ICES Headquarters.
5. It is recommended that further improvements are made to the ICES survey data validation/verification program and that this program is made available by 1 July 1997.
6. It is recommended that the IBTS Working Group should meet in two year's time in either Spain or Portugal to review the progress made in coordination and standardisation of the surveys in the western and southern areas.

11 LITERATURE

WORKING DOCUMENTS

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Table 4.1 List of bottom trawl surveys in 1996 in Sub-areas VI, VII and VIII and Division XIa.

The Scottish Groundfish Survey in Division VIa (code: SGF6a)

Start: 1981
Gear: 36/47 GOV trawl, large rubber bobbins, 20 mm liner
Timing: quarter 1 (March since 1986)
Target: cod, haddock, whiting, saithe and herring
Stratification: by rectangle
Depth strata: no
No of hauls: 40
Continuation: continued in 1997 and 1998
Contact: Andrew Newton, SOAEFD, Aberdeen, Scotland UK

The Scottish Groundfish Survey in Division VIb (code: SGF6b)

Start: 1985
Gear: 48ft Aberdeen trawl, large rubber bobbins, 35 mm cover
Timing: quarter 3 (September)
Target: haddock
Stratification: by rectangle
Depth strata: no
No of hauls: 45
Continuation: continued in 1997 and 1998
Contact: Andrew Newton, SOAEFD, Aberdeen, Scotland UK

The Scottish Mackerel Recruit Survey (code: SMR)

Start: 1985
Gear: 36/47 GOV trawl, large rubber bobbins, 20 mm liner
Timing: quarter 4 (November / December)
Target: mackerel only until 1995 (cod, haddock, whiting, herring added in 1996)
Stratification: by rectangle
Depth strata: no
No of hauls: 50
Continuation: Longterm, area redefined 1997 (see text)
Contact: Andrew Newton, SOAEFD, Aberdeen, Scotland UK

West Coast Groundfish Survey (Code: WCGS)

Start: 1990
Gear: commercial trawl, rockhoppers, 20 mm liner
Timing: quarter 4 (October/November)
Stratification: by rectangle
Depth strata: no
Target: commercial species
No Hauls: 71
Continuation: 1997 and 1998
Contact: Paul Connolly, FRC, Dublin, Ireland

The Irish Sea Recruit Survey (code: ISRS)

Start: 1983
Gear: 3-bridle otter trawl, close contact groundgear, 20 mm codend
Timing: quarter 2 (June) and quarter 3 (September)
Stratification: fixed stations
Depth strata: no
Target: cod, whiting, haddock and plaice
No of hauls: 28 each survey
Continuation: continued in 1997, will be discontinued in 1998
Contact: Paul Connolly FRC, Dublin, Ireland

The Irish Sea and Celtic Sea Groundfish Survey (code: ISCSGS)

Start: 1997
Gear: 20/25 GOV trawl, standard groundgear, 20 mm liner
Timing: quarter 4 (October)
Stratification: by rectangle
Depth strata: <50, 50-100, 100-150, 150-200, 200-250, >250.
Targets: commercially important species
No hauls: 50
Continuation: will commence in 1997
Contact: Paul Connolly, FRC, Dublin, Ireland.

The West and South Coast of Ireland Recruit Survey (code: WSCRS)

Start: 1992
Gear: dual purpose otter trawl, medium bobbins, 20 mm codend
Timing: quarter 3 (July)
Stratification: by depth, fixed stations
Depth strata: no
Target: inshore juvenile fish
No of hauls: 74
Continuation: continued in 1997
Contact: Paul Connolly, FRC, Dublin, Ireland

The Celtic Sea and Western Approaches Groundfish Survey (codes: CSGF)

Start: 1981
Gear: Portuguese high-headline trawl, medium rubber bobbins, 20 mm liner, tickler
Timing: quarter 1 (March)
Stratification: by depth and latitude
Depth strata: 0-89, 90-114, 115-139, 140-179, >180 m
Target: mackerel and commercially important species
No of hauls: 75
Continuation: continuing in 1997 and 1998
Contact: John Nichols, MAFF, Lowestoft, England UK

The Northern Ireland Groundfish Survey in Division VIIa (code: NIGFS)

Start: 1991
Gear: Otter trawl, rockhoppers, 20 mm liner
Timing: quarter 1 (March), quarter 3/4 (September/October) (also June 1991-94)
Stratification: by depth, area and bottom type (7), fixed stations
Depth strata: <50 m, 50 m+
Target: commercially important species
No of hauls: 45 per survey
Continuation: March and September surveys to be continued in 1997 and 1998
Contact: Mike Armstrong, DANI, Belfast, Northern Ireland UK

The German Survey in the western waters (code: GSWW)

Start: 1991
Gear: 36/47 GOV trawl, standard groundgear, 20 mm liner
Timing: quarter 2 (April)
Stratification: by rectangle
Depth strata: no
Target: commercially important species
No of hauls: 40
Continuation: continued in 1996, not in 1997; again in 1998 as part of the mackerel / horse mackerel egg surveys and subsequently triennial
Contact: Nils Hammer, BFA-ISH, Hamburg, Germany

The Dutch Mackerel / Horse Mackerel Recruit Survey (code: DMRS)

Start: 1987
Gear: 36/47 GOV trawl, standard groundgear, 20 mm liner
Timing: quarter 4 (November / December)
Stratification: by rectangle
Depth strata: no
Target: horse mackerel and mackerel
No of hauls: 45
Continuation: continued in 1996; doubtful in 1997
Contact: Guus Eltink, RIVO-DLO, IJmuiden, Netherlands

The French Bottom Trawl Survey in Eastern Channel, Division VIId (code: FCG)

Start: 1988
Gear: 20/25 GOV trawl, standard groundgear, 20 mm codend
Timing: quarter 4 (October)
Stratification: by subrectangle
Depth strata: no
Target: commercially important species
No of hauls: 100
Continuation: continued in 1997
Contact: Andre Carpentier, IFREMER, Boulogne-sur-Mer, France

The French Bottom Trawl Survey in Bay of Biscay and Celtic Sea (code: EVHOE)

Start: 1987
Gear: 36/47 GOV trawl, standard groundgear, 20 mm liner, no kite
Timing: annually in quarter 4 (October/ November), irregular in quarter 2 (May / June)
Stratification: by depth
Depth strata: 15-30, 31-80, 81-120, 121-160, 161-200, 201-400
Target: commercially important species
No of hauls: 165 per quarter
Continuation: continued in 1997, but only in quarter 4
Contact: Jean-Claude Mehe, IFREMER, Lorient, France

The Spanish Groundfish Survey in Cantabrian Sea and off Galicia (code: SPGFN)

Start: 1980
Gear: Baka 44/60 trawl, chain wrapped combination, 20 mm codend
Timing: quarter 4 (October)
Stratification: by depth, random sampling scheme
Depth-strata: 30-100, 101-200, 201-500 m
Target: commercially important species
No of hauls: 100 - 120
Continuation: continued in 1997 and 1998
Contact: Francisco Sanchez, IEO, Santander, Spain

The Spanish Groundfish Survey in the Gulf of Cadiz (code: SPGFS)

Start: 1993
Gear: Baka 44/60 trawl, chain wrapped combination, 20 mm codend
Timing: quarter 1 (March) & quarter 3 (since 1997)
Stratification: by depth, random sampling scheme
Depth-strata: 30-100, 101-200, 201-500 m
Target: commercially important species
No of hauls: 30
Continuation: continued in 1997 and 1998
Contact: Francisco Sanchez, IEO, Santander, Spain

The Portuguese Bottom Trawl Survey (code: PGF)

Start: 1979
Gear: Norwegian Campelen trawl, bobbins, 20 mm codend
Timing: quarter 3 (July) and quarter 4 (October)
Stratification: by depth, fixed stations
Depth-strata: 20-100, 101-200, 201-500, 501-750 m
Target: commercially important species, hake, horse mackerel, mackerel, blue whiting
No of hauls: 97 per quarter
Continuation: continued in 1997 and 1998
Contact: Fatima Cardador, IPIMAR, Lisbon, Portugal

Table 4.2 - Information on the possible continuation in 1997 and 1998 of the bottom trawl surveys in Sub-areas VI, VII, VIII and Divisions IXa							
					Continuation		
Survey					Code	in 1997	in 1998
Scottish Groundfish Survey in Division VIa					SGF6a	YES	YES
Scottish Groundfish Survey in Division VIb					SGF6b	YES	YES
Scottish Mackerel Recruit Survey					SMR	YES	YES
West of Ireland Survey					WI	ceased	
Irish Sea & Celtic Sea Groundfish Survey					ISCSGS	YES	YES
Irish Sea Recruit Survey					ISRS	YES	YES
West and South Coast of Ireland Recruit Survey					WSCRS	YES	YES
Irish Sea Gadoid Survey					ISG	YES	YES
Celtic Sea and Western Approaches Groundfish Survey					CSGF	YES	YES
Dutch Mackerel / Horse Mackerel Recruit Survey					DMRS	NO	NO
French Bottom Trawl Survey in the Eastern Channel					FOG	YES	YES
Fench Survey in the Bay of Biscay and the Celtic Sea					EVHOE	YES	YES
Spanish Survey in the Cantabrian Sea and off Galicia					SPGFN	YES	YES
Spanish Survey in the Gulf of Cadiz					SPGFS	YES	YES
Portuguese Groundfish Survey					PGF	YES	YES

Table 4. 3. Use of data from existing surveys in the Western and Southern areas by ICES Working Groups					
	Species	Stock Areas	Survey results used		
Northern shelf	Cod	Vla	SGF6a	WCGS	
Demersal Stocks (1)	Haddock	Vla	SGF6a	WCGS	
	Whiting	Vla	SGF6a	WCGS	
	Megrim - whiffiagonis	Vla		WCGS	
	Anglerfish	Vla			
	Cod	Vlb			
	Haddock	Vlb	SGF6b		
	Whiting	Vlb			
	Saithe	VI			
	Cod	Vlla	ISG	ISRS	NGFS
	Whiting	Vlla	ISG	ISRS	NGFS
	Plaice	Vlla		ISRS	
	Sole	Vlla			
Southern Shelf	Sole	Vlle			
Demersal Stocks (2)	Plaice	Vlle			
	Cod	Vlle,f,g,h	CSGF		
	Whiting	Vlle,f,g,h	CSGF		
	Sole	Vllf,g			
	Plaice	Vllf,g			
	Hake	IIIa+IVa,c+VI+VII+VIIIa,b	CSGF	EVHOE	
	Monkfish - <i>L.piscatorius</i>	VII+VIIIa,b	CSGF		
	Monkfish - <i>L.budegassa</i>	VII+VIIIa,b	CSGF		
	Megrim - <i>L.whiffiagonis</i>	VII+VIIIa,b	CSGF		
	Sole	VIIIa,b	EVHOE		
	Hake	Vllc+IXa	RGP	SPGFN	
	Monkfish - <i>L.piscatorius</i>	Vllc+IXa	RGP	SPGFN	
	Monkfish - <i>L.budegassa</i>	Vllc+IXa	RGP	SPGFN	
	Megrim - <i>L.whiffiagonis</i>	Vllc+IXa	RGP	SPGFN	
	Megrim - <i>L.boscii</i>	Vllc+IXa	RGP	SPGFN	
	Cod	Vllb,c			
	Whiting	Vllb,c			
	Sole	Vllb,c			
	Plaice	Vllb,c			
	Cod	VII-h,j,k			
	Whiting	VII-h,j,k			
	Sole	VII-h,j,k			
	Plaice	VII-h,j,k			
Pelagic stocks	Mackerel (3)	Vla+Vllb,e-h+VIIIa	CSGF	SGF6a	EVHOE
			SMR	GSWW	
	Horse mackerel (3)	Vllc+IXa	RGP	SPGFN	
	Blue whiting (4)	Northwest Atlantic: Sub-areas I and II, Div Va XIVa+b,Vb,Vla+b,Vllg,h,j,k Vllb,c+Vllc+IXa	RGP	SPGFN	
Crustaceans	<i>Nephrops</i> (5)	Functional Units: 24,25 27, 28+29, 30, 31 (Div. Vllc + IXa)			
	<i>Aristeus antennatus</i> (6)				
	<i>Parapenaeus longirostris</i> (6)				
Deep-Sea Fisheries (7)	Blue ling	V,VI,XIV			
	Tusk	V,VI,XIV			
	Ling	V,VI,XIV			
Sources					
(1)	Report of the Working Group on the Assessment of Northern Shelf Demersal Stocks, Copenhagen, 26 Jun-5 July, 1997/Assess:2				
(2)	Report of the Working Group on the Assessment of Southern Shelf Demersal Stocks, Copenhagen, 3-12 September 1997/ Assess:5				
(3)	Report of the Working Group on the Assessment of Mackerel, Horse mackerel, Sardine and Anchovy, Copenhagen, 13-22 August 1996. C.M.1997/Assess:3				
(4)	Report of the Atlanto-Scandian Herring, Capelin and Blue Whiting Assessment Working Group, Bergen 12-18 October 1995. C.M. 1996/Assess:9				
(5)	Report on the Working Group on Nephrops and Pandalus Stocks, Ostende, 24 February-4 March 1993/Assess:11				
(6)	Stock areas not defined in Portuguese and Spanish waters				
(7)	Report of the Study Group on the Biology and Assessment of deep-sea fisheries resources, Copenhagen, 15-21 February 1996/Assess:8				
Survey Codes : see Table 4.2					

Table 6.1 Survey time in the North Sea, Skagerrak and Kattegat during 1997

Quarter 1	Denmark	3 weeks
	France	4 weeks
	Germany	3 weeks
	Netherlands	4 weeks
	Norway	4 weeks
	Scotland	3 weeks
	Sweden	3 weeks
Quarter 2	Norway	3 weeks
	Scotland	3 weeks
Quarter 3	England	4 weeks
	Germany	2 weeks
	Netherlands	1 weeks
	Scotland	3 weeks
	Sweden	2 weeks
Quarter 4	Norway	4 weeks
	Netherlands	2 weeks

Table 8.1 Data available in the ICES IBTS data base as at 17 March 1997. Second, third and fourth quarters

Ã = Data available
 - = No survey made

Year Country	1991			1992			1993		
	2	3	4	2	3	4	2	3	4
Denmark	-	-	Ã	-	-	Ã	-	-	Ã
France	-	-	-	-	Ã	-	-	Ã	-
Germany	Ã	-	-	Ã	Ã	-	Ã	-	-
Netherlands	Ã	Ã	Ã	Ã	Ã	Ã	Ã	Ã	Ã
Norway	Ã	-	Ã	Ã	-	Ã	Ã	-	Ã
Sweden	Ã	Ã	-	-	Ã	-	Ã	Ã	-
UK (England)	Ã	Ã	Ã	-	Ã	Ã	-	Ã	Ã
UK (Scotland)	Ã	Ã	-	Ã	Ã	-	Ã	Ã	-

Year Country	1994			1995			1996		
	2	3	4	2	3	4	2	3	4
Denmark	-	-	Ã	-	-	Ã			
France	-	Ã	-	-	-	Ã	-	Ã	-
Germany	Ã	-	-	Ã	-	-			
Netherlands	Ã	Ã	Ã	Ã	Ã	Ã			
Norway	Ã	-	Ã	Ã	-	Ã			
Sweden	Ã	Ã	-	Ã	Ã	-			
UK (England)	-	Ã	Ã	-	Ã	Ã			
UK (Scotland)	Ã	Ã	-	Ã	Ã	-	Ã	Ã	-

ICES Rectangles sampled by Scotland in Quarter 1

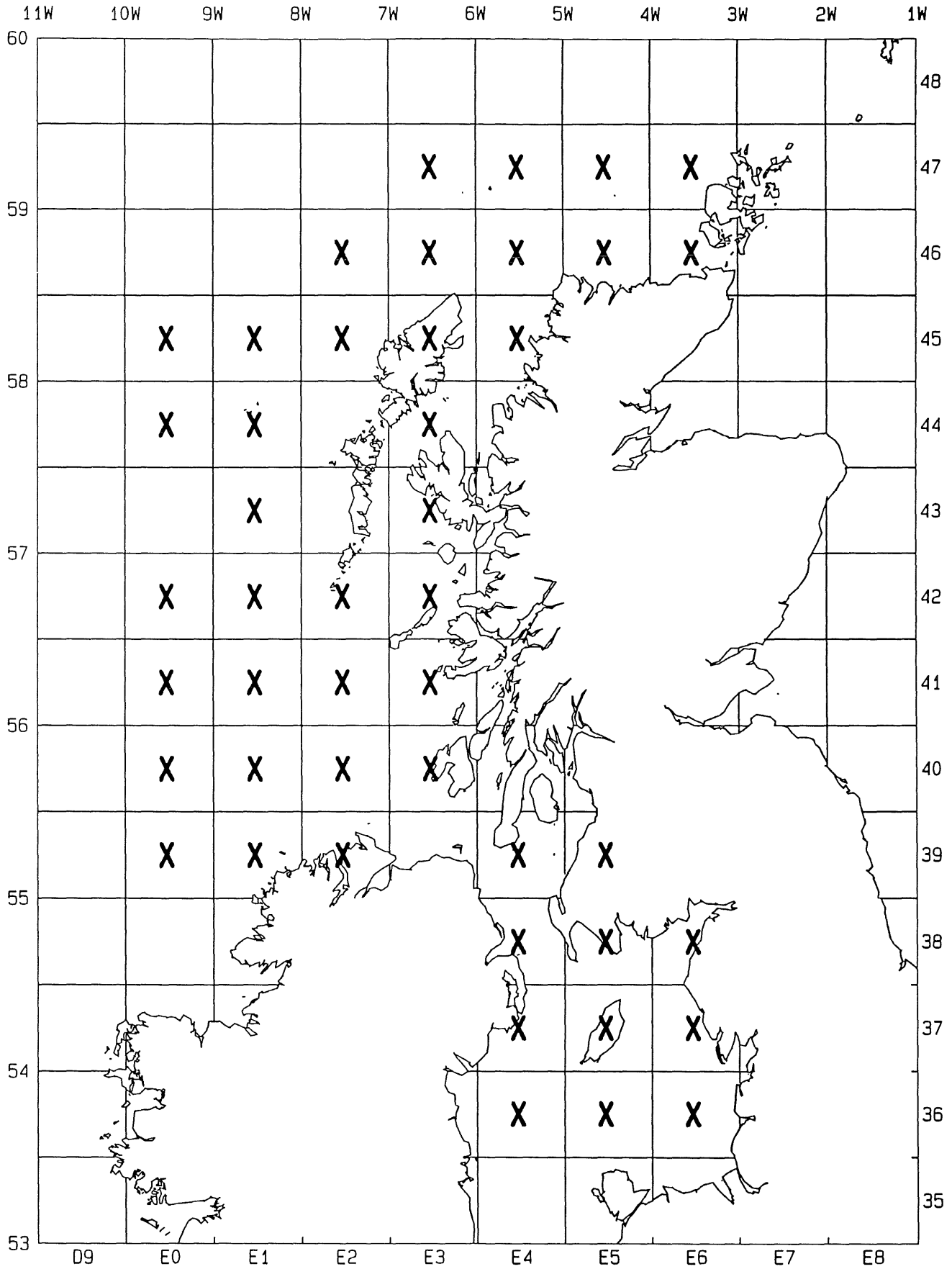


Figure 3.1 Station grid of the quarter 1 Scottish Groundfish Survey in Division VIa (SGF6a)

Area used for Herring 2 Ringer Index

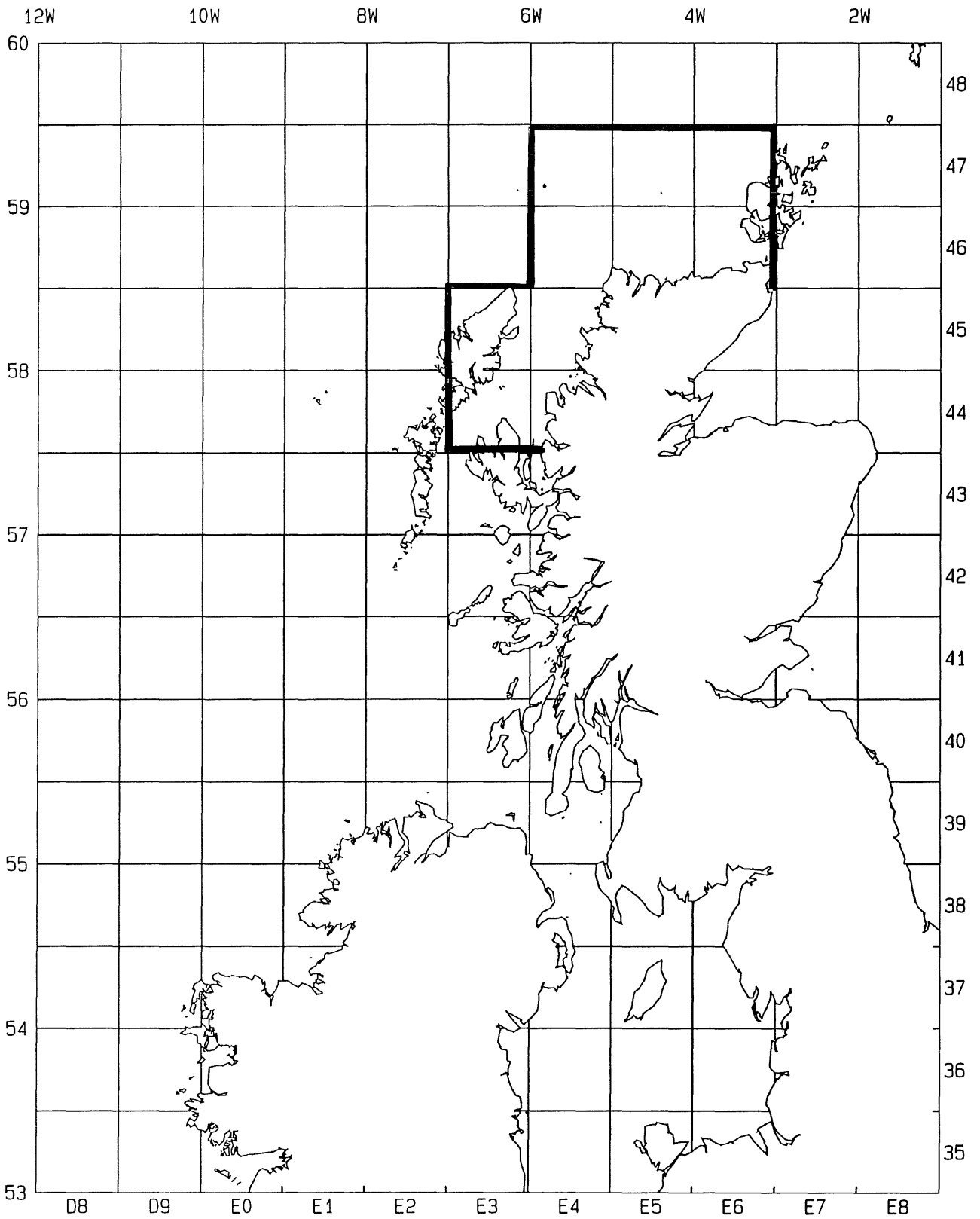


Figure 3.2 Area used for the calculation of the herring index of the Scottish Groundfish Survey in Division VIa

Standard Scottish Stations on Rockall Plateau

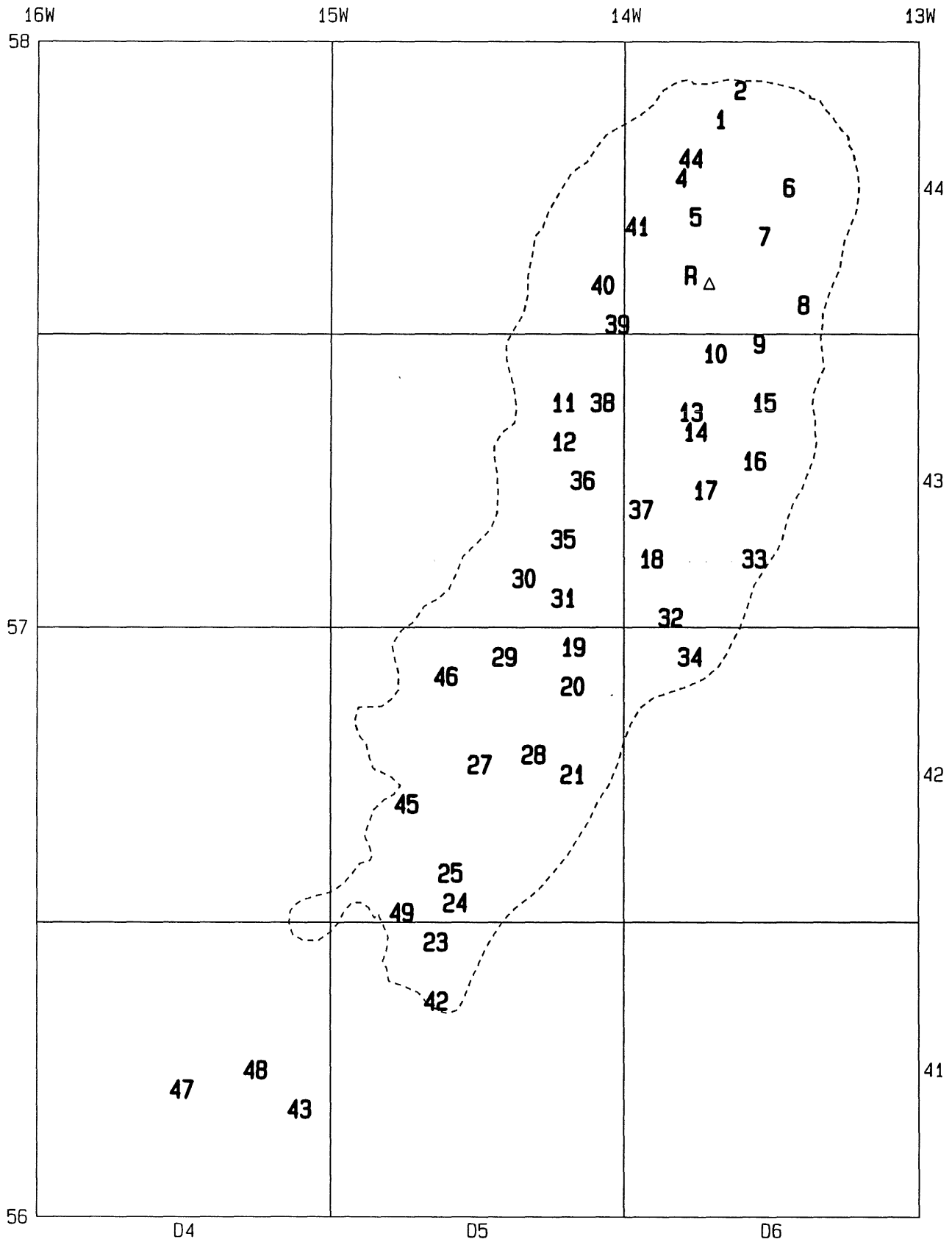


Figure 3.3 Station grid of the quarter 3 Scottish Groundfish Survey in Division VIb (SGF6b)

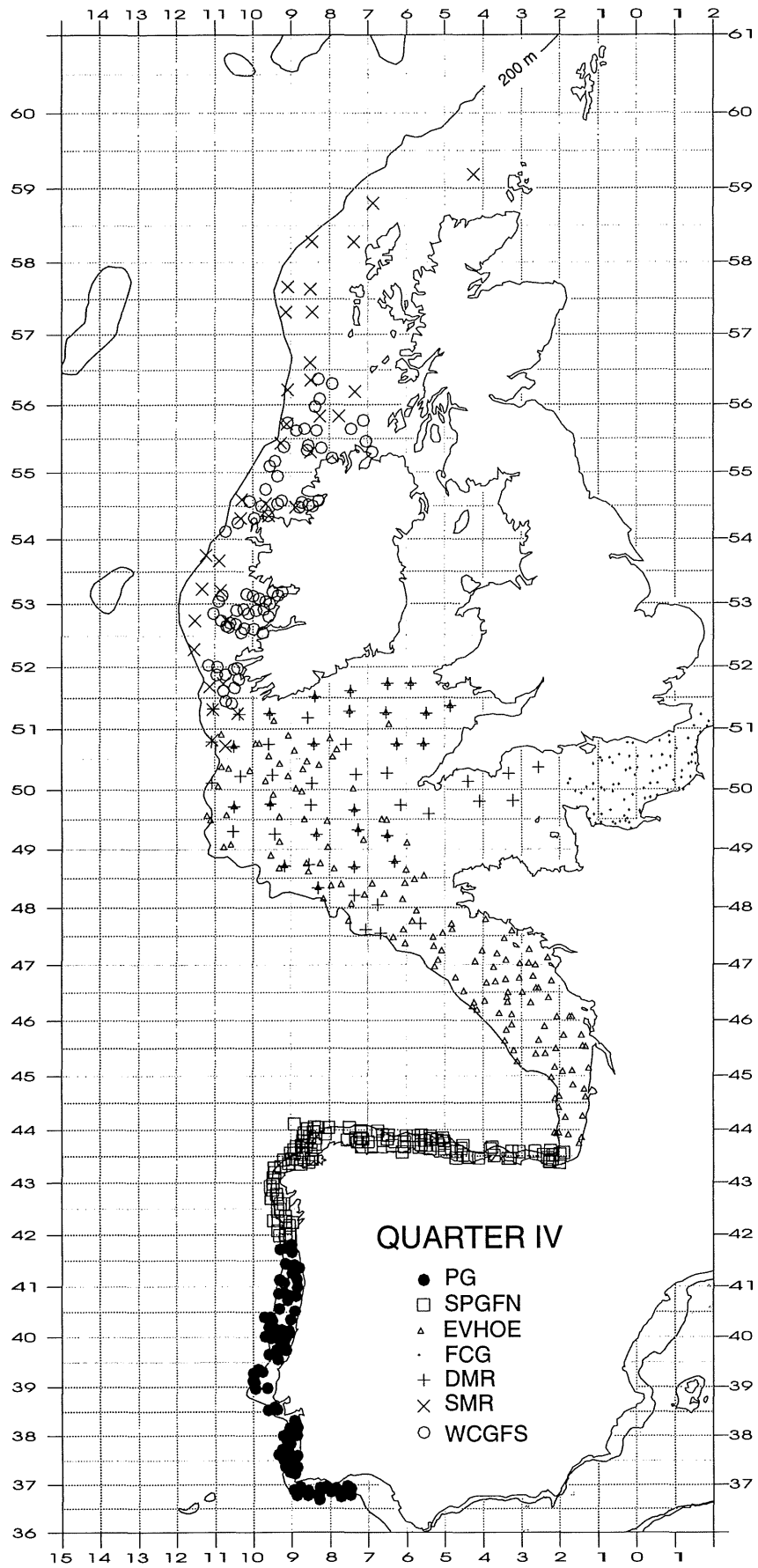


Figure 3.4 Station grid of seven quarter 4 surveys

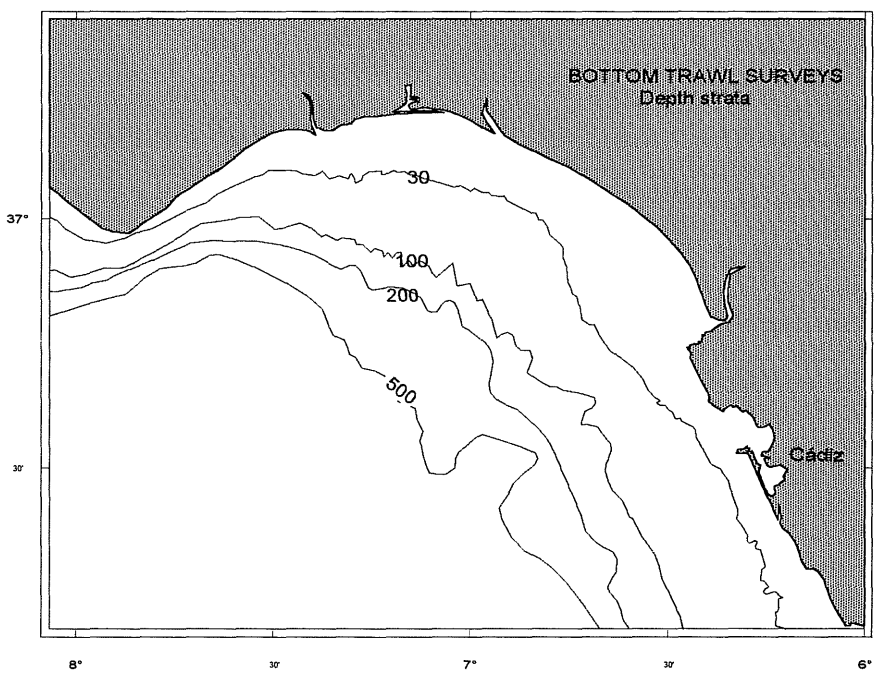
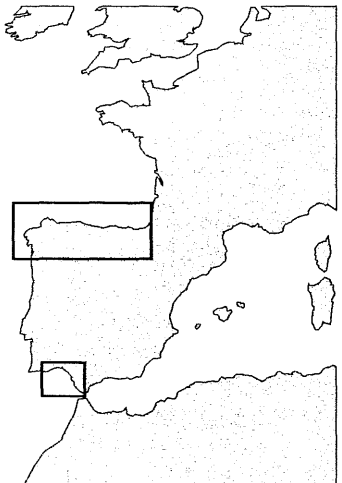
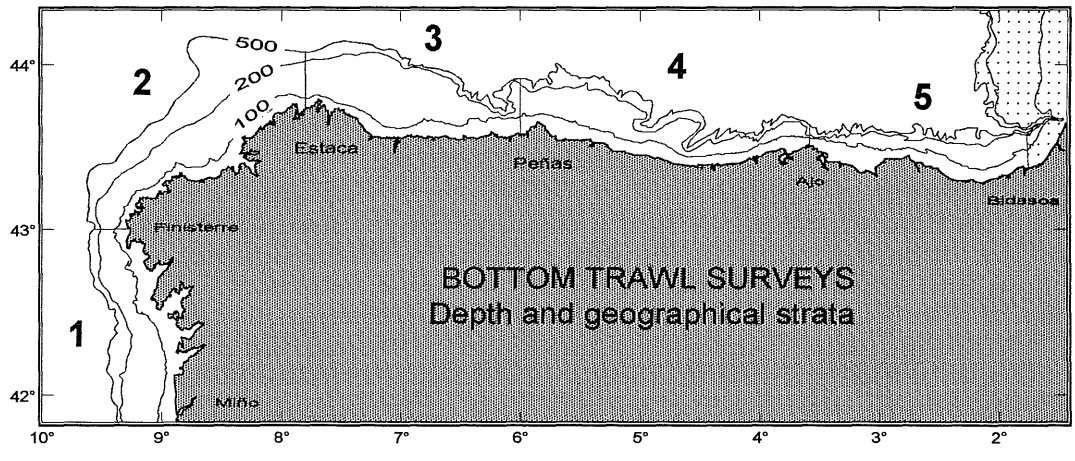


Figure 3.5 Depth strata and geographic sectors used in the Spanish Groundfish Survey in the Cantabrian Sea, off Galicia and in the Bay of Cadiz.

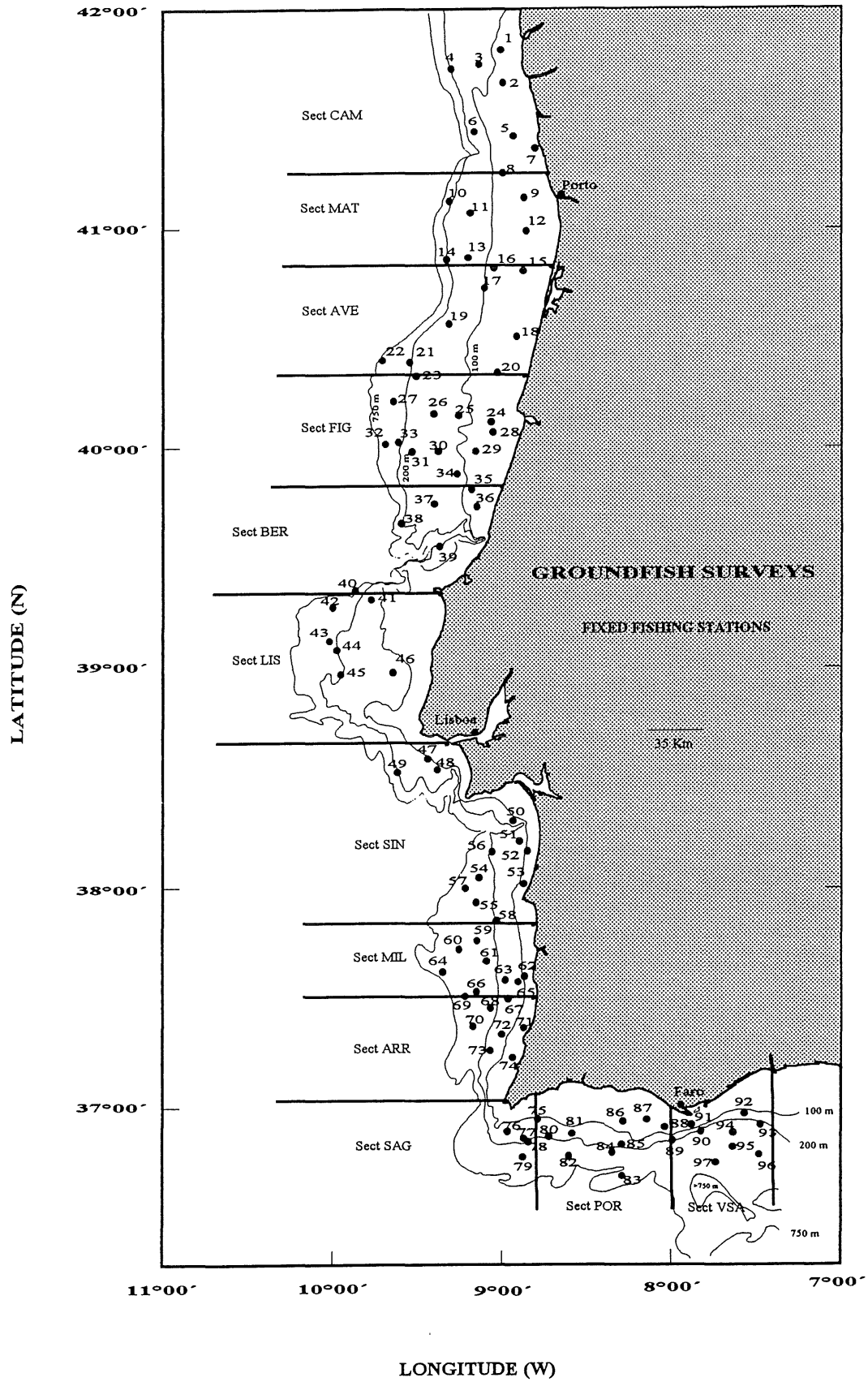


FIGURE 1

Figure 3.6 Stations used in the Portuguese Bottom Trawl Survey

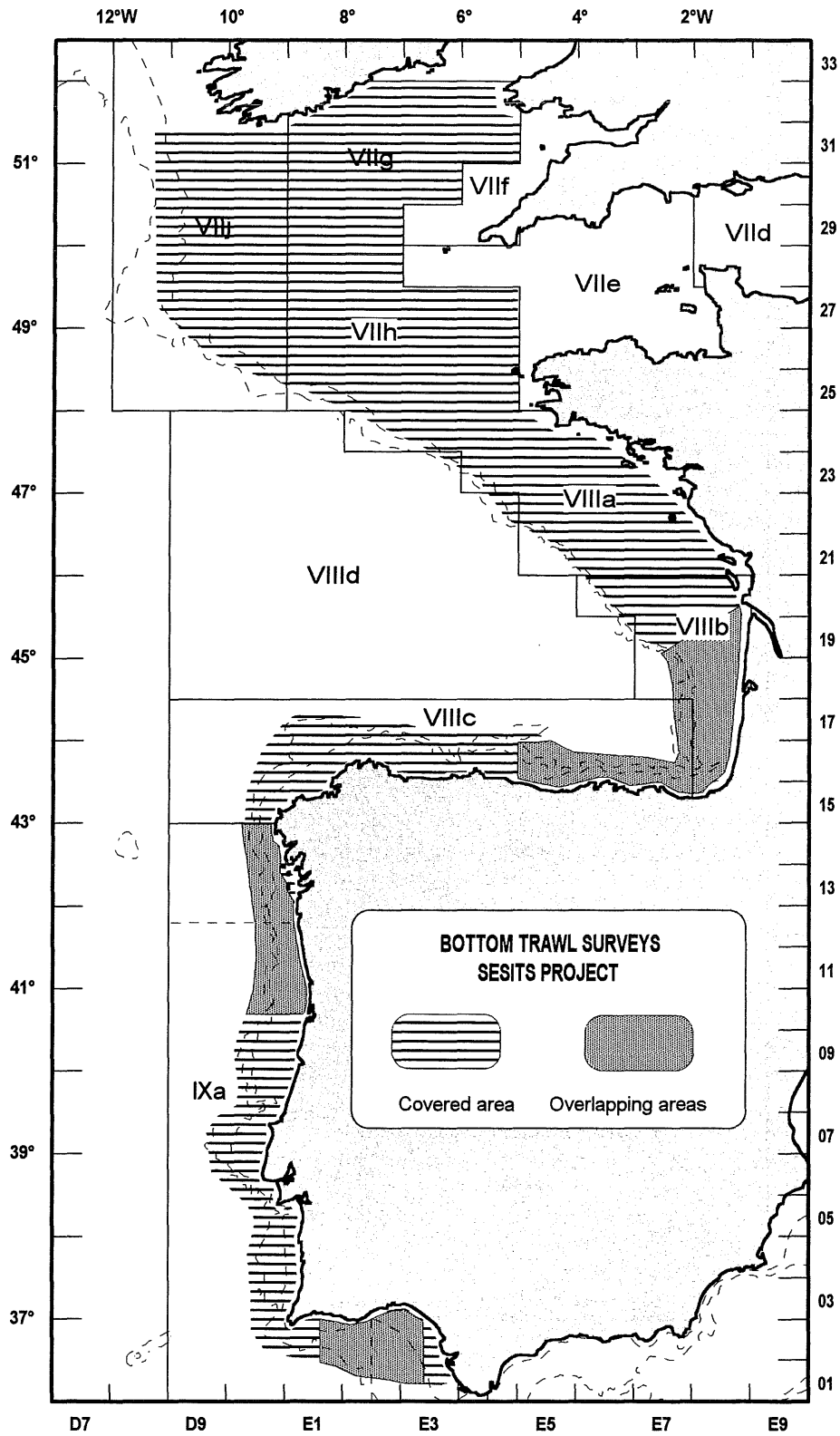


Figure 3.7 Area covered by the SESITS surveys

Proposed sampling in Western Division in Quarter 4

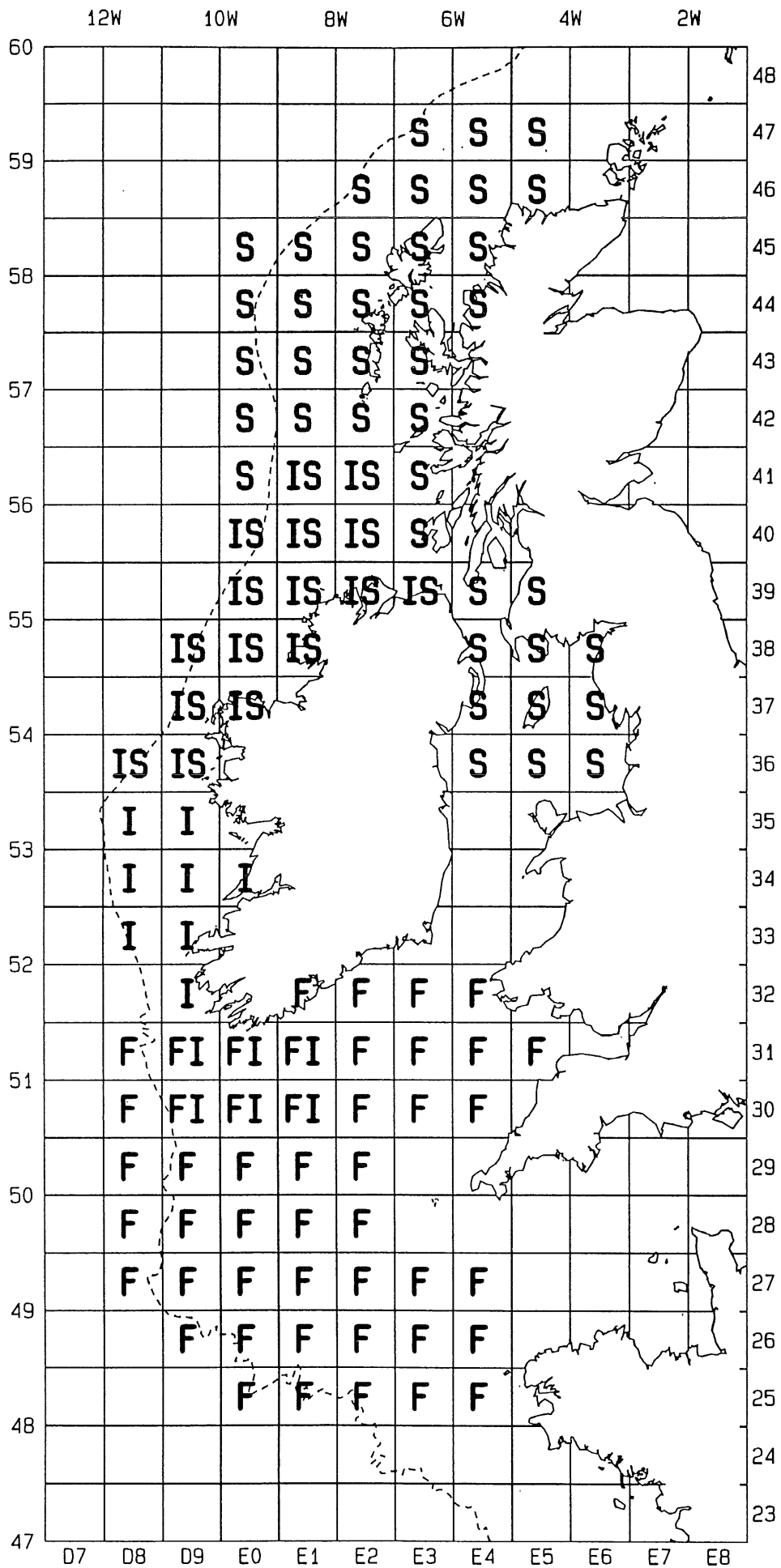


Figure 4.1 Proposed survey coverage in the Western Area

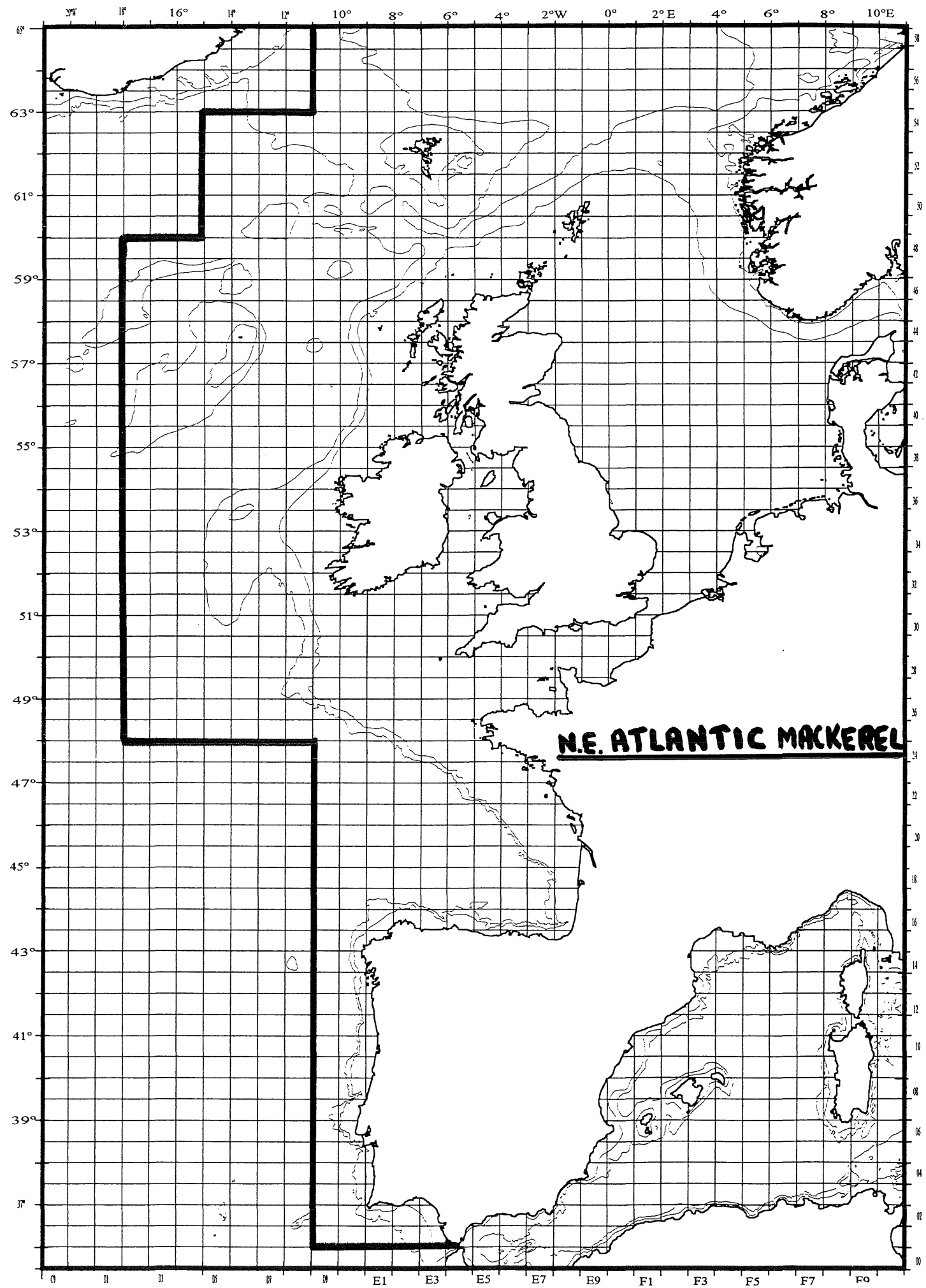


Figure 4.2 Stock management area for N.E. Atlantic mackerel

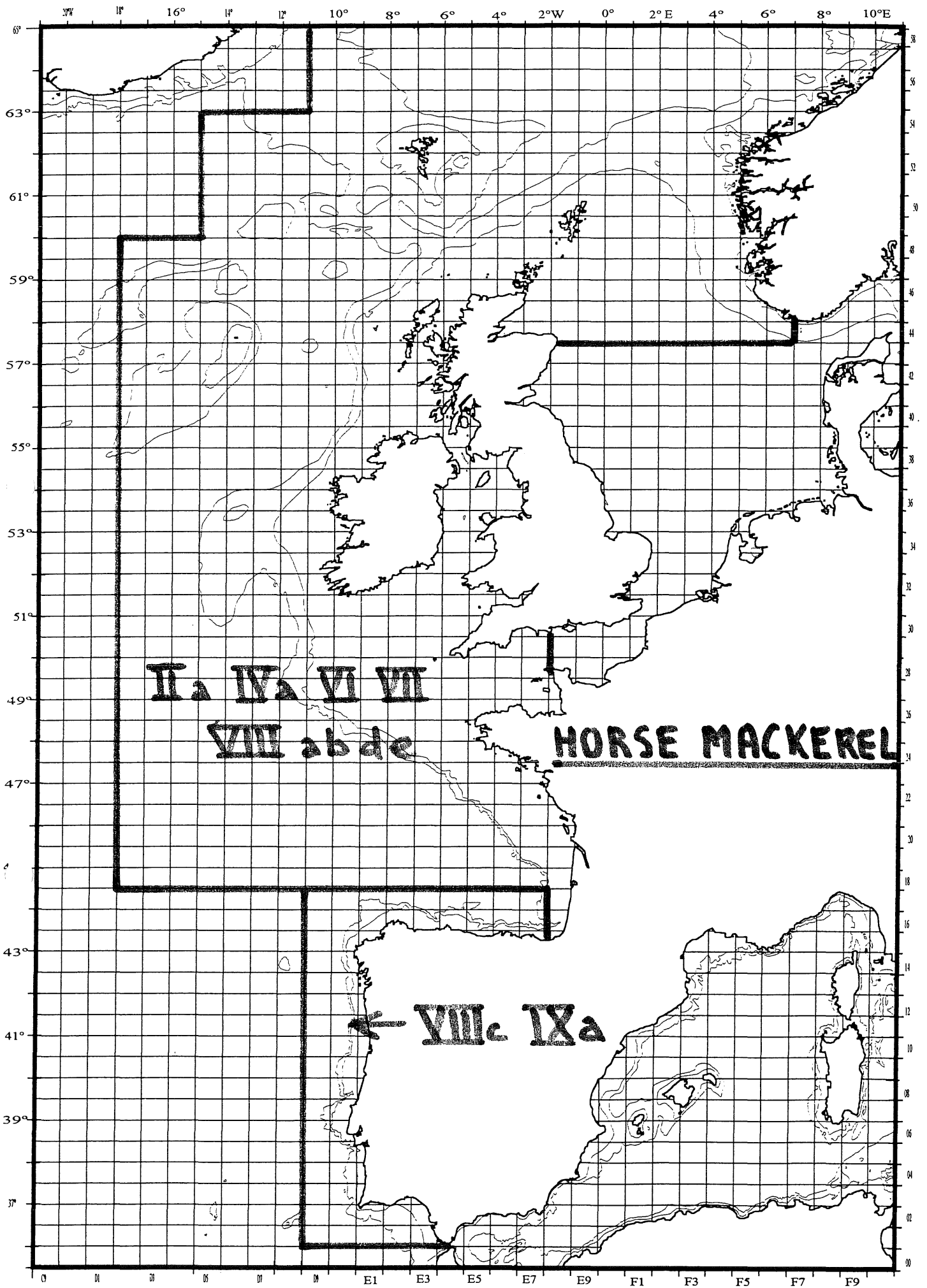


Figure 4.3 Stock management areas for horse mackerel in the western and southern areas

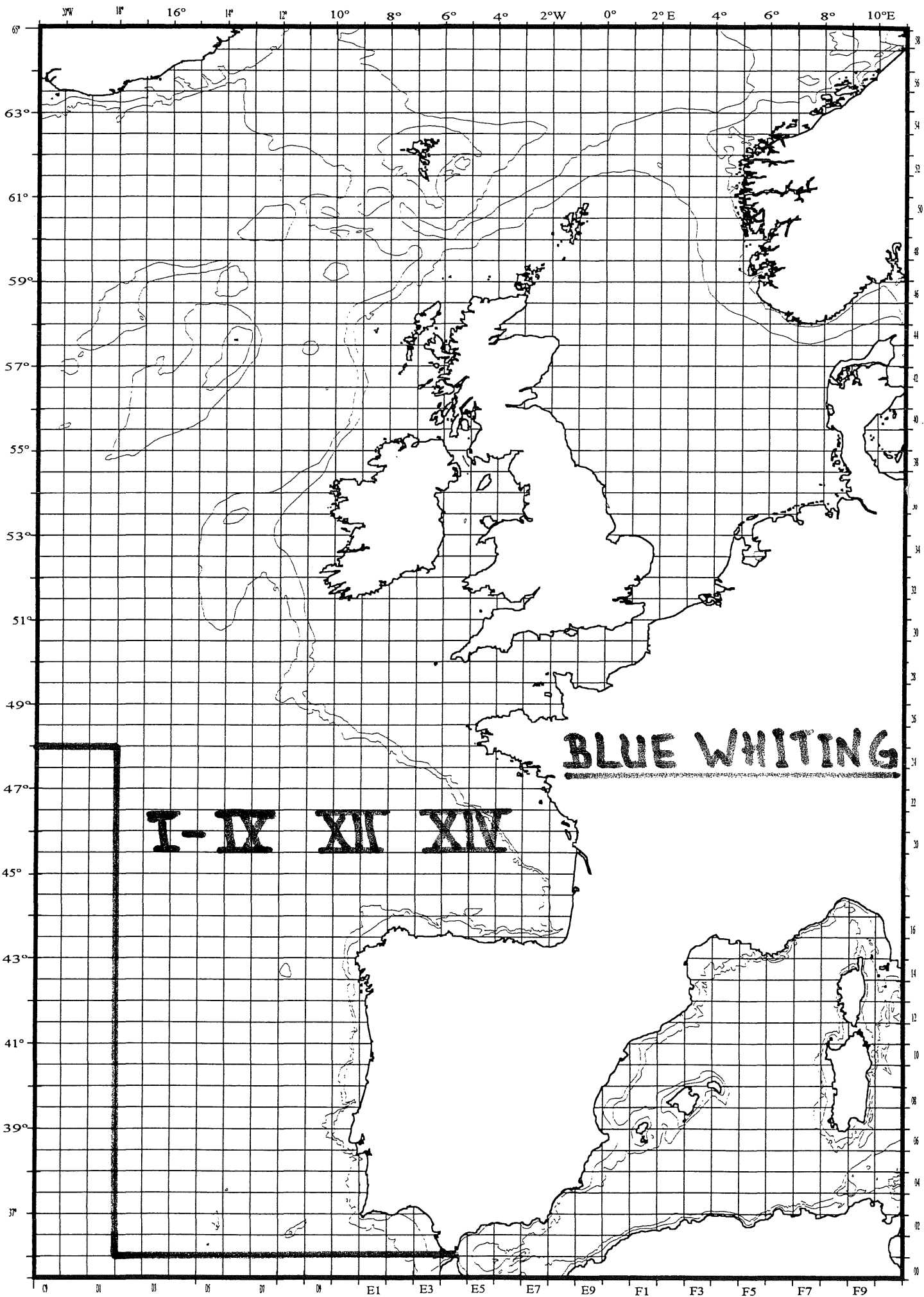


Figure 4.4 Stock management area for blue whiting

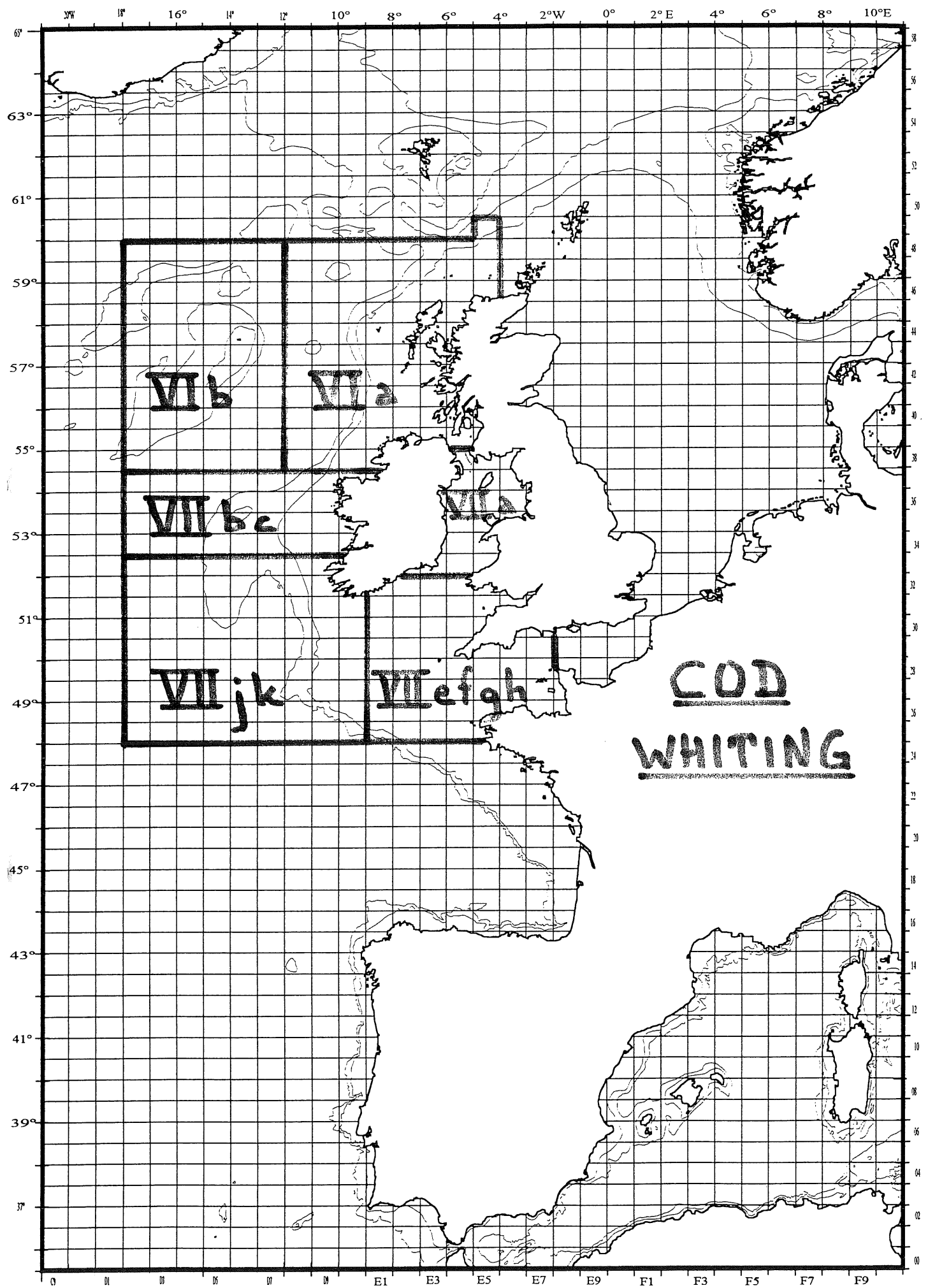


Figure 4.5 Stock management areas for cod and whiting in the western area

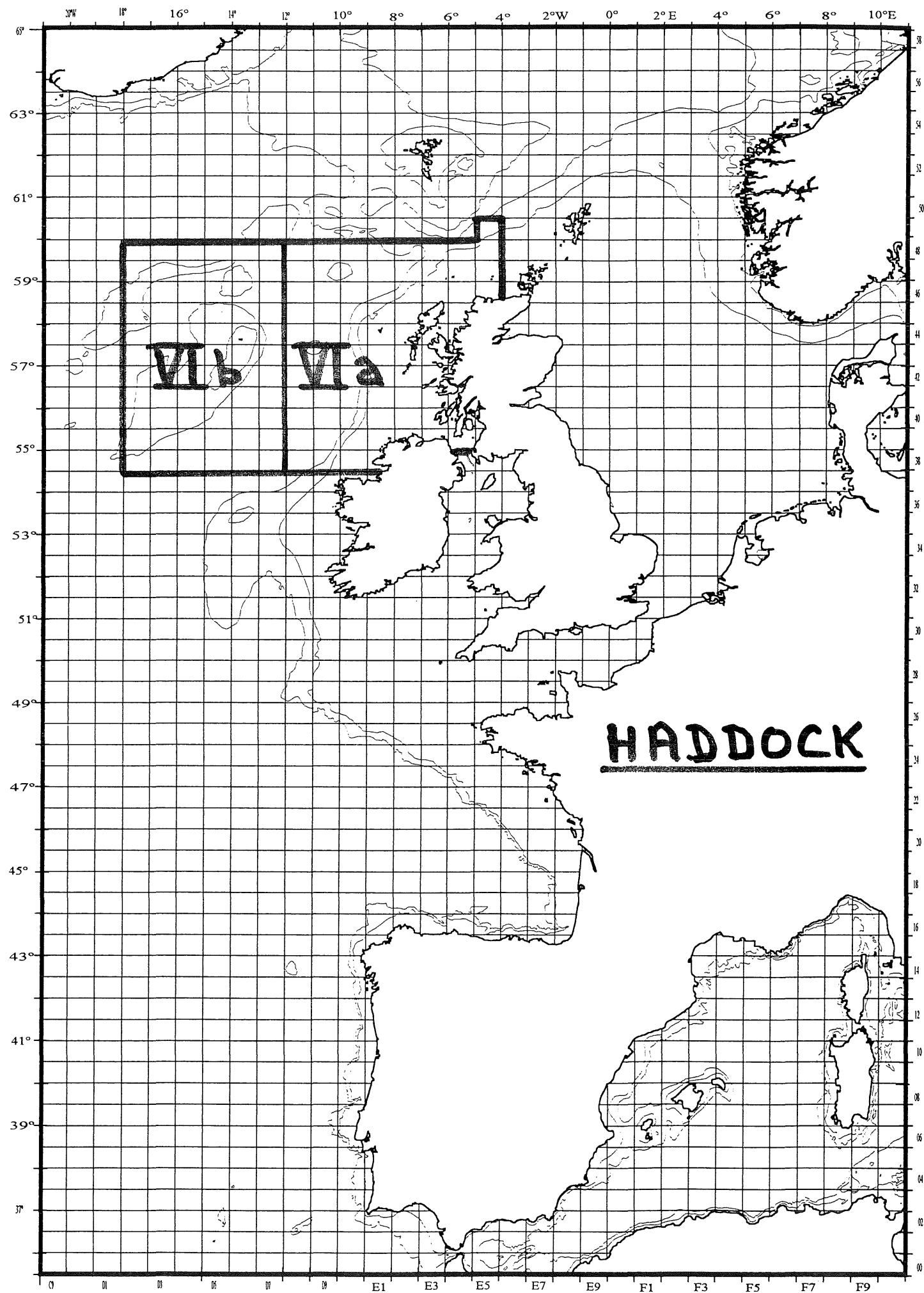


Figure 4.6 Stock management areas for haddock in the western area

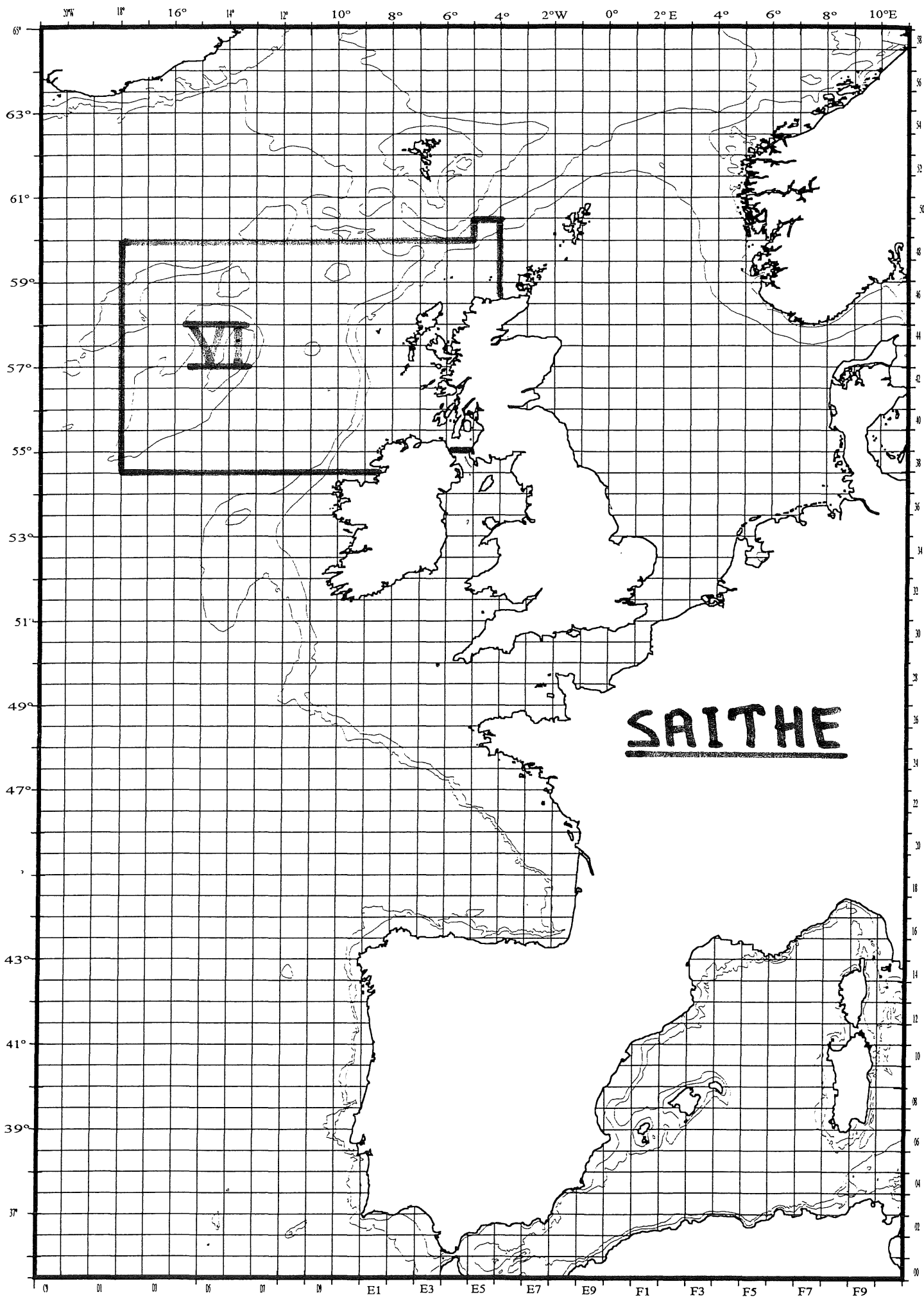


Figure 4.7 Stock management area for saithe in the western area

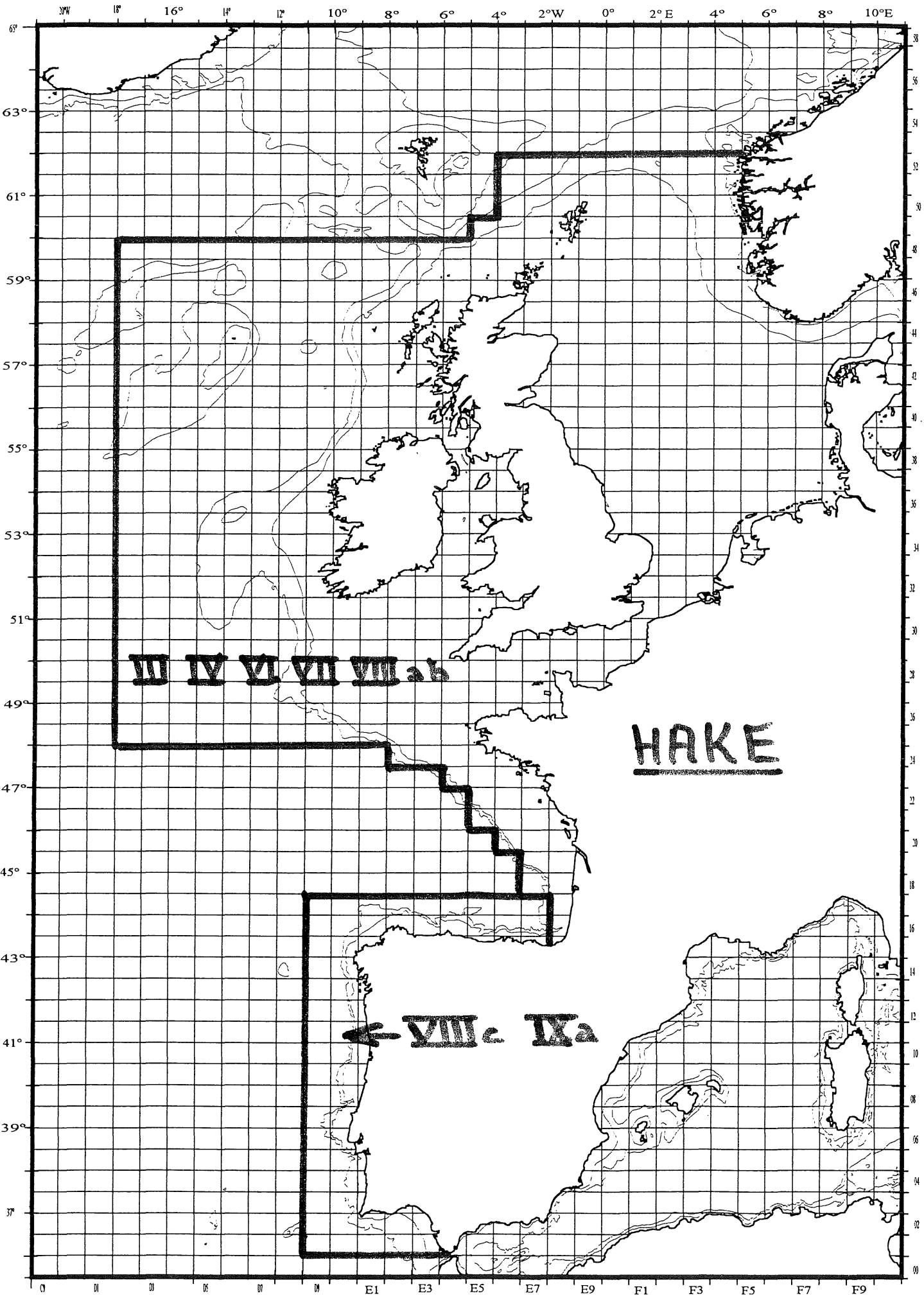


Figure 4.8 Stock management areas for hake

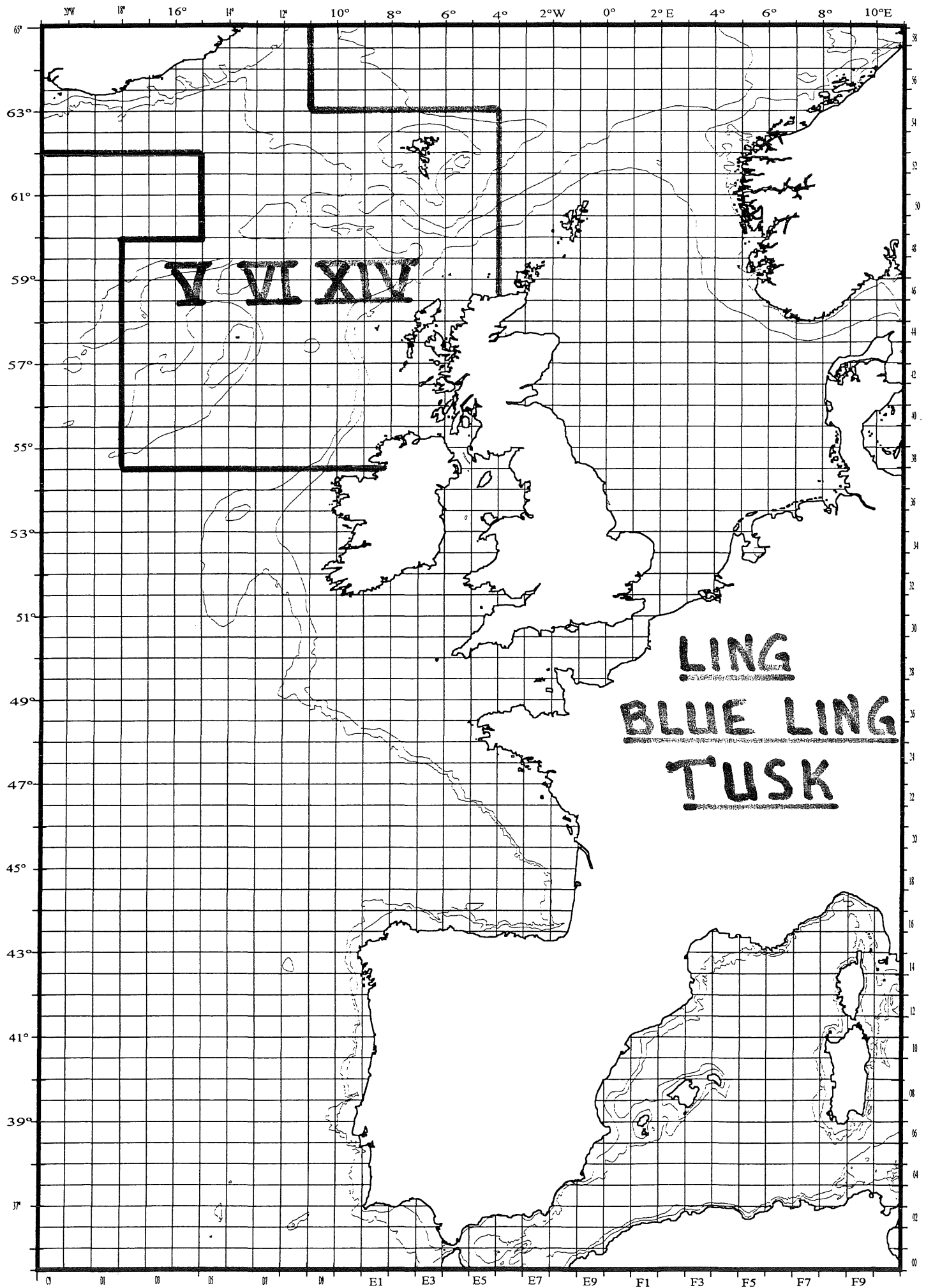


Figure 4.9 Stock management area for ling, blue ling and tusk in the western area

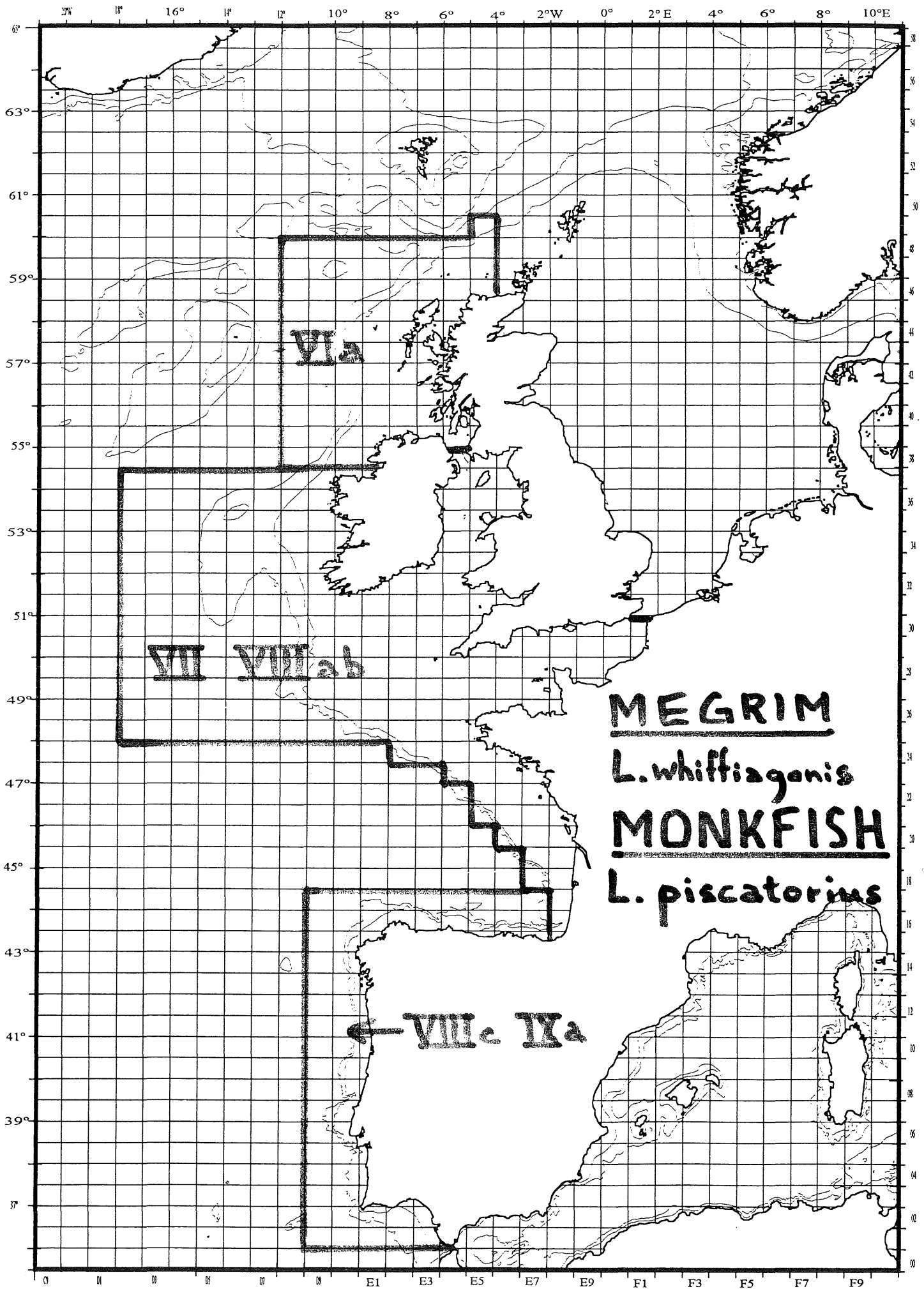


Figure 4.10 Stock management areas for megrim (*L. whiffiagonis*) and monk (*L. Piscatorius*) in the western and southern areas

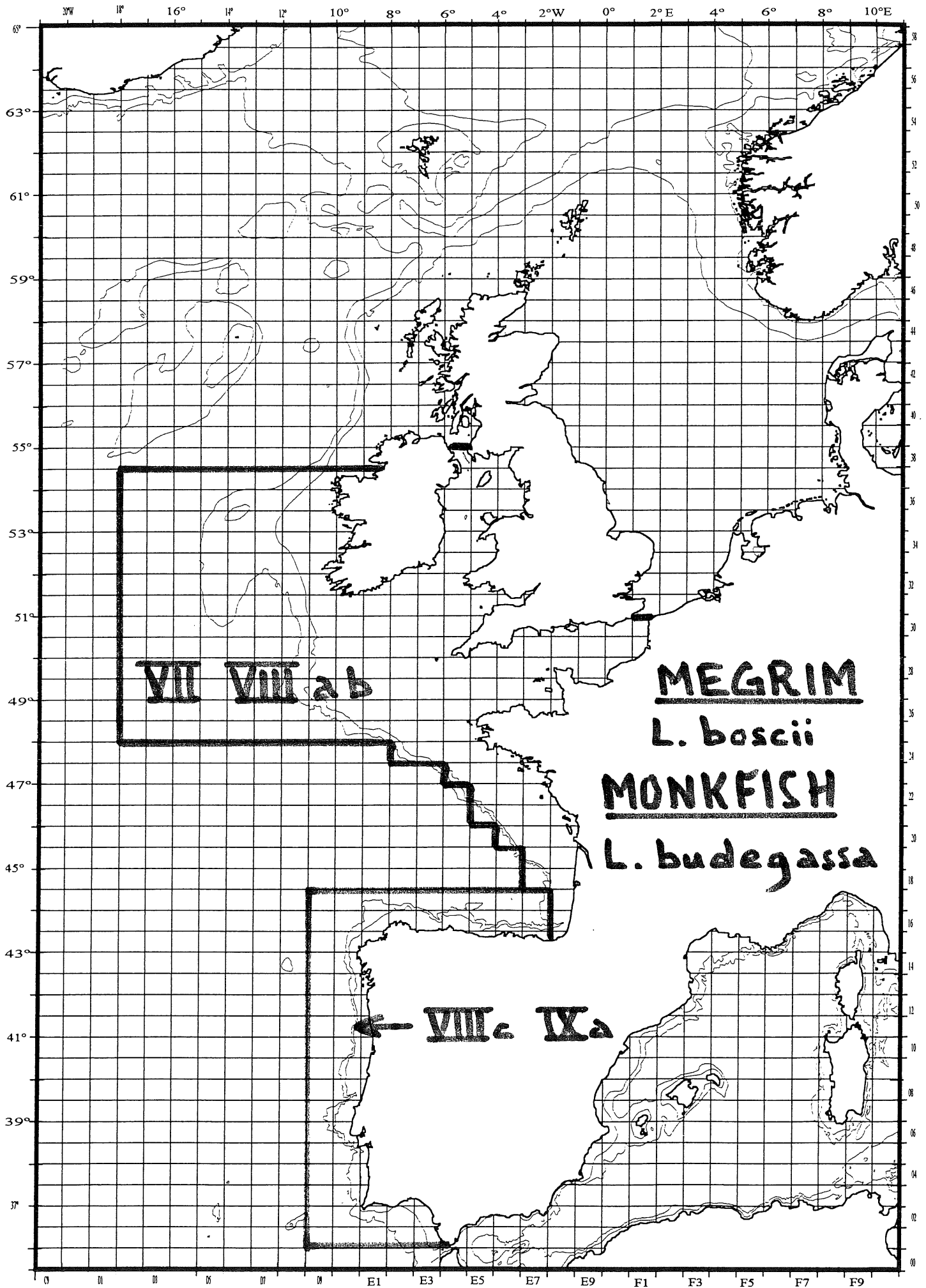


Figure 4.11 Stock management areas for megrim (*L.boscii*) and monk (*L.budegassa*) in the western and southern areas

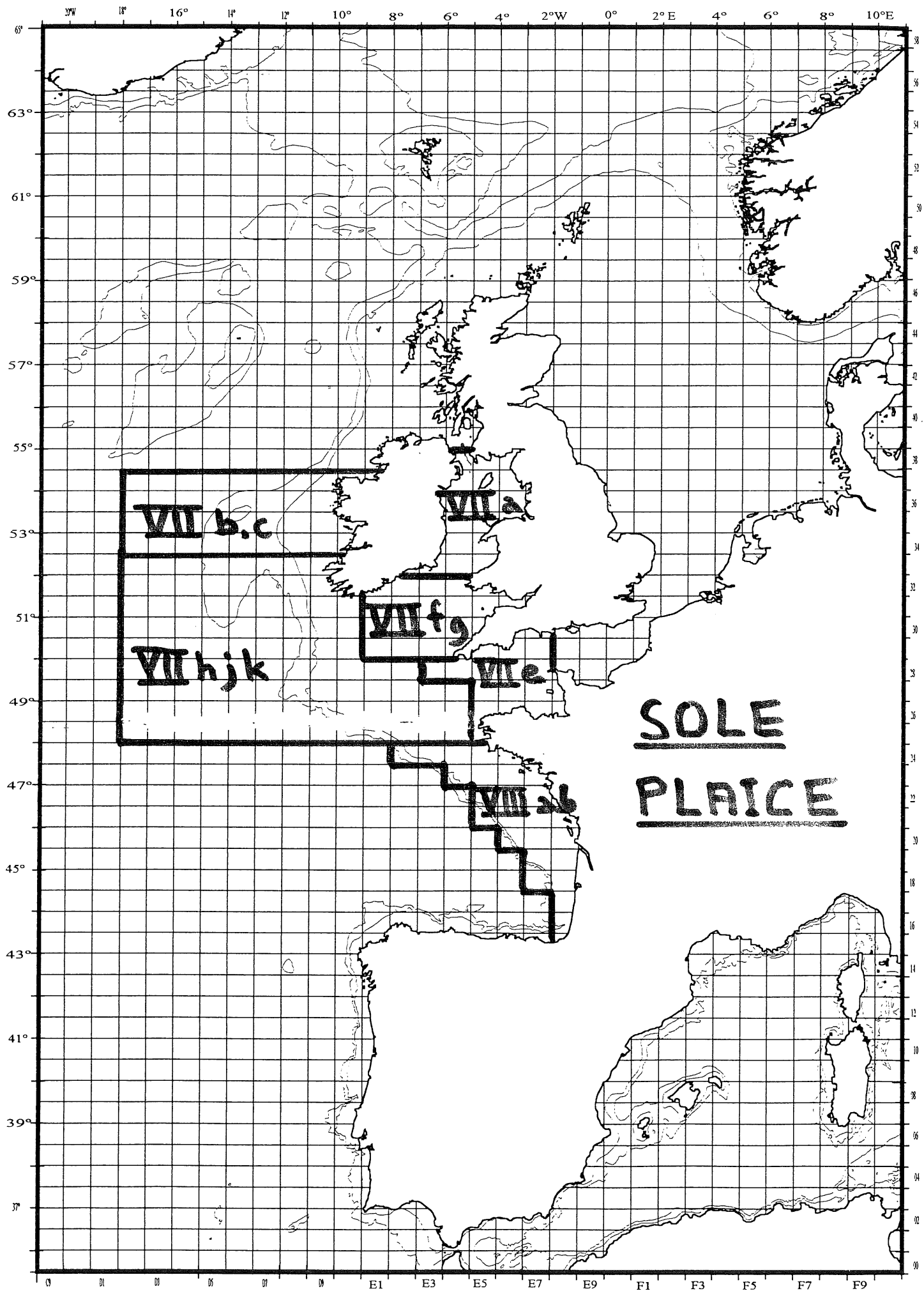


Figure 4.12 Stock management areas for sole and plaice in the western and southern areas

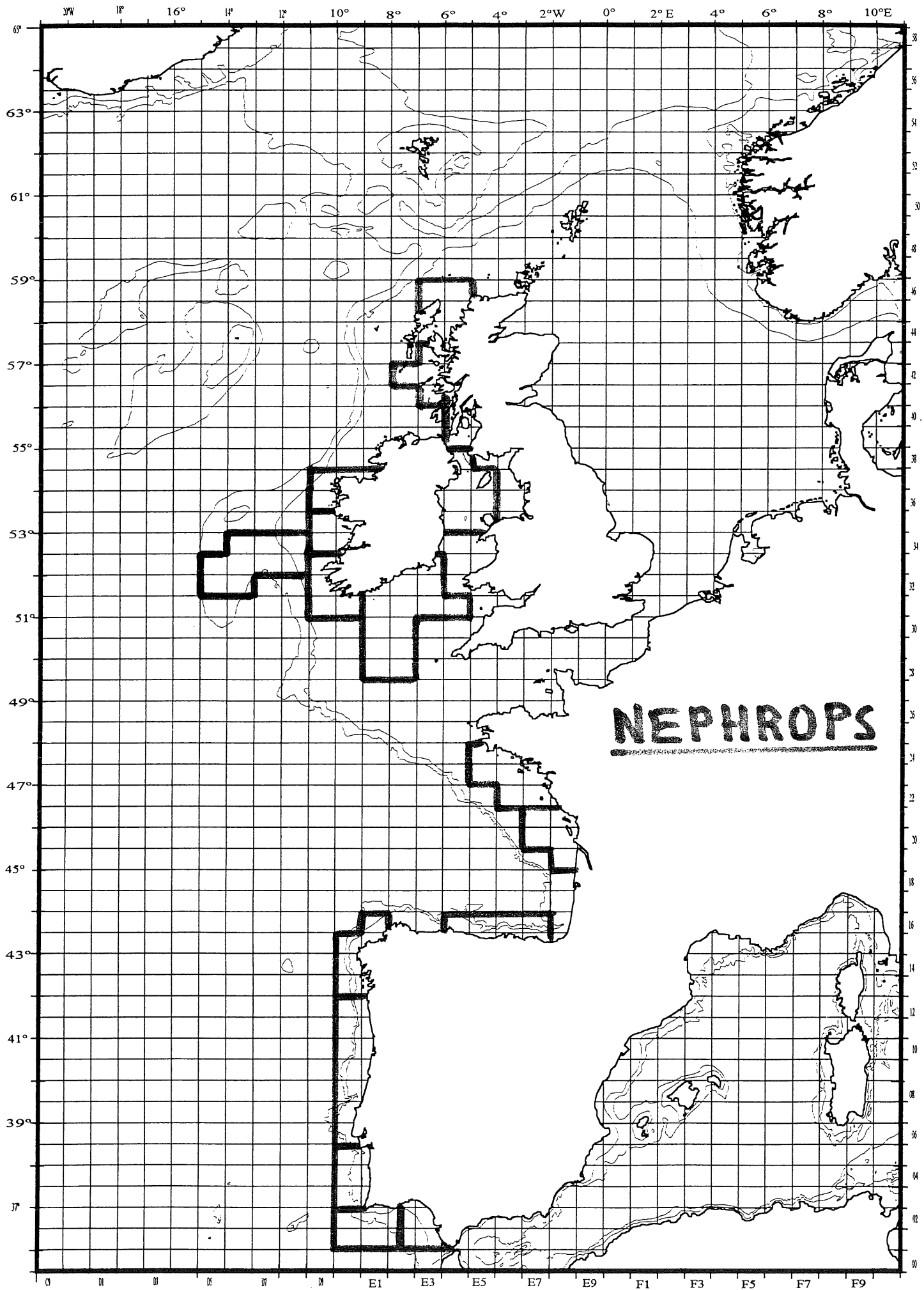


Figure 4.13 Stock management areas for *Nephrops* in the western and southern areas

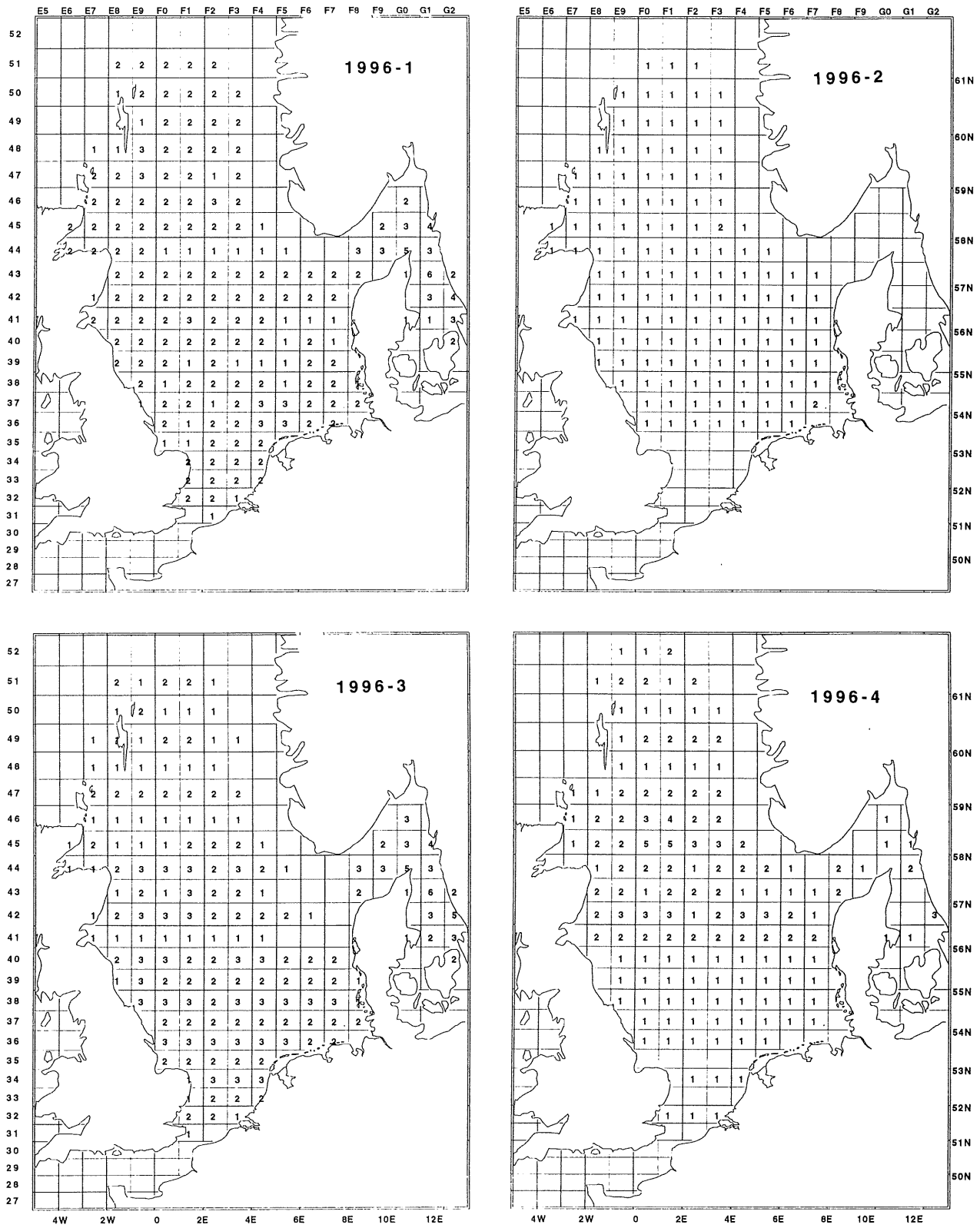


Figure 6.1 Number of hauls per ICES rectangle during the quarterly IBTS in 1996

APPENDIX I

IBTS CLEAR TOW DATA

Required information:

- Country
- Year
- Shoot position
- Haul position
- Accuracy
- Rectangle
- Gear
- Source of positional information

Country: code as per standard 3 letter code (ICES exchange format)

Year: full format e.g. 1992

Shoot position: degrees decimal minutes if possible please

Haul position: idem

Accuracy: accuracy to which position data was recorded as decimal places, e.g.:

50 35.25	=	accuracy code 2
50 35.3	=	accuracy code 1
50 35	=	accuracy code 0 (data this coarse is not really any use)

Rectangle: ICES rectangle

Gear: as per code below

Description	Options
Gear type (3 characters)	GOV
Sweep length (metres)	60/110
Groundrope type (standard or bobbins)	S/B

Source of positional information:

DECCA, GPS, D-GPS

Acceptable file formats are:

Format	Extension
Excel	.XLS
Lotus 1-2-3	.WK?
Dbase3	.DBF
Comma separated	.CSV

The data should be exchanged on high or double density 3.5" disks or by e-mail.

APPENDIX II

IBTSCHK-program

In this pre-release of the IBTS checking program, you will have to do the following:

1. create a directory to run the program

MKDIR IBTS96

2. copy all files from the diskette to this directory

COPY A:*. * IBTS96

3. change your working directory to the directory of the checking-program:

CD IBTS96

(in this pre-release of the checking-program, it is necessary that you execute the checking program in the directory, where it is!)

4. edit the parameter-file

CARD-RD

it gives the year, country etc. for the checking program. (The name of the file has to be CARD-RD !!)

5. checking can now be executed with

IBTSCHK DEN96Q1.TST

(where DEN96Q1.TST is the name of your exchange-format file - for test purposes we have left a small test file, DEN96Q1.TST, on the diskette)

6. after running the checking program - output will be in the file

PRNT-FIL

(an example of the output fil is in PRNT-FIL.TST - some further files LNGT-TEM,. are generated too - they are normally of now interes for the checking process!)

As you may see in the IBTS96.BAT file, a special program XM is used. It uses the extended memory of the PC, and it may not work on all machines. However, we have tested it on three different machines, a 386/25 PC, 486 and Pentium 90. It worked on all three machines.If you, however, have special memory setup's in CONFIG.SYS, there may be problems.

APPENDIX III

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