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International Council for the
Exploration of the Sea

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REPORT OF THE STUDY GROUP ON FISHERIES UNITS IN SUB-AREAS VII AND VIII

Nantes, France, 3-10 June 1992

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*General Secretary
ICES
Palægade 2-4
DK-1261 Copenhagen K
DENMARK

CONTENTS

1 INTRODUCTION	1
1.1 Terms of Reference	1
1.2 Participation	1
1.3 Overview	1
2 OBJECTIVES AND METHODS	3
2.1 Background	3
2.2 Procedures for data processing	5
2.3 Further needs	7
3 DATA PROCESSING	8
3.1 Hake (Northern stock)	8
3.2 Celtic Sea sole	10
3.3 Bay of Biscay sole	11
3.4 <i>Lophius piscatorius</i>	13
3.5 <i>Lophius budegassa</i>	15
3.6 Megrin	15
3.7 Celtic Sea cod	18
3.8 Celtic Sea whiting	19
3.9 Porcupine Bank <i>Nephrops</i>	20
3.10 Celtic Sea <i>Nephrops</i>	21
3.11 Bay of Biscay <i>Nephrops</i>	23
4 FISHING EFFORT	23
5 GENERAL EVALUATION	24
6 RECOMMENDATIONS	26
7 REFERENCES	27
TABLES 3 - 5.1	28
FIGURES 5.1 and 5.2	53
APPENDIX A. Specification of Data Files	55

I - INTRODUCTION

1.1. Terms of reference

At the 1991 ICES Meeting in La Rochelle, the Council decided (C. Res. 1991/2 : 7 : 22) that a Study Group on Fisheries Units in sub-areas VII and VIII (Chairman Dr. J. Casey, UK) will meet in Nantes, France, from 3-10 June 1992 to :

a) continue the development of fleet-based methods of assessment, with particular emphasis on short and medium-term predictions in transitory phases ; and

b) specify a database format for quarterly fleet-disaggregated data, which will provide the basis for assessments to be undertaken by the Working Group on the Assessment of Southern Shelf Demersal Stocks.

1.2. Participants

The following participants attended the meeting :

A. BISEAU	France
J. CASEY (Chairman)	UK
A. FOREST	France
R. GUICHET	France
I. MARTIN	Spain
M. MEIXIDE	Spain
B. MESNIL	France
I. PERONNET	France
V. TRUJILLO	Spain
S. WARNES	UK

1.3 Chairman's Overview

The recommendations made in last years' Report of the Working Group on Fisheries Units in sub-areas VII and VIII (Anon., 1991a), have formed the basis for the approach this Study Group has taken. The general rationale for this approach is outlined in Section 2 of this report.

Specifically, the Group has evaluated the database structure defined at last years' meeting, by working through all the procedures necessary to construct the database files. This has involved investigating technical, practical and logistic problems relating to the availability, processing and storage of data. Members were asked to provide seasonal data, by species and fishery unit for their national fleets, for the years 1986-1991 inclusive. These were to be presented to the Group in the file formats given in Appendix B of last years' report. In practice, it proved impossible to produce these data for the whole of the time period specified, which in itself is an important finding, thereby highlighting the immense difficulties in obtaining historic data at the level of disaggregation required when detailed data have not been preserved. Nevertheless, for each species considered, a representative amount of seasonal data was available for at least one year. A decision was made therefore, to process one years' worth of data for each species, in order to evaluate the following:

i. The data available in terms of landings and discards by Country, fishery unit and species. In addition, the Group has tried to highlight missing data, and indicate whether the absence of such information is likely to be a serious omission from the database.

ii. The practical details associated with creation, manipulation and storage of the various files required. The main aim of this exercise was to document the storage space required for the various file types, but it also served to illustrate the practical difficulties in handling large numbers of data files and the time that such an operation demands.

These evaluations are documented on a species by species basis in Section 3 of the report. An overall summary is presented in Section 5. In general terms, the creation of all the datafiles in the required format was extremely time-consuming and confirmed the notion previously expressed by this Group, that all information of this type should be prepared well in advance of any future Assessment Working Group meeting. Bearing in mind that even though not all the potentially important data were available, at least four complete days' work were required to produce the final files for only one years' data. This is in addition to the considerable time already spent by Group members before the meeting. Despite the fact that the group had incomplete data sets with which to work, for nearly all species, the exercise carried out has proven to be extremely useful, and has indicated that even with complete data sets, the potential storage problems associated with such a large number of files are unlikely to be prohibitive.

In addition, in Section 5, a fully revised list of fishery units and species is given, in accordance with the recommendations made in last year's Report of the Working

Group on Fisheries Units in Sub-areas VII and VIII (Anon., 1991a). A revised data file specification using the new species and unit definitions is given in Appendix A.

Since no assessment was to be carried out this year, no additional information on fleet activities have been documented in the report. However, since fishing effort will ultimately be considered in any future technical interactions assessments, the Group felt that some comment on quality and availability of fishing effort data was necessary. This is presented in section 4.

2. OBJECTIVES AND METHODS.

2.1. Background.

Initially, the Working Group on Fisheries Units in Sub-Areas VII and VIII was created with the objective of carrying out fisheries-oriented evaluations of the regulatory measures applicable to the mixed fisheries in the Celtic Sea and Bay of Biscay. One of its first tasks was to partition the fishing activities on the basis of gear type, area and depth, and to assemble data accordingly.

Since catch at age data were available for a small number of years and species, and are not routinely obtainable for some important species such as hake and *Nephrops*, the assessments were carried out using a multiple-fleet and multiple-species extension of the length-based Jones' model (Jones, 1981). This was particularly well suited to assessing the effects of changes in legal mesh or landing sizes. However, due to the steady-state assumptions of this model, only the immediate and the long-term effects could be indicated, but not the interim trajectories, although these were deemed to be of great importance for managers.

The next stage was to design and use the hybrid age/length model (Mesnil and Shepherd, 1991). In this model, the population numbers for each stock, and the fishing mortalities for each stock by fishery unit are primarily defined by age, so that they can be estimated by VPA. Furthermore, for each stock, the fishing mortalities at age are partitioned into fishing mortalities at length, using the current catch at length compositions within each age group and fishery unit as the key. In this way, discarding and gear selectivity ogives can be applied to fishing mortalities at length to assess the effects of changes in landing sizes and mesh sizes. The predicted catches for various options of mesh size, landing size and effort in each fishery unit are computed by summing up the contribution of each length class for each age, species and fishery unit.

In order to make use of the database assembled for length-based assessments, which consisted of averaged catches at length, these were converted to average age compositions and pseudo-cohort analyses were carried out to estimate the average population numbers and fishing mortalities at age. The simulated management regimes were thus evaluated for average conditions of the stocks and fisheries. If similar evaluations using current estimates of population numbers and fishing mortalities are required, a time series of catches at age and length by unit must be assembled so that conventional VPA can be used to estimate the starting parameters.

One of the main assumptions in the "métier" oriented models currently in use for the assessment of technical interactions, including the length-based and hybrid models, is that whenever effort multipliers are applied to a fishery unit, the reference fishing mortalities at age for all species caught by that unit, are effectively multiplied by the same rate. In many instances, however, the age and species compositions in the catch of a unit significantly differ from one season to another, and fleets in a fishery unit do not distribute their effort evenly throughout the year. Thus, species interactions indicated in annual catch data may in fact take place in some seasons only, and the application of annual effort factors may misrepresent the mixed-fisheries effects and by-catch problems. The assumptions regarding fishing mortality changes across species are more likely to be valid if a seasonal disaggregation of the model's parameters is considered. Since length and age compositions are compiled on a quarterly basis in most countries, the quarter is the most practical unit of time to consider. As a consequence, it is required that databases of quarterly catch data be assembled and maintained.

A seasonal disaggregation would also be advantageous in cases where numerical methods are required to convert length compositions to age compositions. In one way or another, these methods depend on the recognition of modes in the length distributions and these tend to be obscured when annual data are used, due to the growth within the year. This also increases the overlap in the length distributions of adjacent age groups, causing most methods to fail.

Even though software for tuning quarterly VPA's is not yet available, the provision of quarterly catch and effort data may improve the tuning with the current methods. Presently, the tuning data for each fleet include a single effort figure for each year, which is supposed to apply to all ages. In fact, as mentioned previously, fleets may target different fractions of the stocks (eg, spawners vs. juveniles) in different seasons, so that the various age groups are not exposed to the same amount of effort throughout the year. The cpue's obtained by dividing catches at age by a single annual effort figure may thus give biased estimates of population numbers and catchabilities at age. To some extent, tuning might be improved by sub-dividing each fleet's set of cpue data separately by quarter (i.e., treating each fleet/quarter

combination as an independent "fleet"), and taking into account only the most relevant age groups in each quarter.

Altogether, these considerations led to the database specifications given in Appendix B of last year's report of the Working Group (Anon., 1991a), and repeated with minor amendments in Appendix A of this report. In summary, the data for each species, country, fishery unit, year and quarter are assembled in four files. File type 1 contains the length compositions of the landings and of the discards and, when relevant (eg, megrim and sole), the sex ratios at length. The landings and discards weights and the corresponding effort in appropriate units are also given in that file, together with the parameters of the length-weight relationship (for SOP checks), the total numbers caught and the mesh size in use in the unit. File type 2 contains the age-length key but may be missing, in which case the ALK for the most similar country, unit or quarter has to be used. File type 3 is derived when the ALK is applied to the length composition data. For the specific requirements of the hybrid model, it contains the catches in number at each length for each age, but the catches and landing ratios at age are also given for use in conventional age assessments. Since assessments of mixed-fisheries make more sense when values are considered, landing prices at length are provided in file type 4. To facilitate the manipulation of these files by either specific computer programs or commercial software (editors, spreadsheets or database packages), the length and age ranges in which data must be provided is fixed for each stock.

It remained to be verified, however, whether these specifications were feasible in practice, in terms of number and volume of files, data flow, software, etc. and this has been the primary task of the Study Group during this meeting. It was expected that data for past years back to 1986 would be provided, but this was impossible for many stocks. This is further proof that detailed data should not be aggregated too early, otherwise the cost of recovering them is excessive, and that some anticipation of future data needs is required in order to have operational databases available in good time. However, it should be pointed out that these difficulties of extracting earlier data are a different problem than those we are concerned with in the current evaluation; it is expected that the preservation of disaggregated data in future should not be as problematic if people are now aware that this will be required routinely. Eventually, the feasibility tests were carried out on an experimental basis using 1991 data, with the exception of hake for which age compositions were only obtainable for 1990.

2.2 Procedures for data processing.

In principle, the four basic data files should be provided for each stock, fishery unit, country, year and quarter. A first procedure (S78CHK) is used to check the validity and consistency of each data set. It checks in particular, that the codes for species, year and quarter given in the files'

headings are correct, and that the length and age limits are mutually consistent and comply with the standards decided for each stock. It also verifies that the catch numbers are given in thousands and the catch weights in tonnes as recommended. Some exceptions are accepted to allow for missing data: the ALK in file type 2 can be copied from another country, fishery unit or quarter (but not species or year), and the prices in file type 4 can be taken from another unit or quarter, or from another country in which case it is recommended that they are first converted to ECU.

The length composition data and catch weights can be further checked for sum-of-products consistency using the procedure S78SOP. This may also be used to raise the catch-at-length compositions to the catch weights of countries or units for which no sample is available. When the catch data include discards, these are raised independently by the appropriate factor.

Usually, when an ALK is missing in the basic data set, the age and length distribution in file type 3 would also be missing. The procedure S78ALK can be used to generate these data, applying an appropriate ALK. In addition to the calculated ALD, the program computes the catch numbers and landings ratios at age, and also the mean weights at age in the landings and in the discards in case these might be needed.

When the data sets are complete, the next stage is to consolidate the data for all relevant countries in a unit for each stock, year and quarter. This is accomplished by the procedure S78UNIT, the main task of which is to sum the ALD files among countries. However, it also needs to access the individual length composition files in order to calculate weighted average international landing ratios at length. In addition, international length-weight parameters are computed by regression from the series of weighted average mean weights at length; the reason is that different countries may use their own set of parameters. Similarly, the individual price files must be accessed in order to calculate weighted average landing prices at length; the national prices are converted to ECU when this was not done beforehand. If any of these files is missing or still has invalid data or parameters, the country in question is excluded from the sum, and this is recorded in the output file.

Results are written to a type 5 file, starting with a heading section similar in structure to that of the ALD file type 3. The records for each length in the standard range for the stock read as follows: size, catches in number at length from first to last standard age, mean landing ratio, international price, mean weight.

These are followed by:

Catch numbers from first to last age, sum of catches in number;

Landing ratios from first to last age;

Landings weight, discards weight, landings value, total effort (to use if consistent units only);

International factor and exponent of the length-weight relationship;

A list of all countries included in those sums, with a reminder of the mesh size in use and of the effort figure provided in the first effort record at the bottom of file 1;

A list of countries excluded because of invalid or incompatible data in any of the files.

It can be argued that those results should rather be written to three individual files having the structure and data contents of file types 1, 3 and 4 respectively, with "AA" (for all countries) as country code in their name. This is certainly feasible but difficulties are anticipated if SOP corrections to account for total international catches are applied to the length composition data, for example, without being applied to the ALD file and to the total landed value in file type 4 as well. It would be safer to make such corrections consistently throughout file type 5 with an appropriate program, which is not available at the moment. A minor drawback, however, is that the program S78UNIT has to be run on the basic data set even if a single country is involved in a unit and quarter.

2.3 Further needs.

The data flow described above was designed under the assumption that each country might want to preserve the ability to use its own age-length keys, possibly by fishery unit, and would produce specific ALDs which would then be summed up with those of other countries for any given unit. For several species, however, this does not seem to occur in practice. Rather, a single ALK is often used for several units, and some species are poorly sampled for age in some countries or not sampled at all. In addition, quarterly ALKs happen to be based on small sample sizes at some lengths, and ageing material may even be missing for some classes. In that case, a more reliable ALK can be obtained by pooling the national ALKs in the same quarter, preferably on a fishery unit basis if relevant data exist. An alternative procedure would then consist in first summing up the length compositions (without forgetting to also work up the price files), then applying the pooled ALK to generate the international ALD. A practical advantage would be the reduction in the number of files, since national type 3 files (ALD's) would not be required. It is not suggested, however, that this should replace the current procedures, but rather that the choice should be given depending on the circumstances.

In principle, file type 5 data are the basic element constituting the database of quarterly and fishery unit disaggregated catch data by stock. Given the international fishing mortalities at age in a quarter estimated by a quarterly VPA, these can be split by fishery unit for input to age-based technical interaction models and, further, by length and age in a unit, as needed by the hybrid model. The main requirement now would be a software to manage a time series of such files, but the choice of this is not clear yet. One option is to use purpose made programs, but these are inevitably rather tedious to use and more so to write down. Otherwise, there are certainly commercial packages capable of achieving the task efficiently, but it seems unlikely that any single product can be imposed on the various countries and laboratories involved in this project. As far as ICES is concerned, it should be verified whether the data format and volume are compatible with the SAS software adopted by the Secretariat.

Whichever choice is made, procedures will be needed to aggregate the units' data for each quarter, and possibly each year, and for deriving the reference fishing mortalities by unit and length at age for catch predictions on the basis of the data for an appropriate range of years.

With respect to the hybrid model, the software to handle quarterly disaggregated parameters is not yet ready, but this should not be too difficult since the need has been anticipated. Nothing has been done for this meeting with regard to this, because no time series database or proven methods of tuning quarterly VPA are available yet. Also, the memory requirements of a quarterly hybrid model are beyond the capacities of computers currently available to most members of the Group, especially if prices are given by length class rather than age group as of now.

DATA PROCESSING

3.1. Hake (Northern stock).

Data available.

Length composition data were available for all quarters of 1990 and 1991 from France in units 3, 4, 5, 8, 9, 10, 13, 16 and 17, from Spain in units 1, 4, 12 and 14, and from the UK (England and Wales) in units 3, 5 and 6 (Table 3.1.1). Prices at length by quarter were also available for the same countries and units, except for EW unit 6. In addition, landings weights by quarter were provided by the UK (England

and Wales only) for units 1, 2, 4 and 16 (including Division VIIa and d).

Weights and length compositions of discards are provided by France only, for fishery units 9, 10 and 17 in the Bay of Biscay. The data are estimated by comparing the length compositions sampled on the markets with those obtained during quarterly surveys on the grounds fished by those units, using the same gear type and mesh size as the commercial trawlers. It is assumed that no discarding takes place in Spanish fisheries.

The ALK's for hake must still be set up using numerical methods, preferably that of Kimura and Chikuni (1987), which provides specific ALK's for different years by reference to the length composition of the catch in each year. Since length composition data for a significant part of the catch in 1991 were not available before the meeting, no key could be computed for that year. An iterated annual age-length key derived from the total international catch composition data provided to last year's meeting of the Hake Working Group was computed for 1990. The modal lengths at age used to set up this key are based on revised growth parameters ($L_{inf} = 117.2$, $K = 0.084$, $t_0 = -0.91$) estimated from French quarterly data since 1983, with reference to conventional rather than absolute age. Being the only set which could be converted to age compositions, data for 1990 were used for the present evaluation.

Estimates of quarterly catch weights by country and unit used by the Group are given in Table 3.1.2. The rules for deriving missing data were basically the same as those given in last year's report, keeping in mind that unit 7 is now merged with unit 4 (Table 3.1.3).

For the EW, landings by unit 1 in 1990 were negligible and not taken into account, but it should be noted that they are significant in 1991 and would require the derivation of a complete set of files. Length compositions for EW unit 2 and unit 4 in each quarter were derived from Spanish samples for longliners in unit 1 and for trawlers in unit 4 respectively, in the corresponding quarter. Spanish prices were also used for these units. Prices for EW unit 6 were taken from EW unit 5 in each quarter.

Length compositions of the landings by France in unit 8 are based on samples from French unit 5; no discards estimates are available for unit 8.

Annual official landings by Belgian vessels (assumed to be in unit 6) were available by division in last year's report, but these are relatively small and no attempt was made to partition them by quarter. Last year, Irish length compositions in units 3, 4, 5 and 16 were tentatively derived from EW samples and quarterly proportions of EW landings in the corresponding units, but this was not repeated this year.

The major difficulties were encountered with unit 16 for which the only quarterly data available are French length compositions and catch weights from England and Wales (including VIIa and d). A large part of the catch by this unit is taken in Sub-areas IV and VI, and also in recent years in Division IIIa, but relevant data are not available especially with the quarterly resolution required here. Official landings for these areas and Division VIIa are not given in last years'

report and are incomplete in the report of the Hake Working Group. It was thus decided to raise the French unit 16 samples to the quarterly catch figures estimated last year for the whole unit, although these will certainly need to be revised and updated. The French prices at length were used for this unit.

Practical aspects.

At the lowest level of disaggregation, i.e. by country, unit and quarter, the set of input data used for the present evaluation consisted of 76 length composition files (195.7 kbytes), a single annual ALK file (9.4 kbytes) and 76 prices files (178.3 kbytes). Application of the ALK resulted in 76 age/length composition files occupying hardly more than 1 Mbyte. As mentioned earlier, these numbers may vary somewhat (eg, inclusion of EW unit 1 in 1991, or provision of quarterly ALKs in future) depending on the year of interest. Obviously, the age/length composition files (type 3) may pose problems for archiving on floppies if more countries provide original data.

Since there are 14 fishery units catching hake, the aggregation of countries' data into units results in 56 type 5 files, with a total size of 913.2 kbytes, which should remain rather stable from year to year.

3.2 Celtic Sea Sole

Data available

Data availability for 1991, by quarter and fishery unit, are shown in Table 3.2.1. The landings to which these data were applied are shown in Table 3.2.2. Four fishery units (units 3,4,5,6) prosecuted this fishery in 1991, with sole taken as a by-catch in unit 8.

Quarterly age-length keys were available for England and Wales' landings from Unit 5 and 6 combined. Quarterly length distributions and prices were available for England and Wales' landings from Units 5 and 6. Quarterly prices, all units combined were available for French landings. No data were available for landings by Ireland.

The derivations of length distributions for landings where none were available are shown in Table 3.2.3. Unit 4 length distributions were derived from landings by England and Wales Unit 6 vessels fishing in medium to deep water. No attempt was made to derive length distributions and numbers at age for landings from unit 8 (50 tonnes).

No discard data were available from any country, so the final fishery unit length and age compositions are based on landings

only. Although no discard data are available for Celtic Sea sole, the Group considers that some fishing mortality is unaccounted for, if landings information only is used. This species is subjected to a TAC involving rigid enforcement of national quota regulations, which may prevent the landing of sole at certain times. Catches taken when such regulations are in force may be discarded at sea or landed illegally. In either case, the absence of data means that some fishing mortality, which at times may be significant, can not be accounted for. In addition, the length composition data available for landings invariably only include fish above the legal minimum landing size, and at present the Group has no information on catches of smaller individuals.

Practical aspects

The set of 1991 input data used for the present evaluation consisted of 27 length files (49 kbytes), 27 price files (16 kbytes) and 4 age-length keys (5 kbytes). Applying the age-length keys resulted in 27 age-length distribution files (142 kbytes). Most of the fishing mortality on sole can be accounted for by 4 fishery units which results in 16 unit files (file-type 5), with a total size of 103 kbytes. It is possible that a further significant source of fishing mortality on sole could be unit 8, although in the present evaluation, no account has been taken of this.

It seems that the archiving of basic datafiles and consolidated unit files for Celtic Sea sole is unlikely to be a problem even if in future, data which were missing from the current evaluation are provided.

3.3. Biscay sole

Data Available

Data for 1991 catches have been used for the present evaluation. Their availability is shown in Table 3.3.1.

Previously, landings of inshore trawlers, shrimp trawlers and gillnetters for sole were combined in fishery unit 15. In accordance with the decision taken at the last year meeting of the Group, disaggregated data for these métiers were provided for 1991 and they are now included in fishery units 17 (inshore trawlers), 18 (shrimp trawlers) and 19 (gillnetters for sole).

Quarterly catch estimates for 1991 by country and fishery unit as used by the Study Group are given in Table 3.3.2. Some French trawlers have landed their catches to Spain ; these landings have been taken into account in French landings of sole in Fishery unit 10 ; they amount for less than 6 % of the total landings in this unit.

Quarterly length compositions of Biscay sole landings for 1991 were provided by France for fishery units 10, 17, 18 and 19. Landings from unit 11 (Beam trawlers) were not sampled and length compositions for this unit were derived using unit 10 data.

Information on discards based on survey data were available on a quarterly basis for sole caught by French trawlers in 1991 in fishery unit 10, and were also used to derive discard length compositions for units 11 and 17. This method could lead to an underestimate of discards for unit 17.

Discards in the shrimp fishery (F.U. 18) are not available each year on a quarterly basis. For this fishery unit, all data available from previous years were combined in order to produce an estimate of the catch length compositions by quarter. It is important to note that since 1984, this fishery has decreased and its contribution to the total landings is now less than 1 % in weight. No discarding of sole occurred in the gillnet fishery (F.U. 19).

Combined sex length-weight relationships were available for each quarter from sampling for fishery unit 10.

Quarterly age length key (ALK's) were provided by sex based on samples from fishery unit 10. For each sex, a fixed number of otoliths was sampled at length. Such a sampling scheme permits other studies which involve taking into account differences in life-histories between males and females. However, if these ALK's are directly combined, the resulting ALK will not reflect the actual sex ratio in the catches and therefore will be biased. In order to construct unbiased ALK's for combined sexes, the ALK's for each sex were weighted by the sex ratio at length in the quarterly catches from unit 10.

The same ALK's were used to obtain the length at age distribution (ALD's) in landings and discards for unit 10, 11, 17 and 19. In fishery unit 10, the bulk of the catches consists of very small fish, and age length keys were obtained by modal analysis of the catches distributions using the programme NORMSEP.

Prices at length in ECU were obtained for unit 10, 17, 18 and 19. No Belgian estimate was available and EW prices in fishery unit 6 were applied to unit 11.

Practical aspects

Using available software provided by the Group, a database has been created, using 1991 catch estimates, which includes on a quarterly basis by fishery unit and country, length compositions of landings and discards, prices at length, age length keys and length distributions at age. Standard files have been created, consisting of 19 length files (46 kbytes), 19 price files (38 kbytes), 8 ALK files (24 kbytes). Applying the ALK files to the length distributions gave 19 ALD files (115 kbytes). In total, 19 unit files were created occupying 140 kbytes (Table 5.1).

3.4. *L. piscatorius*

Data available.

Data availability for *L. piscatorius* for 1991 is shown in Table 3.4.1. It is important to remember that, in most fisheries, landings of anglerfish are not separated by species, and landings' weights are derived from length measurements when available

For fishery units 1, 2, 3, 10 and 12, total landings for EW were available only for both species combined. These amounted to 469 tonnes (450 from fishery unit 3), and accounted for only 2% of the total international landings of both species, and have not been included in the data processing.

No landings data from Belgium were available to the Group, but landings of both species combined in 1990, were reported as only 320 tonnes.

No discard data were provided by any country. Although no quantitative estimates are available, discarding is believed to be small in most fisheries, since there is no EC minimum size regulation, and only the smallest individuals are likely to be discarded.

At the time of the meeting, quarterly length distributions of the landings were available as follows:

- France: Units 4, 5, 8, 9, 10 and 14, for 1990 and 1991.
- Spain: Units 4 and 14, from 1988 to 1991.
- EW: Units 5 and 6, from 1988 to 1991.
- Ireland: Unit 4 in 1991.

After considering the data available at the time of the meeting, the Group decided to carry out an evaluation using 1991 data.

Estimated total catches of *L. piscatorius* in 1991 by fishery unit, country and quarter are shown in Table 3.4.2.

Quarterly prices were available for the following fishery units:

- Fishery Unit 4: France and Spain.
- Fishery Unit 5: England + Wales and France
- Fishery Unit 6: England + Wales
- Fishery Units 8, 9 and 10: France
- Fishery Unit 14: Spain and France

Quarterly age-length keys were only provided by France, principally based on unit 4 samples.

For fishery unit 4, only combined quarterly landings of both species for EW vessels were available. Since most of these landings are directly to Spain, length compositions were derived using Spanish sample data for the same unit. Landings of EW vessels from unit 5 during the first quarter were available as combined landings of both species. Separation of the landings into length distributions by species were derived from French data for the same unit and quarter. Spanish prices were assumed for EW landings from Fishery Unit 4. Irish prices were assumed to be Irish punt equivalents of the EW unit 5 sterling prices, and a conversion factor of 1.46 ECU = IR 1, was used to obtain the equivalent prices in ECU.

Quarterly age-length keys based on French samples were applied to all fisheries units and countries.

Practical aspects

The total number of files of each type and their size is shown in Table 5.1. In total there are 176 files were created for *L. piscatorius*, which occupy 1.161 kbytes.

3.5. L. budegassa

Data available.

The availability of data for this species was the same as for *L. piscatorius* and are shown in Table 3.4.1. and commented on in section 3.4.

Estimated catches by fishery unit are shown in Table 3.5.1. and include only those units for which species separation was possible.

The derivation of length and age compositions was the same as that carried out for *L. piscatorius* and is described in section 3.4.

Practical aspects.

The total number of files of each type and their size is shown in Table 5.1. In total there are 176 files for *L. budegassa*, which occupy 818 kbytes.

3.6. Megrim

Data available

Data used for this evaluation relate to 1991 catches and are summarised in Tables 3.6.1 and 3.6.2.

Length compositions of landings and discards by quarter for sexes combined were available from :

- France : units 4, 5, 8, 9, 14
- Spain : units 4,14 ((no discarding assumed for units 9 and 14))
- England and wales: unit 6 (landings only)
- Ireland units 4,5 (landings only in unit 4)

Age length keys for sexes combined were available by quarter and country as follows :

- unit 4 for France and Spain
- unit 6 for England and Wales
- unit 14 for Spain

An annual ALK was provided by Ireland, based on unit 5 catches, but was not used.

Landings in weight by quarter were available from England and Wales for units 4 and 5.

Quarterly prices by fishery unit were available from England, France and Spain.

For French fleets an estimate of fish discarded in the Bay of Biscay and Celtic sea fisheries was carried out in 1991. The aim of this study is to obtain length and age compositions of discards by quarter and fishery unit. Independent data were therefore available for each fishery unit.

For Spanish catches length compositions of discards were available for unit 4, derived from a study carried out in 1988-89. The vessels in unit 14 are assumed to discard no megrim. For Irish catches length compositions of discards were available for unit 5 but no information on the year or the method of sampling. were provided. No information was available on discards for Irish catches in unit 4. For England and Wales no discards information was available for any fishery unit.

The absence of discards information is likely to be a significant problem for assessments for this species, especially those involving technical interactions.

Estimates for missing catch length compositions were derived using length compositions of other countries' samples (Table 3.6.3) :

- For England and Wales the Spanish length compositions of landings and discards were used to estimate the catch compositions in fishery unit 4 and the French length compositions were used for unit 5.
- The length compositions of Irish discards were not available, for unit 4, and were derived using French data for unit 4. Irish landings prices for all units

were assumed to be the same as those for England and Wales in the corresponding units and quarter.

Data Problems

When it recommended last year, that age-based assessments of megrim might be carried out on sexes combined, the Group worked on the principle that the age-length keys should reflect the sexual dimorphism in growth and the sex-ratios in the population. One problem was overlooked, however, which is related to the sampling methods used in some countries.

In Spain and in England and Wales, length compositions are measured by sex but a fixed number of otoliths is taken at each length without preliminary separation by sex (i.e., samples for age are random with respect to sex). In France, however, the whole sampling for length and age compositions is carried out for males and females separately, and each sex's ALK is based on a fixed number of otoliths for each length group. For conventional assessments, such as carried out by the Hake Working Group, this procedure is correct since age compositions are first obtained for each sex then summed and used for input into a combined sex VPA. A problem occurs however when we wish to merge the separate ALKs into a single key which can be applied to the summed length compositions of both sexes, since such a key will be biased.

A possible solution to construct an unbiased ALK is to weight the numbers of otoliths for each sex at each length and age by the sex-ratio at that length. A further difficulty with megrim is that the sex-ratios at length differ significantly by area and depth, and therefore by fishery unit. This means that ALKs must be recombined for each unit in accordance with the specific sex-ratios at length in its catches. This is possible in principle but could not be done during this meeting. Instead since the majority of samples come from unit 4, combined ALKs by quarter were reconstructed on the basis of sex-ratios in that unit and were applied to French data in other units as well.

Whether this procedure should be abandoned or continued remains a difficult question and should be investigated and quantified using actual sample data. A disadvantage of the random sampling procedure is that it should be done on a fishery unit basis, which is more costly than the current procedure. In addition, working on separate sexes appears safer if natural mortality for males is shown to be different to that for females, as assumed in previous assessments made by this Group. This would have some consequences with regard to the current database problem since the size of the megrim data set would be nearly doubled.

There are advantages, however, in having a standard procedure in all countries. It was realised during this meeting that ALKs for some countries may be based on very few otoliths at some lengths. In such cases, it may be preferable to use data from other countries to fill the gaps or, even, to sum up the

ALKs from different countries if they are based on compatible sampling schemes. The latter approach was used to derive international quarterly ALKs based on the Spanish, English and reconstructed French ALKs, which were applied to the length compositions of units 4 and 14 from Spain, and units 4 and 5 from Ireland and the UK.

Practical aspects

The basic data set resulted in 183 files (710 kbytes) for 1991 catches and consisted of 49 length compositions files (71.2 kbytes), 12 ALK files (20.3 kbytes) and 49 prices files (41.2 kbytes). After conversions to age compositions 49 age length compositions files (361.4 kbytes) were obtained. The aggregation of additional data into fishery unit results in 24 files occupying 216 kbytes (Table 5.1).

3.7 Celtic Sea Cod

Data available

Data availability for 1991, by quarter and fishery unit, are shown in Table 3.7.1. The landings to which these data were applied are shown in Table 3.7.2. Of the seven fishery units (numbers 1,2,3,4,5,6,8.) that prosecuted this fishery in 1991, four units take cod only as a by-catch.

Quarterly age-length keys, length distributions, and prices were available for French landings from Unit 5 and were applied to landings by French vessels from all units. The same ALK was used to derive age compositions for other countries' landings. Quarterly length distributions and prices were available for England and Wales' landings from units 3, 5 and 6 ; a length distribution was also available for quarter four for unit 4. It should be noted that the majority of landings by England and Wales vessels prosecuting unit 4 are landed outside the UK, resulting in difficulties in obtaining length measurements.

Spanish landings for cod in unit 4 were provided as gutted weight so a conversion factor of 1.25 was used to give these landings in whole weight. No data were available for landings by Belgium or Ireland.

The derivations of length distributions for landings where none were available are shown in Table 3.7.3.

No discard data were available from any country, so the final length and age compositions by fishery unit are based only on landed catches. The Group considers that the absence of discard information for celtic sea cod is potentially serious. Table 3.7.1 indicates that discarding is likely to be significant in all fishery units which exploit this stock. Even if the level of discarding in individual fishery units is not significant, the combined effect over all units could be a significant source of fishing mortality.

Practical aspects

The set of input data used for the present evaluation consisted of 40 length files (120 kbytes), 40 price files (40 kbytes) and 4 age-length keys (8 kbytes). Applying the age-length keys resulted in 28 age-length distribution files (380 kbytes). Most of the fishing mortality on cod can be accounted for by 7 fishery units which results in 28 unit files (file-type 5), with a total size of 329 kbytes.

It seems that the archiving of basic datafiles and consolidated unit files for cod is unlikely to be a problem in the future, even if data which were missing from the current evaluation are provided.

3.8. Celtic sea whiting

Data available.

The availability of data for 1991 whiting catches by quarter, is outlined in Table 3.8.1 and the quarterly landings as estimated by the Study Group are given in Table 3.8.2. This stock is prosecuted by four main fishery units; units 4,5,6 and 8, although it is essentially a by-catch species in all units. For some units, for example, for Belgium (unit 6) and Ireland (units 4 and 5), the group has no catch information although significant fishing mortality is believed to be exerted on this species by these fleets. With the exception of French catches in units 5 and 8, no estimates of discards are available. Discarding at sea is likely to significantly contribute to the fishing mortality on this species, particularly for the youngest age groups. In addition, whiting is often taken as an unwanted by-catch in some units, resulting in varying amounts of discards of fish of all sizes.

Although EW quarterly landings data for units 1 and 2 were provided, these were not taken into account in assembling age/length distributions, since no sample data were available and, in these units, landings account for only a small proportion of the overall landings from this stock. In addition, catches by these gears are likely to be restricted

to larger, older fish. Hence relatively few in number will be caught.

Spanish landings for whiting in unit 4 were provided as gutted weight. A conversion factor of 1.13 was used to give these landings whole weight.

Quarterly length compositions were available for French catches (landings and discards) from unit 5, discards only from unit 8, and for EW landings only from unit 5. The derivation of length compositions for other landings by fishery unit and country is given in Table 3.7.3. Discard estimates have only been taken into account for those units for which samples were provided.

Quarterly age length keys were provided based on French landings from unit 5, and discards from units 5 and 8. These were used as indicated in Table 3.8.3.

Prices at length were provided by fishery unit for French and England and Wales landings. Irish and Spanish landing prices were assumed to be the same as those for England and Wales.

Practical aspects

The set of input data used for the present evaluation consisted of 31 length files (62 kbytes), 31 price files (22 kbytes) and 12 age-length keys (16 kbytes). Applying the age-length keys resulted in 31 age-length distribution files (195 kbytes). Most of the fishing mortality on whiting can be accounted for by 5 fishery units which results in 20 unit files (file-type 5), with a total size of 160 kbytes.

It seems that the archiving of basic datafiles and consolidated unit files for whiting is unlikely to be a problem even if in future, data which were missing from the current evaluation are provided.

3.9. Porcupine bank Nephrops

Data available

Data available for 1991 *Nephrops* from Porcupine bank are given in Table 3.9.1 and international landings by quarter as estimated by the Study Group are given in Table 3.9.2. This stock is presented by unit 4 vessels only. This fishery relates to a different functional unit to that used by the *Nephrops* Working Group. Last year this group decided to abolish fishery unit 7, and include its landings with those of unit 4. With this new definition, this fishery unit is not equivalent to the functional unit used by the *Nephrops* Working

Group. Landings for the United Kingdom (England and Wales) and Ireland (for the 2nd and 3rd quarter) were provided for sexes combined and were split by sex using the sex ratio of Spanish landings (Table 3.9.2). No discards information were available for this fishery unit. Effort data in days fishing by quarter were submitted by Spain and the United Kingdom.

Quarterly length compositions for 1991 have been estimated for fishery unit 4. Derivation of length compositions for the United Kingdom (England and Wales) and Ireland (2nd and 3rd quarter) were obtained using the Spanish length compositions (Table 3.9.3.).

Since there is no direct method to age *Nephrops*, age compositions of landings for 1991 from unit 4 were estimated using the cohort slicing using the same L_{inf} and K used by the *Nephrops* Working Group. The value of t_0 did not appear in last years' report of that Working Group, so three different values were tried in order to obtain ranges of lengths at age by quarter for each sex. The growth parameters used were as follows :

Females: $L_{inf}=60$ mm $K= 0.16$ $t_0= - 0.7, - 0.9, -1.0$

Males : $L_{inf}=75$ mm $K= 0.14$ $t_0= - 0.6, - 0.8, - 0.9$

Finally t_0 values of -0.7 for females and -0.6 for males were adopted because the quarterly age compositions obtained using these parameters, gave an annual age composition similar to that obtained by the *Nephrops* Working Group (Anon., 1991b). The upper limits of the length intervals (carapace length rounded to the mm below) for each age group, calculated for the end of each quarter are given in Table 3.9.4. The same age-length keys were applied to all landings.

Practical details

The number and size of files used for 1991 are given in the table 5.1. For each sex, 38 files were created which occupied 95 kbytes of disk space.

3.10 Celtic Sea *Nephrops*

Data available

The availability of data for 1991 *Nephrops* catches for the Celtic Sea is outlined in Table 3.10.1. Estimated landings are

given in Table 3.10.2. Weights and length distributions of both landings and discards were available by quarter for 1991 for French catches.

A French discard sampling programme was undertaken in 1991 on commercial vessels. The previous sampling exercise for discards took place in 1985.

The derivation of length and age compositions is given in Table 3.9.3.

Ireland provided only an annual weight for landings (423 tonnes in 1991). In order to take account of these significant landings, it was decided to derive quarterly length distributions for landings and discards by sex, using French sample data, and to apply French prices to them.

EW data were not taken into account since landings were considered insignificant (about 10 tonnes) and were not sampled.

Age distributions for each sex were compiled using von Bertalanffy growth parameters as a basis for carrying out cohort slicing of the length distributions.

The growth parameters used were similar to those for previous years, ie :

males $L_{inf} = 68 \text{ mm}$, $K = 0.12$ and $t_0 = - 0.8$

females $L_{inf} = 49 \text{ mm}$, $K = 0.17$ and $t_0 = - 0.9$

The upper limits of the length intervals (carapace length rounded to the mm below) for each age group, calculated for the end of each quarter are given in table 3.10.3.

Practical aspects

The set of input data used for the present evaluation consisted of 16 length files (22 kbytes), 16 price files (20 kbytes) and 8 age-length keys (8 kbytes). Applying the age-length keys resulted in 16 age-length distribution files (76 kbytes). Since this stock is presented by only one fishery unit, the number of unit files is 4 (quarter) X 2 (stocks) giving 8 files occupying 44 kbytes (Table 5.1).

3.11. Bay of Biscay Nephrops

Data available

The only country involved in this fishery is France. Weights and length distributions of landings and discards are available by quarter for 1991 (Tables 3.11.1 and 3.11.2).

Discard information was obtained in 1991 using samples from commercial vessels. The previous sampling programme for discards was in 1986.

As for the Celtic Sea *Nephrops*, age distributions were obtained by cohort slicing of length compositions using the same growth parameters as last year :

Males $L_{inf} = 76 \text{ mm}, K = 0.11, t_{-0} = - 1.1$

Females $L_{inf} = 56 \text{ mm}, K = 0.14, t_{-0} = - 1.3$

It is important to note that the first lengths caught (13 and 14 mm) correspond to age 0 in quarters 3 and 4, but were allocated to age 1 to conform with the standard age range, specified for this stock. Although catches in these lengths are relatively few, in future the Group recommends that the first age should be set at age 0, and the plus group at age 9. This has been included in the new file specifications given in Appendix A.

The upper limits of the length intervals (carapace length rounded to the mm below) for each age group, calculated for the end of each quarter are given in Table 3.11.3.

Practical aspects

The set of input data used for the present evaluation consisted of 8 length files (6 kbytes), 8 price files (12 kbytes) and 8 age length keys (8 kbytes). Applying the age length keys resulted in 8 age length distribution files (40 kbytes). A total of 8 unit files were created occupying 48 kbytes of disk space (Table 5.1).

4. FISHING EFFORT.

Provision has been made in file type 1 to record estimates of quarterly fishing effort by country and unit. It was recommended that as a priority, effort should be provided as unadjusted days fishing. However, it is possible to express

effort in whichever units of measurement are deemed appropriate, and to provide these in additional records.

The available estimates of unadjusted effort for 1990 and 1991 are summarised in Tables 4.1 and 4.2 respectively. Obviously, these data must be interpreted with caution, and should by no means be used for analyses equating effort with fishing mortalities or catch-per-unit-effort with abundance without a detailed knowledge of the fleets concerned. They do, however, provide useful information on the behaviour of the national fleets, in terms of seasonal variations of activity and of the relative practices of the different "métiers". If such data were also provided by other countries and units having significant activities in the area, they may to some extent, indicate the relative importance and/or attraction of the various fishery units for constituent fleets, both nationally and internationally. In other words, for management purposes, the relative importance of the units can be established on the basis of fleet utilization, rather than on their achievements (catch or F), or on more traditionally-used measures such as number of vessels, number of people concerned etc. Similarly, it will be possible to monitor inter-annual variations of this effort as a time series is built up.

It must be pointed out that the effort of any fishery unit is assumed to apply to all species caught by that unit. This is consistent with the underlying assumptions of the technical interaction models in use, but may be at variance with the approach often used to estimate effort by people working on a species basis (eg, effort recorded when relative catch of the species in a trip or period is above some threshold).

5. GENERAL EVALUATION.

The primary aim of the Study Group has been to evaluate the practical aspects of creating, handling and storing the data files required for a seasonally and fleet disaggregated database. Section 2 of this report outlines the approach adopted and the comments relating to each species are given in the relevant sub-sections of Section 3. In practice, the Study Group had to deal with seasonal data from a maximum of 19 fishery units and 11 stocks, although not all are caught in all units. Since the species and unit definitions have changed from those dealt with previously, a schematic description of the fishery units currently used is given in Figure 5.1. Figure 5.2 indicates the depth ranges used by the Group in defining the fishery units.

To carry out its evaluations, the Group chose to take one years' worth of data for each species and carry out all the processes necessary to derive the files that will be required for an as yet undefined, database. For all species except hake, for reasons outlined in Section 3.1, the year chosen was 1991. However, data for some fishery units and countries were unavailable. Nevertheless, a large number of files had to be dealt with and the magnitude of this task should not be underestimated. A summary of the total numbers of files created and handled using the compilation software outlined in Section 2, is given in Table 5.1. In total 7486 data files occupying some 7.5 megabytes of disk space were dealt with.

Despite this large number, no serious problems were encountered with regard to managing these files. However, it is important to remember that a single sub-directory accommodates only up to 112 files, with the result that basic datafiles must be stored on separate disks which adds to the general file management problems.

In some cases relatively small unsampled catches of particular species and units are provided by Group members. Since these may amount to only a small proportion of the overall catches, the workload required to produce a full range of files for each set, may not be justifiable. A more practical way to deal with these data would be to raise the type 5 files by the appropriate raising factor, but at present a software to do this does not exist.

It was also noted that price files provided in national currency were of a different size than those which had been converted to ECU using the programme S78CHK. In some cases the size of the latter was some three times that of the former. This is not anticipated to cause any problems with regard to data storage since the size of this file type is relatively small. Similarly, the ALD files created using the programme S78ALK were also larger than the equivalent files created in spreadsheet software and output in CSV format. This difference arises because the S78ALK programme creates ALD files in fixed format, whereas datafields in original CSV files have no surplus blanks. However the Group considers that even for this case, any future storage problems are unlikely to arise.

The majority of these files are created as intermediate steps in compiling age length distribution files (file type 5) which will form the basis of an assessment database. In the current evaluation, 243 type 5 files were created, occupying some 2.7 megabytes of disk space. However, since each of these files contains information which is specific to a single fishery unit, the Group foresees no future problems with regard to their portability on floppy disk. This is despite the fact that the group had to work in this instance with incomplete data. The numbers of type 5 files by species range from 4 for each *Nephrops* stock, to 56 for hake which occupies some 913 kbytes. Since the number of species specific type 5 files is the product of the number of fishery units \times 4(quarters), the number of this file type should remain more or less the same for most species unless there are marked changes in fishing practices. However the overall size of the files is not considered to be critical since the database is likely to be distributed separately by stock, as is the current practice within ICES.

For *Nephrops*, artificial ALK's had to be created using cohort slicing, which relies on estimates of von Bertalanffy growth parameters to set up ranges of length at age. The group referred to the 1991 Report of the *Nephrops* Working Group (Anon, 1991b) to obtain growth parameter for each stock but could find no reference to values of t_0 for the Porcupine bank stock, and this had to be estimated by trial and error (see Section 3-9). As a general reminder, when using cohort slicing, the limits of the distribution of length at age should be estimated for the middle of the time period that the data relate to, in this case, the middle for each quarter. However, more critical is on which definition of age (age group or true age), the growth parameters are based.

Furthermore, for sole and megrim, for which the Group thought it desirable to maintain the possibility of carrying out

separate assessments by sex, unforeseen problems were encountered in creating combined sex age-length keys. These related to the way in which sampling for otoliths was carried out and are fully discussed in section 3.6 (Problems with data). In future, it is important to take into account, and may be prudent to reconsider, the age sampling strategy for species which have significantly different growth rates, particularly when the sexes are subject to different rates of exploitation by different fleets in different sea areas.

One further point of note is that in order to carry out assessments and predictions involving technical interactions between species and fleets, data on discards is essential. Since there is a dearth of discard data for many species and fleets, the validity of the database may be questioned with regard to these species and fleets for which discarding is considered to be significant and where data are presently unavailable.

In summary, the evaluation exercise has been extremely informative. Basically, there were no unforeseen problems that could not be solved at the meeting except with regard to the difficulties of extracting historic data in a seasonally disaggregated format. In future, the creation of the seasonally disaggregated unit files should pose no major problems, provided that national laboratories maintain their fishery related catch data routinely at the level of disaggregation required ie. quarterly. However, a suitable database software for archiving such data must still be specified, but it is not immediately apparent which of the commercially available packages would be most suitable, or whether a specific programme should be written. If the latter course is chosen, it must be borne in mind that someone will have to write the necessary software; a task that is by no means trivial. It would seem more appropriate to use a commercially available package, but it is unlikely that any single product could be imposed on the participating laboratories. In this respect, the ICES Secretariat should indicate whether the datafiles are compatible with the SAS software, which is now available at ICES headquarters.

6. RECOMMENDATIONS

1. The Study Group has successfully evaluated the practical aspects relating to the database structure and associated software it has at its disposal, and this structure is now ready to be handed over to the Working Group on the Assessment of Southern Shelf Demersal Stocks. However, at present no time series of international data is available at the seasonally disaggregated level required. This is primarily due to the time and effort involved in extracting historic data in this form. Being realistic, the cost involved in extracting such data may be prohibitive for some laboratories. However, for some species and fishery units national data are already preserved in the required format. The Group therefore recommends that future data should be maintained at the quarterly level of disaggregation required, and be routinely provided to the Working Group on the Assessment of Southern

Shelf Demersal Stocks, together with all available historic data. If this is done, a useful database could be available in a few years from now. For this to happen however, national laboratories must make a commitment to provide all available relevant data to the Working Group for at least 1991 onwards.

2. Although the database structure has been tested and evaluated, a software to manage a time series of files is still required. The Group therefore wishes to establish whether a commercially available package or a purpose build software would be preferable. This problem could be solved if the file types are compatible with the SAS software now available at ICES headquarter. The Group therefore seeks advice as to whether this is the case, and asks that the

current Chairman of the Southern Shelf Demersal Working Group be informed accordingly.

3. For every species dealt with by this Study Group, discard data are not routinely available or are entirely missing. This is considered to be a serious deficiency. The Group wishes to reiterate that if, as intended, the database is to be used for carrying out assessments of technical interactions between species and fleets in mixed fisheries, it is imperative that discard data are provided for all species and fishery units where discarding is thought to be significant.

4. The Study Group considers that it has satisfactorily addressed its Terms of Reference and foresees no reason to recommend a further meeting in the immediate future. The database structure and associated procedures have been defined, tested and evaluated and should now be handed over to the Working Group on the Assessment of Southern Shelf Demersal Stocks.

7. REFERENCES

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Table 3. Key to symbols for data availability tables

**	Landings' and discard's weights and associated length distributions
*-	Landings' weights and associated length distributions only. No discard information.
*	Landings' weights and associated length distributions only. No significant discarding is believed to occur.
O-	Landings' weights only
O	Landings' weights only. No significant discarding is believed to occur.
--	No catch information but catches believed to significantly contribute to the fishing mortality on this species
no symbol	no significant fishing mortality believed to be generated by this unit and country.

TABLE 3.1.1. Quarterly data available for hake by country and fishery unit for 1990

Country		Belgium	France	Ireland	Spain	UK	Others
Unit	Quarter						
1	1				*	0	
	2				*	0	
	3				*	0	
	4				*	0	
2	1					0	
	2					0	
	3					0	
	4					0	
3	1		*	--		*-	
	2		*	--		*-	
	3		*	--		*-	
	4		*	--		*-	
4	1		*	--	*	0	
	2		*	--	*	0	
	3		*	--	*	0	
	4		*	--	*	0	
5	1		*	--		*-	
	2		*	--		*-	
	3		*	--		*-	
	4		*	--		*-	
6	1					*	
	2					*	
	3					*	
	4					*	
8	1		*-				
	2		*-				
	3		*-				
	4		*-				
9	1		**				
	2		**				
	3		**				
	4		**				
10	1		**				
	2		**				
	3		**				
	4		**				
12	1				*		
	2				*		
	3				*		
	4				*		
13	1		*				
	2		*				
	3		*				
	4		*				
14	1				*		
	2				*		
	3				*		
	4				*		
15	1						
	2						
	3						
	4						
16	1		*	--		0-	-
	2		*	--		0-	-
	3		*	--		0-	-
	4		*	--		0-	-
17	1		**				
	2		**				
	3		**				
	4		**				
18	1						
	2						
	3						
	4						
19	1						
	2						
	3						
	4						
Age length key	1 2 3 4		(1)				

(1) Annual age length key derived by the numerical method of Chikuni and Kimura (1989) using the international catch length composition for 1990.

Key to symbols : see Table 3

Table 3.1.2 Estimated quarterly catches (tonnes) of Hake by Country and Fishery Unit for 1990

Country Unit	Quarter	Belgium	France	Ireland	Spain	EW	Others	Total
1	1				1160			1160
	2				2651			2651
	3				2382			2382
	4				2062			2062
2	1					17		17
	2					294		294
	3					127		127
	4					89		89
3	1		15			137		152
	2		3			282		285
	3		7			434		441
	4		15			160		175
4	1		68		2084	53		2205
	2		220		1776	111		2107
	3		217		1464	181		1862
	4		107		1344	229		1680
5	1		168			23		191
	2		352			50		402
	3		386			51		437
	4		249			60		309
6	1					12		12
	2					22		22
	3					27		27
	4					23		23
7	1							
	2							
	3							
	4							
8	1		20					20
	2		89					89
	3		136					136
	4		81					81
9	1		394					394
	2		1453					1453
	3		953					953
	4		839					839
10	1		1608					1608
	2		2409					2409
	3		1825					1825
	4		2374					2374

Country Unit	Quarter	Belgium	France	Ireland	Spain	EW	Others	Total
11	1							
	2							
	3							
	4							
12	1				736			736
	2				3641			3641
	3				2227			2227
	4				614			614
13	1		1134					1134
	2		410					410
	3		1018					1018
	4		1257					1257
14	1				2125			2125
	2				3087			3087
	3				2884			2884
	4				2229			2229
15	1							
	2							
	3							
	4							
16	1		141				818	959
	2		135				4075	4210
	3		133				2975	3108
	4		192				2367	2559
17	1		133					133
	2		636					636
	3		658					658
	4		458					458
18	1							
	2							
	3							
	4							
19	1							
	2							
	3							
	4							
Total			20293		32466	2382	10235	65376

TABLE 3.1.3. Derivation of quarterly length compositions for hake by country and fishery unit for 1990.

Country		Belgium	France	Ireland	Spain	UK	Others
Unit	Quarter						
1	1				SP1.Q1.90		
	2				2		
	3				3		
	4				4		
2	1					SP1.Q1.90	
	2					2	
	3					3	
	4					4	
3	1		FR3.Q1.90			UK3.Q1.90	
	2		2			2	
	3		3			3	
	4		4			4	
4	1		FR4.Q1.90		SP4.Q1.90	SP4.Q1.90	
	2		2		2	2	
	3		3		3	3	
	4		4		4	4	
5	1		FR5.Q1.90			UK5.Q1.90	
	2		2			2	
	3		3			3	
	4		4			4	
6	1					UK6.Q1.90	
	2					2	
	3					3	
	4					4	
8	1		FR5.Q1.90				
	2		2				
	3		3				
	4		4				
9	1		FR9.Q1.90				
	2		2				
	3		3				
	4		4				
10	1		FR10.Q1.90				
	2		2				
	3		3				
	4		4				
12	1				SP12.Q1.90		
	2				2		
	3				3		
	4				4		
13	1		FR13.Q1.90				
	2		2				
	3		3				
	4		4				
14	1				SP14.Q1.90		
	2				2		
	3				3		
	4				4		
15							
16	1		FR16.Q1.90				FR16.Q1.90
	2		2				2
	3		3				3
	4		4				4
17	1		FR17.Q1.90				
	2		2				
	3		3				
	4		4				
Age length key	1						
	2						
	3		1		1		1
	4						

1 : Age length key derived by the iterated method of Chikuni and Kimura (1987) using the 1990 international catch length composition,

TABLE 3.2.1. Quarterly data available for Celtic Sea sole by country and fishery unit for 1991

Country		Belgium	France	Ireland	Spain	UK	Others
Unit	Quarter						
3	1					O-	
	2					O-	
	3					O-	
	4					O-	
4	1					O-	
	2					O-	
	3					O-	
	4					O-	
5	1		O-	--		*-	
	2		O-	--		*-	
	3		O-	--		*-	
	4		O-	--		*-	
6	1	O-		--		*-	
	2	O-		--		*-	
	3	O-		--		*-	
	4	O-		--		*-	
8	1		O-				
	2		O-				
	3		O-				
	4		O-				
Age length key	1					*	
	2					*	
	3					*	
	4					*	

Key to symbols : see Table 3.

Table 3.2.2 Estimated quarterly landings of Celtic sea Sole (tonnes) by Country and Fishery Unit for 1991.

Country		Belgium	France	Ireland	Spain	EW	Others	Total
Unit	Quarter							
1	1							
	2							
	3							
	4							
2	1							
	2							
	3							
	4							
3	1					6		6
	2					4		4
	3					4		4
	4					2		2
4	1		19			0		19
	2		8			+		8
	3		10			1		11
	4		23			10		33
5	1		51			16		67
	2		54			14		67
	3		23			27		50
	4		58			22		80
6	1	6				356		362
	2	44				182		227
	3	23				187		210
	4	169				241		410
7	1							
	2							
	3							
	4							
8	1							
	2							
	3							
	4							
Total		242	245			1071		1558

+ = Less than 1 tonne

TABLE 3.2.3. Derivation of quarterly length compositions for Celtic Sea sole for 1991

Country Unit	Data	Belgium	France	Ireland	Spain	UK	Others
3	Landings					UK.06.91	
	Discards					- (1)	
4	Landings			-	-	UK.06.91	-
	Discards			-	-	- (1)	-
5	Landings		UK.06.91	-		UK.05.91	
	Discards		-	-		-	
6	Landings	UK.06.91				UK.06.91	
	Discards	-				-	
Age length key	Landings	UK.06.91	UK.06.91	-	-	UK.6+6.91	-
	Discards	-	-	-	-	-	-

(1). Length compositions derived using unit 6 length samples from landings from medium-deep water only.

TABLE 3.3.1 Quarterly data available for sole in the Bay of Biscay by country and fishery unit for 1991

Country Unit	Quarter	Belgium	France	Ireland	Spain	UK	Others
10	1		**				
	2		**				
	3		**				
	4		**				
11	1	O-					
	2	O-					
	3	O-					
	4	O-					
17	1		*-				
	2		*-				
	3		*-				
	4		*-				
18	1		*-				
	2		*-				
	3		*-				
	4		*-				
19	1		*				
	2		*				
	3		*				
	4		*				
Age length key	1		**				
	2		**				
	3		**				
	4		**				

Key to symbols : see Table 3.

Table 3.3.2 Estimated quarterly Catches of Biscay sole (tonnes)
by Country and Fishery Unit for 1991.

Country		Belgium	France	Ireland	Spain	EW	Others	Total
Unit	Quarter							
9	1							
	2							
	3							
	4							
10	1		847					847
	2		375					375
	3		448					448
	4		703					703
11	1	18						18
	2	144						144
	3	303						303
	4	0						0
12	1							
	2							
	3							
	4							
13	1							
	2							
	3							
	4							
14	1							
	2							
	3							
	4							
15	1							
	2							
	3							
	4							
16	1							
	2							
	3							
	4							
17	1		174					174
	2		157					157
	3		234					234
	4		195					195
18	1		27					27
	2		62					62
	3		14					14
	4		19					19
19	1		1304					1304
	2		458					458
	3		313					313
	4		164					164
Total		465	5494					5959

TABLE 3.4.1. Quarterly Data Available for *Lophius piscatorius* and *Lophius budegassa* by country and fishery unit for 1991

Country Unit	Quarter	Belgium	France	Ireland	Spain	UK	Others
1	1 2 3 4						
2	1 2 3 4						
3	1 2 3 4					(1)	
4	1 2 3 4		*- *- *- *-	*- *- *- *-	*- *- *- *-	-- -- -- --	
5	1 2 3 4		*- *- *- *-			-- *- *- *-	
6	1 2 3 4	-- -- -- --				*- *- *- *-	
8	1 2 3 4		*- *- *- *-				
9	1 2 3 4		*- *- *- *-				
10	1 2 3 4		*- *- *- *-				
12	1 2 3 4						
13	1 2 3 4						
14	1 2 3 4		*- *- *- *-		*- *- *- *-		
15	1 2 3 4						
16	1 2 3 4						
17	1 2 3 4						
18	1 2 3 4						
19	1 2 3 4						
Age length key	1 2 3 4		* * * *				

1) Landings available only as total weight of both species combined. They account for only 2 % of total landings of both species.

Key to symbols : see Table 3

Table 3.4.2 Estimated quarterly catches of *Lophius piscatorius* (tonnes) by Country and Fishery Unit for 1991.

Country	Unit	Quarter	Belgium	France	Ireland	Spain	EW	Others	Total
1	1								
	2								
	3								
	4								
2	1								
	2								
	3								
	4								
3	1								
	2								
	3								
	4								
4	1	893	154	723	129			1899	
	2	1070	236	1235	216			2757	
	3	1019	358	921	196			2494	
	4	888	264	654	146			1952	
5	1	66			20			86	
	2	47			45			92	
	3	49			83			132	
	4	107			63			170	
6	1				261			261	
	2				294			294	
	3				250			250	
	4				285			285	
7	1								
	2								
	3								
	4								
8	1	221						221	
	2	332						332	
	3	308						308	
	4	164						164	
9	1	115						115	
	2	112						112	
	3	73						73	
	4	53						53	
10	1	99						99	
	2	50						50	
	3	62						62	
	4	44						44	

Country	Unit	Quarter	Belgium	France	Ireland	Spain	EW	Others	Total
11	1								
	2								
	3								
	4								
12	1								
	2								
	3								
	4								
13	1								
	2								
	3								
	4								
14	1	225	206						431
	2	147	124						271
	3	225	75						300
	4	272	97						369
15	1								
	2								
	3								
	4								
16	1								
	2								
	3								
	4								
17	1								
	2								
	3								
	4								
18	1								
	2								
	3								
	4								
19	1								
	2								
	3								
	4								
Total				6641	1012	4035	1988		13676

Table 3.5.1. Estimated quarterly catches of *Lophius budegassa* (tonnes) by Country and Fishery Unit for 1991.

Country		Belgium	France	Ireland	Spain	EW	Others	Total
Unit	Quarter							
1	1							
	2							
	3							
	4							
2	1							
	2							
	3							
	4							
3	1							
	2							
	3							
	4							
4	1		460	146	370	66		1042
	2		552	201	729	127		1609
	3		445	254	593	127		1419
	4		376	257	396	88		1117
5	1		7			2		9
	2		17			2		19
	3		7			12		19
	4		6			7		13
6	1					68		68
	2					88		88
	3					129		129
	4					96		96
7	1							
	2							
	3							
	4							
8	1		142					142
	2		312					312
	3		119					119
	4		117					117
9	1		157					157
	2		158					158
	3		150					150
	4		110					110
10	1		6					6
	2		85					85
	3		49					49
	4		56					56

Country		Belgium	France	Ireland	Spain	EW	Others	Total
Unit	Quarter							
11	1							
	2							
	3							
	4							
12	1							
	2							
	3							
	4							
13	1							
	2							
	3							
	4							
14	1		270		249			519
	2		264		249			513
	3		208		127			335
	4		193		148			341
15	1							
	2							
	3							
	4							
16	1							
	2							
	3							
	4							
17	1							
	2							
	3							
	4							
18	1							
	2							
	3							
	4							
19	1							
	2							
	3							
	4							
Total			4266	858	2861	812		8797

TABLE 3.6.1. Quarterly data available for megrim by country and fishery unit for 1991

Country		Belgium	France	Ireland	Spain	UK	Others
Unit	Quarter						
1	1						
	2						
	3						
	4						
2	1						
	2						
	3						
	4						
3	1						
	2						
	3						
	4						
4	1		**	*-	**	O-	
	2		**	*-	**	O-	
	3		**	*-	**	O-	
	4		**	*-	**	O-	
5	1		**	**		O-	
	2		**	**		O-	
	3		**	**		O-	
	4		**	**		O-	
6	1	--		--		*-	
	2	--		--		*-	
	3	--		--		*-	
	4	--		--		*-	
8	1		**				
	2		**				
	3		**				
	4		**				
9	1		*				
	2		*				
	3		*				
	4		*				
10	1						
	2						
	3						
	4						
12	1						
	2						
	3						
	4						
13	1						
	2						
	3						
	4						
14	1		*		*		
	2		*		*		
	3		*		*		
	4		*		*		
15	1						
	2						
	3						
	4						
16	1						
	2						
	3						
	4						
17	1						
	2						
	3						
	4						
18	1						
	2						
	3						
	4						
19	1						
	2						
	3						
	4						
Age length key	1		**	Annual	**	*-	
	2		**	ALK	**	*-	
	3		**	only	**	*-	
	4		**		**	*-	

Key to symbols ; see Table 3,

TABLE 3.6.3. Derivation of quarterly length compositions for megrim for 1991

Country		Belgium	France	Ireland	Spain	UK	Others
Unit	Data						
4	Landings		FR.04.91	IR.04.91	SP.04.91	SP.04.91	
	Discards		FR.04.91	SP.04.91	SP.04.91	SP.04.91	
5	Landings		FR.05.91	IR.05.91		FR.05.91	
	Discards		FR.05.91	IR.05.91		FR.05.91	
6	Landings					UK.06.91	
	Discards					-	
8	Landings		FR.08.91				
	Discards		FR.08.91				
9	Landings		FR.09.91				
	Discards						
14	Landings		FR.14.91		SP.14.91		
	Discards				0		
Age length key	Landings		FR.04.91	AA.20.91	AA.20.91	AA.20.91	
	Discards		FR.20.91	AA.20.91	AA.20.91	AA.20.91	

TABLE 3.7.1. Quarterly data available for Celtic Sea cod by Country and fishery unit for 1991

Country		Belgium	France	Ireland	Spain	UK	Others
Unit	Quarter						
1	1				--	O-	
	2				--	O-	
	3				--	O-	
	4				--	O-	
2	1					O-	
	2					O-	
	3					O-	
	4					O-	
3	1					*-	
	2					*-	
	3					*-	
	4					*-	
4	1		O-	--	O-	O-	--
	2		O-	--	O-	O-	--
	3		O-	--	(1) O-	O-	--
	4		O-	--	O-	*-	--
5	1		*-	--		*-	
	2		*-	--		*-	
	3		*-	--		*-	
	4		*-	--		*-	
6	1	--		--		*-	
	2	--		--		*-	
	3	--		--		*-	
	4	--		--		*-	
8	1		O-				
	2		O-				
	3		O-				
	4		O-				
Age length key	1		*-				
	2		*-				
	3		*-				
	4		*-				

(1) Landings provided as gutted weight. A conversion factor of 1.25 x gutted weight was used to derive whole weight

Key to symbols : see Table 3.

Table 3.7.2 Estimated quarterly landings of Celtic sea cod (tonnes) by Country and Fishery Unit for 1991.

Country		Belgium	France	Ireland	Spain	EW	Others	Total
Unit	Quarter							
1	1					+		+
	2					2		2
	3					3		3
	4					4		4
2	1					2		2
	2					+		+
	3					+		+
	4					3		3
3	1					137		137
	2					73		73
	3					58		58
	4					38		38
4	1		79		19	9		107
	2		285		39	40		364
	3		133		21	32		186
	4		128		4	32		164
5	1		1420			163		1583
	2		585			63		648
	3		578			88		666
	4		738			118		856
6	1					115		115
	2					39		39
	3					42		42
	4					66		66
7	1							
	2							
	3							
	4							
8	1		151					151
	2		507					507
	3		359					359
	4		99					99
Total			5062		83	1126		6271

+ = Less than 1 tonne

TABLE 3.7.3. Derivation of quarterly length compositions for Celtic Sea cod for 1991

Country	Unit	Data	Belgium	France	Ireland	Spain	UK	Others
1	Landings						UK.3.91	
	Discards						-	
2	Landings						UK.3.91	
	Discards						-	
3	Landings						UK.3.91	
	Discards						-	
4	Landings			FR.5.91	-	UK.5.91 ⁽¹⁾	UK.5.91 ⁽¹⁾	-
	Discards			-	-	-	-	-
5	Landings			FR.5.91	-		UK.5.91	
	Discards			-	-		-	
6	Landings		-				UK.6.91	
	Discards		-				-	
8	Landings			FR.5.91				
	Discards			-				
Age length Key	Landings			FR.5.91		FR.5.91	FR.5.91	
	Discards			-		-	-	

(1) Quarter 4 length distributions derived using sampled landings from EW unit 4.

TABLE 3.8.1. Quarterly data available for Celtic Sea whiting by country and fishery unit for 1991

Country Unit	Quarter	Belgium	France	Ireland	Spain	UK	Others
1	1					O-	
	2					O-	
	3					O-	
	4					O-	
2	1					O-	
	2					O-	
	3					O-	
	4					O-	
3	1					O-	
	2					O-	
	3					O-	
	4					O-	
4	1					O-	--
	2					O-	--
	3					O-	--
	4					O-	--
5	1					**	
	2					**	
	3					**	
	4					**	
6	1	--				O-	
	2	--				O-	
	3	--				O-	
	4	--				O-	
8	1		O*				
	2		O*				
	3		O*				
	4		O*				
Age length key	1		**			**	
	2		**			**	
	3		**			**	
	4		**			**	

Landings provided as gutted weight. A conversion factor of 1.13 x gutted weight was used to derive whole weight.

Key to symbols : see Table 3.

Table 3.8.2 Estimated quarterly catches* of Celtic sea whiting (tonnes) by Country and Fishery Unit for 1991.

Country Unit	Quarter	Belgium	France	Ireland	Spain	EW	Others	Total
1	1					0		0
	2					1		1
	3					+		+
	4					0		0
2	1					+		+
	2					+		+
	3					1		1
	4					+		+
3	1					75		75
	2					17		17
	3					6		6
	4					11		11
4	1		115			19		134
	2		144			29		173
	3		67			34		101
	4		85			18		103
5	1		3068			635		3703
	2		1484			244		1728
	3		2336			430		2765
	4		2108			315		2422
6	1					97		97
	2					24		24
	3					19		19
	4					21		21
7	1							
	2							
	3							
	4							
8	1		145					145
	2		400					400
	3		683					683
	4		347					347
Total			10981			1994		12975

* Discard estimates included for French catches in units 5 and 8 only

+ = Less than 1 tonne

TABLE 3.8.3. Derivation of quarterly length compositions for Celtic Sea whiting for 1991

Country Unit	Data	Belgium	France	Ireland	Spain	UK	Others
3	Landings Discards					UK.5.91 -	
4	Landings Discards		FR.5.91 -	- -	UK.5.91 -	UK.5.91 -	- -
5	Landings Discards		FR.5.91 FR.5.91	- -		UK.5.91 -	
6	Landings Discards	- -				UK.5.91 -	
8	Landings Discards		FR.5.91 FR.8.91				
Age length key	Landings Discards		FR.5.91 FR.5+8.91		FR.5.91 -	FR.5.91 -	

Key to symbols : see Table 3

TABLE 3.9.1. Quarterly data available for Porcupines bank Nephrops by country and fishery unit for 1991

Country Unit	Quarter						
	1	2	3	4	1	2	3
4							
Age length key							

Key to symbols : see Table 3

Table 3.9.2 Estimated quarterly landings of Porcupine bank nephrops (tonnes) by Country and Fishery Unit for 1991.

Country		Belgium	France	Ireland	Spain	EW	Others	Total
Unit	Quarter							
4 Males	1				129	15		144
	2			93	386	39		518
	3			61	296	71		428
	4				203	11		214
4 Females	1				11	1		12
	2			10	41	4		55
	3			6	31	7		44
	4				16	1		17
4 Sexes Combined	1				140	16		156
	2			103	427	43		573
	3			67	327	78		472
	4				219	12		231
Total				170	1113	149		1432

TABLE 3.9.3. Derivation of quarterly length compositions for the the three Nephrops stocks in 1991

Country		Belgium	France	Ireland	Spain	UK	Others
Unit	Data						
Stock	Landings			SP.04.91	SP.04.91	SP.04.91 -	
	4 Discards			- (1)	-	-	-
Porc. Bank	Landings		FR.08.91	FR.08.91			
	8 Discards		FR.08.91	FR.08.91			
Celt. Sea	Landings		FR.09.91				
	9 Discards		FR.09.91				
Bisc.	Landings		Obtained	Obtained	Obtained	Obtained	
	L K Discards		by slicing	by slicing	by slicing	by slicing	

(1) No landings for the 1st and 4th quarters

TABLE 3.9.4. Upper limits of the length intervals of each age group for Porcupine Bank *Nephrops*, calculated for the end of each quarter.

Males

Age	Quarter			
	1	2	3	4
1	17	19	21	22
2	24	26	28	29
3	31	32	34	35
4	36	38	39	40
5	41	43	44	45
6	46	47	48	49
7	50	50	51	52
8	53	54	54	55
9	56	56	57	57
10	58	59	59	60

Females

Age	Quarter			
	1	2	3	4
1	16	17	19	21
2	22	24	25	26
3	28	29	30	31
4	32	33	34	35
5	36	37	38	39
6	40	41	41	42
7	43	43	44	45
8	45	46	46	47
9	47	48	48	49
10	49	50	50	50

TABLE 3.10.1. Quarterly data available for *Nephrops* in the Celtic Sea by country and fishery unit for 1991

Country		Belgium	France	Ireland	Spain	UK	Others
Unit	Quarter						
8	1		**	-- (1)			
	2		**	--			
	3		**	--			
	4		**	--			
Age length key	1						
	2						
	3						
	4						

(1) Only annual landings weight available for the Irish fleet.

Key to symbols : see Table 3

Table 3.10.2 Estimated quarterly landings of Celtic sea nephrops (tonnes) by Country and Fishery Unit for 1991.

Country		Belgium	France	Ireland	Spain	EW	Others	Total
Unit	Quarter							
8 Males	1		676	105				781
	2		1380	215				1595
	3		802	125				927
	4		606	94				700
8 Females	1		66	10				76
	2		851	132				983
	3		251	39				290
	4		34	5				39
8 Sexes Combined	1		742	115				857
	2		2231	347				2578
	3		1053	164				1217
	4		640	99				739
Total			4666	725				5391

TABLE 3.10.3. Upper limits of the length intervals (carapace length, rounded to the mm below) for each age group of Celtic Sea *Nephrops*, calculated for the end of each quarter.

Males

Age	Quarter			
	1	2	3	4
1	14	16	17	19
2	20	22	23	24
3	26	27	28	29
4	30	32	33	34
5	35	36	37	37
6	38	39	40	41
7	42	42	43	44
8	45	45	46	47
9	47	48	48	49
10	49	50	50	51

Females

Age	Quarter			
	1	2	3	4
1	15	16	17	19
2	20	21	22	23
3	24	25	26	27
4	28	29	30	31
5	31	32	33	33
6	34	35	35	36
7	36	37	37	38
8	38	39	39	39
9	40	40	40	41
10	41	41	42	42

TABLE 3.11.1. Quarterly data available for Nephrops in the Bay of Biscay by country and fishery unit for 1991

Country		Belgium	France	Ireland	Spain	UK	Others
Unit	Quarter						
9	1		**				
	2		**				
	3		**				
	4		**				
Age length key	1						
	2						
	3						
	4						

Key to symbols : see Table 3

Table 3.11.2 Estimated quarterly landings of Biscay nephrops (tonnes) by Country and Fishery Unit for 1991.

Country		Belgium	France	Ireland	Spain	EW	Others	Total
Unit	Quarter							
9 Males	1		557					557
	2		1578					1578
	3		1173					1173
	4		495					495
9 Females	1		267					267
	2		956					956
	3		623					623
	4		251					251
9 Sexes Combined	1		824					824
	2		2534					2534
	3		1796					1796
	4		746					746
Total			5900					5900

TABLE 3.11.3. Upper limits of the length intervals (carapace length rounded to the mm below) for each age group of Biscay *Nephrops*, calculated for the end of each quarter.

Males

Age	Quarter			
	1	2	3	4
1	17	18	20	21
2	23	24	26	27
3	28	30	31	32
4	33	34	36	37
5	38	39	40	41
6	42	43	43	44
7	45	46	47	48
8	48	49	50	50
9	51	52	52	53

Females

Age	Quarter			
	1	2	3	4
1	16	18	19	20
2	21	23	24	25
3	26	27	28	29
4	30	31	31	32
5	33	34	35	35
6	36	37	37	38
7	39	39	40	40
8	41	41	42	42
9	43	43	44	44

TABLE 4.1. Fishing effort data by country, fishery unit and quarter for 1990, expressed as unadjusted days fishing.

Country		Belgium	France	Ireland	Spain	UK	Others
Unit	Quarter						
1	1			n/a	1 801	38	
	2			n/a	2 293	231	
	3			n/a	2 604	225	
	4			n/a	2 694	241	
2	1		198			61	
	2		361			239	
	3		229			444	
	4		255			169	
3	1		143	n/a		2 308	
	2		118	n/a		4 899	
	3		92	n/a		5 586	
	4		63	n/a		4 317	
4	1		3 956	n/a	6 851	166	
	2		4 554	n/a	7 192	492	
	3		4 559	n/a	6 691	528	
	4		7 308	n/a	6 377	846	
5	1		3 738	n/a		7 006	
	2		4 435	n/a		8 924	
	3		4 758	n/a		10 345	
	4		4 273	n/a		8 618	
6	1	n/a				3 585	
	2	n/a				3 546	
	3	n/a				4 908	
	4	n/a				4 629	
8	1		1 240				
	2		4 872				
	3		4 158				
	4		1 575				
9	1		8 124				
	2		11 290				
	3		9 124				
	4		9 617				
10	1		6 395				
	2		7 028				
	3		8 057				
	4		6 933				
11	1	n/a					
	2	n/a					
	3	n/a					
	4	n/a					
12	1				1 114		
	2				1 469		
	3				1 296		
	4				989		
13	1		909				
	2		740				
	3		1 114				
	4		1 731				
14	1		1 492		4 253		
	2		2 445		3 425		
	3		2 420		3 183		
	4		1 547		4 266		
15	1						
	2						
	3						
	4						
16	1		2 872				
	2		2 134				
	3		1 962				
	4		2 673				
17	1		3 429				
	2		8 552				
	3		7 679				
	4		4 586				
18	1		n/a				
	2		n/a				
	3		n/a				
	4		n/a				
19	1		n/a				
	2		n/a				
	3		n/a				
	4		n/a				

n/a : not available

TABLE 4.2. Fishing effort by country, fishery unit and quarter, for 1991, expressed as unadjusted days fishing.

Country		Belgium	France	Ireland	Spain	UK	Others
Unit	Quarter						
1	1			n/a	1 470	175	
	2			n/a	2 346	770	
	3			n/a	2 347	574	
	4			n/a	2 119	409	
2	1		148			116	
	2		180			165	
	3		555			319	
	4		163			230	
3	1		92	n/a		3 009	
	2		59	n/a		3 810	
	3		159	n/a		4 487	
	4		48	n/a		2 237	
4	1		4 245	n/a	6 096	890	n/a
	2		6 098	n/a	6 998	1 346	n/a
	3		5 017	n/a	6 733	1 149	n/a
	4		5 101	n/a	6 410	1 229	n/a
5	1		3 431	n/a		5 759	
	2		1 805	n/a		5 388	
	3		2 789	n/a		6 265	
	4		4 474	n/a		5 725	
6	1	n/a				4 116	
	2	n/a				2 312	
	3	n/a				2 695	
	4	n/a				2 419	
8	1		2 044				
	2		5 021				
	3		3 892				
	4		1 598				
9	1		6 496				
	2		7 655				
	3		7 960				
	4		5 408				
10	1		6 726				
	2		5 938				
	3		6 963				
	4		9 408				
11	1	n/a					
	2	n/a					
	3	n/a					
	4	n/a					
12	1				720		
	2				1 267		
	3				1 286		
	4				653		
13	1		n/a				
	2		n/a				
	3		n/a				
	4		n/a				
14	1		2 495		3 905		
	2		1 206		3 161		
	3		1 370		5 197		
	4		1 694		3 553		
15	1						
	2						
	3						
	4						
16	1		2 569			n/a	
	2		2 210			n/a	
	3		2 906			n/a	
	4		2 549			n/a	
17	1		4 586				
	2		8 872				
	3		9 533				
	4		4 889				
18	1		n/a				
	2		n/a				
	3		n/a				
	4		n/a				
19	1		n/a				
	2		n/a				
	3		n/a				
	4		n/a				

n/a : not available

Table 5.1 Summary of the number and size (in kilobytes) of each file type created

	File type 1		File type 2		File type 3		File type 4		File type 5		Total	
	L*.*		K*.*		A*.*		P*.*		U*.*			
Stock	No	kb	No	kb	No	kb	No	kb	No	kb	No	kb
HKE	76	196	1	9	76	1018	76	178	56	913	285	2314
SOC	27	49	4	5	27	142	27	16	16	103	101	315
SOB	19	46	8	24	19	115	19	38	19	140	84	363
LPI	48	96	4	10	48	585	48	49	28	421	176	1161
LBU	48	68	4	7	48	412	48	36	28	295	176	818
MEG	49	71	12	20	49	361	49	41	24	216	183	709
COD	40	120	4	8	40	380	40	40	28	329	152	877
WHG	31	62	12	16	31	195	31	22	20	160	125	455
NPM	10	7	4	4	10	47	10	15	4	22	38	95
NPF	10	7	4	4	10	47	10	15	4	22	38	95
NCM	8	11	4	4	8	38	8	10	4	22	32	85
NCF	8	11	4	4	8	38	8	10	4	22	32	85
NBM	4	3	4	4	4	20	4	6	4	24	20	57
NBF	4	3	4	4	4	20	4	6	4	24	20	57
Total	382	750	73	123	382	3418	382	482	243	2713	1462	7486

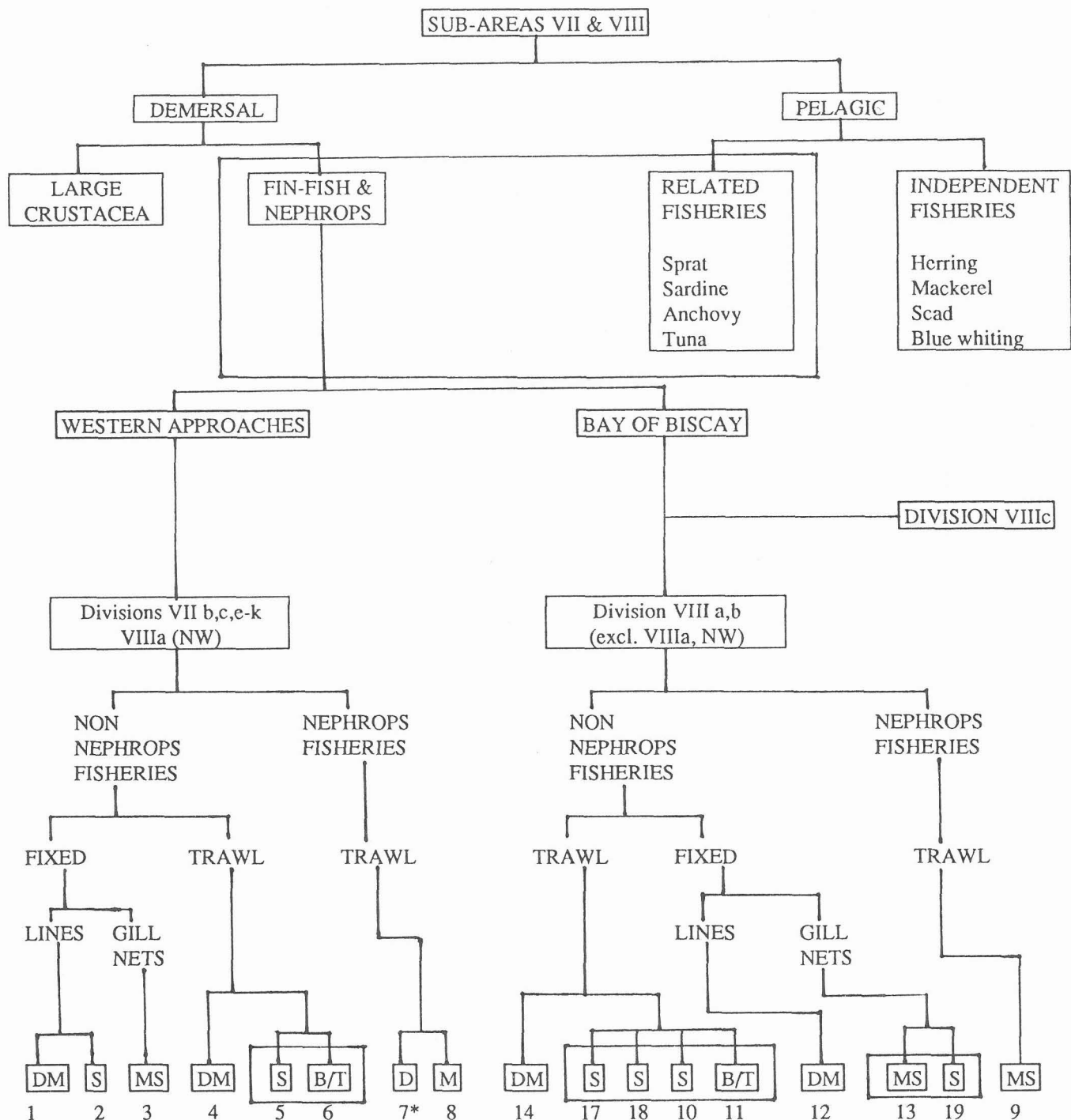


Figure 5.1. Summary of fishery units

Each closed box represents an identifiable "operational unit of exploitation" which may also form an "operational unit of management". The first approach to "operational units of assessment" are the units labelled D, M, S and B/T. Double boxes identify units which are very closely related.

Abbreviations: B/T; beam trawl; D; predominantly deeper than 200m; S; predominantly less than 100m; M; between D and S.

*Unit 7 now obsolete (catches included in Unit 4)

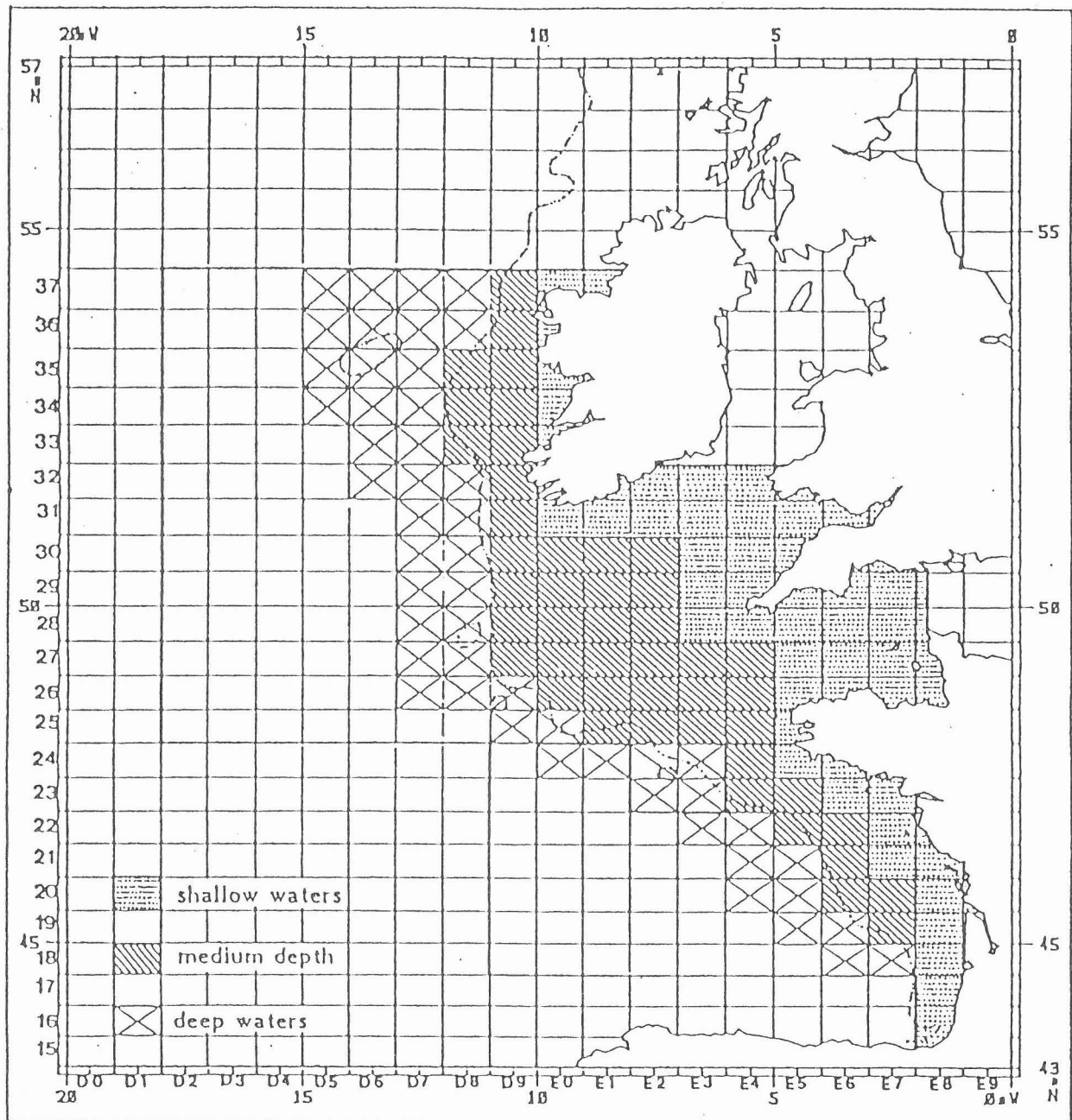


Figure 5.2. Statistical rectangles corresponding to the three depth zones used for the definition of fishery units.

APPENDIX A

A1. SPECIFICATIONS OF DATA FILES FOR FUTURE MEETINGS

Data Contents :

Given the objective of carrying out age-based VPA, the basic fisheries data are as follows:

For each stock of interest, catch-at-age compositions by fishery unit, year, and quarter. An additional requirement of the hybrid model is the provision of catch compositions at age **AND** length by fishery unit and quarter, which are used to partition the reference fishing mortalities input to the model. These data are intermediate results when the age-length key is applied to length compositions of the catch, and necessary adjustments should be made to the ALK conversion software used by the various Institutes in order to preserve these data on file. Due to sampling or age reading problems however, it is possible that the ALK used by a particular country in a given quarter may be of insufficient reliability. If different countries provide useful ALK data for the same area and quarter, the Group has the possibility of correcting for deficiencies in age data. Provision has thus been made in the database to handle ALK data, which should be provided as absolute numbers of otoliths read, together with the associated length composition data.

In addition, the hybrid model requires that the input fishing mortalities relate to catches, and uses fitted logistic functions to convert predicted catches at-length into landings for each stock, fishery unit and season (ultimately). In order to estimate the parameters of such functions, length compositions of both landings and discards must be provided whenever relevant. For each age group estimates of the proportions of the catches which are landed must also be provided in the appropriate file. The model also allows landings to be expressed in terms of value, and a file has been designed to handle landing prices per kg at length.

Data Formats :

As indicated above, the database comprises the following elements which should be provided by each country for each species, fishery unit and quarter. Note that the length and the age ranges should comply with the standards summarized in Table A5.

1) Filetype 1: Length Compositions

Files with 1cm (1mm carapace length for *Nephrops*) length compositions of the landings and discards given in thousands of fish. Zeros should be used to indicate missing or irrelevant discards data. In case it is necessary to return to separate sex assessments, the sex-ratio (defined as number of females/total number caught) at each length should also be provided, in particular for megrim. Should these data be unavailable or inappropriate, a default value of -1 must be specified. This file should also contain, at the end, the landed and discarded weights (in tonnes), the total number landed, the total number discarded, and, for the sake of verification, the parameters of the length-weight relationship used to calculate the SOP (weights at length should be calculated at mid-

length class). In addition, estimates of the fishing effort by the fishery unit concerned should be provided in this file ; the effort unit is free but should be indicated in a comment, and different records may be used to provide estimates in different units. For future needs, it is desirable that at least one of these estimates is expressed as unadjusted days fishing. This should be the first measure of effort expressed in the file (See Table A1).

An example of the length composition file is given in Table A1.

2) Filetype 2: Age length Keys.

Files with ALK data giving, for each length group, the absolute number of otoliths for each age ; zeros should be included where appropriate, to fill each row to match the age range. The first and last lengths must match those in the length composition files. The data need not be provided for each fishery unit separately; additional records can be used to identify to which fishery units these ALK data apply. However, the fishery unit identifier in record 4 of the file should be 20, if the ALK is applicable to more than one unit. It is important to provide the data in absolute numbers to permit summations with other countries' ALK's for the same species, quarter and area.

An example of the ALK file is given in Table A2.

3) File type 3: Age Length Distributions.

Files with ALD data, i.e., for each length, number (thousand) of fish caught at each age by fishery unit and quarter. This file should be set up by the ALK length-to-age conversion program. Again, the length and age ranges must comply with the standards, and zeros must be placed in each relevant column. The format is similar to that of the ALK files, except that the first record at the "bottom" of the ALD table should give the column totals, i.e., the catches in number at age, followed by the sum of the numbers caught at age. The second record should give, for each age group, the proportions of the catch of each age group which is landed.

An example of the ALD file is given in Table A3.

4) File type 4: Prices at Length.

Files with landing prices per kg at length. Note that the unit of value used (national currency or ECU) should be in record 6 of the heading section of the file to avoid problems when combining prices across countries.

An example of the Prices file is given in Table A4.

Each of the above file types starts with a block of records which are used to identify the file contents and to provide programme parameters. There is some redundancy in some of the parameters and file contents, but this is intentional, since this allows the files to be created using either text editors, spreadsheet software or specific programs in various languages. It is important to preserve this facility by filling each record with the appropriate data (or missing values ie. -1), and separating the data fields with either blanks or **preferably commas**. Text

items should be written between double quotes (ie. "text"), since this is the format required for importation into some spreadsheets.

The standard format for each of the files is given in Tables A1 to A4. Members are urged to strictly comply with these formats which should be conspicuously displayed in each Institute and committed to memory.

A.2. STANDARD FORMATS.

File naming convention.

File names should comply with the following convention, which assumes MS-DOS rules:

File name = **dsppuucc.yyq**

where

d:= data type; = 1 for length compositions, k for ALK, a for ALD, p for prices;

spp:= a 3-letter species code; see section A.3;

uu:= a 2-digit code for fishery units (e.g., 01 for unit 1); see section A7;

cc:= a 2-letter country acronym; see section A4;

yy:= last 2 digits of the year to which data refer (e.g., 91 for 1991 data);

q:= 1-digit quarter rank, or a 0 to indicate annual data; people interested in preserving monthly data can use letters; see sections A5 and A6;

Filenames should be in lower case, to ensure compatability between different computer operating systems.

Heading section

Record 1. Filename (text)

Record 2 Title: General (text), as informative as possible;

Record 3. Species identifier (numeric rank) , followed by species name (text); see section A3

Record 4. Year , Quarter (numeric); see section A6

Record 5. Fishery unit (numeric rank) , Country Code (numeric) , Country (text); see sections A4 and A7

Record 6. File type (single digit numeric):

- 1 = length distribution
- 2 = Age length key
- 3 = Age length distribution
- 4 = prices at length

Record 7. Unit of content in power of 10

For file type 1 (LEN): unit of catch numbers ,
(should be 3 for thousands)
unit of catch weight ,
(should be 1 for tonnes)

For file type 2 (ALK): unit of numbers aged
(should be 1)

For file type 3 (ALD): unit of numbers caught at length and
age (should be 3 for thousands)

For file type 4 (VAL): unit of prices per kg at length
(1 for country's currency, 2 for ECU's)

Record 8. First length group , last length group , number of length
groups , length increment (must be 1)

For file types 2 and 3, continue with: 1st age group , last age group ,
number of age groups

Data Section

* File type 1 (Table A1)

Record 9. Mesh size in mm (-1 if not relevant)

Record 10 (1st length) to **Record N** (last length) :
length group, No. landed, No. discarded, proportion of
females
(-1 if not relevant or unavailable)

Record N+1 Landings weight , discards weight, total number landed,
total number discarded

Record N+2 Length weight relationship used to derive catch weights
(numeric):
Factor a (for cm or mm carapace length (*Nephrops*) to kg),
Exponent b

Record N+3 Effort (numeric) , comments eg. unit of effort (text)

Record N+4 etc.
Effort (numeric) in other unit , with comment (text)

* File type 2 (ALK) (Table A2)

Record 9 (1st length) to **Record N** (last length) :

1st Length group , Number (1st age),.....,Number (last age)

2nd Length group , Number (1st age),.....,Number (last age)

...

...

Last Length group , Number (1st age),.....,Number (last age)

Record N+1.: comment as to which units included/excluded (text).

*** File type 3 (ALD) (Table A3)**

Record 9 (1st length) to **Record N** (last length) :

1st Length group , Number (1st age),.....,Number (last age)

2nd Length group , Number (1st age),.....,Number (last age)

...

...

Last Length group , Number (1st age),.....,Number (last age)

Record N+1. Sum of numbers caught at length for each age group :
1st age, 2nd age,.....,last age, sum of numbers caught at age
(NB. Start in the 1st field of the record)

Record N+2: Landing/catch proportion (1st age), (2nd age),.....,(last age)

ie. proportion of catch landed at age.

(NB.Start in the 1st field of the record)

*** File type 4 (VAL) (Table A4)**

Record 9 (1st length) to **Record N** (last length) :

Length group , 1st sale value (per kg)

Record N+1 Comment as to which units included/excluded (text)

A.3. List of stock codes.

Alphanumeric code	Species	Numeric Rank
hke	Hake	1
soc	Celtic sea sole	2
sob	Biscay sole	3
lpi	Lophius piscatorius	4
lbu	Lophius budegassa	5
meg	Megrim	6
cod	Celtic sea cod	7
whg	Celtic sea whiting	8
npm	Porcupine Bank Nephrops Males	9
npf	Porcupine Bank Nephrops Females	10
ncm	Celtic sea Nephrops Males	11
ncf	Celtic sea Nephrops Females	12
nbm	Biscay Nephrops Males	13
nbf	Biscay Nephrops Females	14

A.4. List of Country codes.

Alphanumeric	Country	Numeric Rank
be	Belgium	1
dk	Denmark	2
fr	France	3
ge	German	4
ir	Ireland	5
nl	Netherlands	6
no	Norway	7
po	Portugal	8
sp	Spain	9
uk	United Kingdom	10
ew	United Kingdom (England and Wales)	11
ni	United Kingdom (Northern Ireland)	12
sc	United Kingdom (Scotland)	13
aa	All countries combined	14
zz	Others	99

A.5. List of Monthly codes.

a	January
b	February
c	March
d	April
e	May
f	June
g	JuLy
h	August
i	September
j	October
k	November
l	December

A.6. List of Quarterly codes (numeric).

1	January-March
2	April-June
3	July-September
4	October-December
0	Annual

A.7. List of Fishery Unit codes (numeric)

Three new units, numbered 17,18 and 19, have been created to allow new information on what was previously unit 15 (miscellaneous catches) to be taken into account (see section 2.6.1). The unit 15 label will still exist however, to be used to record activities and catches of vessels not described by any other unit. Furthermore, the group has proposed that unit 7 be abolished because of the reduction in effort targetted at *Nephrops* (see section 2.4.1), and activities and catches of vessels

previously included in this unit will be allocated to unit 4. However, the unit 7 label will be retained for the time being.

Celtic sea (sub-area VII) fisheries.

1. Longlines in medium - deep waters.
2. Longlines in shallow waters.
3. Fixed nets.
4. Non *Nephrops* trawl in medium - deep waters.
5. Non *Nephrops* trawl in shallow waters.
6. Beam trawl.
7. *Nephrops* trawl in medium - deep waters (now obsolete).
8. *Nephrops* trawl in shallow waters.

Bay of Biscay (divisions VIIIA,b) fisheries.

9. *Nephrops* trawl in shallow - medium waters.
10. Non *Nephrops* trawl in shallow - medium waters.
11. Beam trawl.
12. Longlines in deep and medium waters.
13. Fixed nets in shallow - medium waters.
14. Non *Nephrops* trawl in medium - deep waters.
15. Miscellaneous:
16. Outsiders (other hake catches)
17. Inshore trawlers.
18. Shrimp trawlers.
19. Sole fixed netters
20. A combination of units (may be used in ALK and Prices files, filetypes 2 and 4)

Table A.1. File type 1: Length distributions:

```
"lwhg05fr.911"  
"LD for Celtic sea whiting quarter1,1991,FRANCE,unit 5"  
8,"Celtic sea whiting"  
1991,1  
5,3,"France"  
1  
3,1  
14,70,57,1  
80  
14,0,0,-1  
15,0,0,-1  
16,0,0,-1  
17,0,0,-1  
18,0,0,-1  
19,0,0,-1  
20,0,0,-1  
21,0,0,-1  
22,0,0,-1  
23,0,0,-1  
24,0,0,-1  
25,0,0,-1  
26,10.585,0,-1  
27,42.343,0,-1  
28,158.783,0,-1  
29,306.983,0,-1  
30,698.65,0,-1  
31,688.063,0,-1  
32,805.514,0,-1  
33,822.249,0,-1  
34,648.043,0,-1  
35,434.92,0,-1  
36,323.424,0,-1  
37,265.355,0,-1  
38,187.525,0,-1  
39,146.726,0,-1  
40,134.695,0,-1  
41,128.043,0,-1  
42,48.416,0,-1  
43,57.568,0,-1  
44,38.796,0,-1  
45,31.598,0,-1  
46,35.94,0,-1  
47,12.807,0,-1  
48,12.901,0,-1  
49,5.982,0,-1  
50,7.665,0,-1  
51,5.982,0,-1  
52,8.974,0,-1  
53,4.486,0,-1  
54,2.244,0,-1  
55,3.738,0,-1  
56,3.738,0,-1  
57,1.496,0,-1  
58,1.496,0,-1  
59,0.748,0,-1  
60,0,0,-1  
61,0.748,0,-1  
62,0,0,-1
```

63,0,0,-1
64,0,0,-1
65,0,0,-1
66,0,0,-1
67,0,0,-1
68,0,0,-1
69,0,0,-1
70,0,0,-1
2545,0,6086.466,0
2.78E-06,3.358
3431,"days fishing, 1day=20hours"
68620,"hours fished"

Table A.2. File type 2: Age-Length-Key.

```

"kwhg05fr.911"
"ALK for celtic sea whiting quarter1,1991,FRANCE, unit 5"
8,"Celtic sea whiting"
1991,1
5,3,"France"
2
1
14,70,57,1,0,7,8
14,0,0,0,0,0,0,0,0
15,0,0,0,0,0,0,0,0
16,0,0,0,0,0,0,0,0
17,0,0,0,0,0,0,0,0
18,0,0,0,0,0,0,0,0
19,0,0,0,0,0,0,0,0
20,0,0,0,0,0,0,0,0
21,0,0,0,0,0,0,0,0
22,0,0,0,0,0,0,0,0
23,0,0,0,0,0,0,0,0
24,0,0,0,0,0,0,0,0
25,0,0,0,0,0,0,0,0
26,0,0,0,0,1,0,0,0
27,0,0,2,0,0,0,0,0
28,0,0,5,0,2,1,0,0
29,0,0,6,0,4,0,0,0
30,0,0,9,6,9,1,0,0
31,0,0,5,1,12,2,0,0
32,0,0,2,9,16,0,0,0
33,0,0,5,6,14,4,0,0
34,0,0,3,3,13,5,0,0
35,0,0,2,3,19,3,0,0
36,0,0,0,7,19,1,0,0
37,0,0,2,0,20,4,0,0
38,0,0,1,4,11,5,0,0
39,0,0,0,7,11,5,0,0
40,0,0,0,2,19,6,0,0
41,0,0,0,5,18,10,2,0
42,0,0,0,2,17,7,0,0
43,0,0,0,1,14,13,1,0
44,0,0,0,2,12,7,0,0
45,0,0,0,0,12,10,3,0
46,0,0,0,2,18,9,0,0
47,0,0,0,0,6,5,1,0
48,0,0,0,0,5,8,1,0
49,0,0,0,0,5,2,0,0
50,0,0,0,0,2,4,2,0
51,0,0,0,0,2,4,0,0
52,0,0,0,0,2,6,0,0
53,0,0,0,0,0,4,0,0
54,0,0,0,0,2,1,0,0
55,0,0,0,0,1,3,0,0
56,0,0,0,0,0,2,2,0
57,0,0,0,0,0,2,0,0
58,0,0,0,0,0,1,1,0
59,0,0,0,0,0,0,1,0
60,0,0,0,0,0,0,0,0
61,0,0,0,0,0,1,0,0
62,0,0,0,0,0,0,0,0
63,0,0,0,0,0,0,0,0

```


64,0,0,0,0,0,0,0,0

65,0,0,0,0,0,0,0,0

66,0,0,0,0,0,0,0,0

67,0,0,0,0,0,0,0,0

68,0,0,0,0,0,0,0,0

69,0,0,0,0,0,0,0,0

70,0,0,0,0,0,0,0,0

"ALK based on samples from Unit 5"

Table A.3. File type 3: Age-Length-Distribution:

```

"awhg04fr.911"
"LD for Celtic sea whiting quarter1,1991,FRANCE, unit 4"
8,"Celtic Sea Whiting"
1991,1
4,3,"France"
3
3
14,70,57,1,0,7,8
14,0,0,0,0,0,0,0,0
15,0,0,0,0,0,0,0,0
16,0,0,0,0,0,0,0,0
17,0,0,0,0,0,0,0,0
18,0,0,0,0,0,0,0,0
19,0,0,0,0,0,0,0,0
20,0,0,0,0,0,0,0,0
21,0,0,0,0,0,0,0,0
22,0,0,0,0,0,0,0,0
23,0,0,0,0,0,0,0,0
24,0,0,0,0,0,0,0,0
25,0,0,0,0,0,0,0,0
26,0,0,0,0,0,0.478,0,0,0
27,0,0,1.913,0,0,0,0,0
28,0,0,4.484,0,1.794,0.8969,0,0
29,0,0,8.323,0,5.549,0,0,0
30,0,0,11.37,7.577,11.37,1.263,0,0
31,0,0,7.773,1.555,18.65,3.109,0,0
32,0,0,2.696,12.13,21.57,0,0,0
33,0,0,6.406,7.687,17.94,5.125,0,0
34,0,0,3.66,3.66,15.86,6.101,0,0
35,0,0,1.456,2.184,13.83,2.184,0,0
36,0,0,0,3.789,10.28,0.5413,0,0
37,0,0,0.9223,0,9.223,1.845,0,0
38,0,0,0.4035,1.614,4.439,2.018,0,0
39,0,0,0,2.018,3.171,1.441,0,0
40,0,0,0,0.4508,4.283,1.352,0,0
41,0,0,0,0.8266,2.976,1.653,0.3306,0
42,0,0,0,0.1683,1.431,0.5891,0,0
43,0,0,0,8.97E-02,1.256,1.166,8.97E-02,0
44,0,0,0,0.167,1.002,0.5843,0,0
45,0,0,0,0,0.6854,0.5712,0.1714,0
46,0,0,0,0.112,1.008,0.504,0,0
47,0,0,0,0,0.2895,0.2412,4.83E-02,0
48,0,0,0,0,0.2082,0.3331,4.16E-02,0
49,0,0,0,0,0.1929,7.71E-02,0,0
50,0,0,0,0,8.65E-02,0.173,8.65E-02,0
51,0,0,0,0,9.00E-02,0.18,0,0
52,0,0,0,0,0.1015,0.3045,0,0
53,0,0,0,0,0,0.203,0,0
54,0,0,0,0,6.73E-02,3.37E-02,0,0
55,0,0,0,0,4.23E-02,0.1267,0,0
56,0,0,0,0,0,8.45E-02,8.45E-02,0
57,0,0,0,0,0,6.80E-02,0,0
58,0,0,0,0,0,3.40E-02,3.40E-02,0
59,0,0,0,0,0,3.40E-02,0
60,0,0,0,0,0,0,0,0
61,0,0,0,0,0,3.40E-02,0,0
62,0,0,0,0,0,0,0,0
63,0,0,0,0,0,0,0,0

```

64,0,0,0,0,0,0,0,0,0
65,0,0,0,0,0,0,0,0,0
66,0,0,0,0,0,0,0,0,0
67,0,0,0,0,0,0,0,0,0
68,0,0,0,0,0,0,0,0,0
69,0,0,0,0,0,0,0,0,0
70,0,0,0,0,0,0,0,0,0
0,0,49.4,44.03,147.9,32.84,0.9206,0,275.062
0,0,1,1,1,1,1,1,0

Table A.4. File type 4: Prices at length:

"pwhg05fr.911"
"FR Lorient landing prices at length, quarter 1,1991"
8,"Celtic sea whiting"
1991,1
5,3,"France"
4
1
14,70,57,1
14,0
15,0
16,0
17,0
18,0
19,0
20,0
21,0
22,0
23,0
24,0
25,0
26,4.22
27,4.22
28,4.22
29,4.22
30,4.22
31,4.22
32,8.83
33,8.83
34,8.83
35,8.83
36,11.44
37,11.44
38,11.44
39,11.44
40,11.69
41,11.69
42,11.69
43,11.69
44,11.69
45,11.69
46,11.69
47,11.69
48,11.69
49,11.69
50,11.69
51,11.69
52,11.69
53,11.69
54,11.69
55,11.69
56,11.69
57,11.69
58,11.69
59,11.69
60,11.69
61,11.69
62,11.69
63,11.69

64,11.69

65,11.69

66,11.69

67,11.69

68,11.69

69,11.69

70,11.69

"All fishery units included"

TABLE A5. Ranges of length and age group to be used for creation of datafiles for each stock unit.

		First length	Last length	First age group	Age of Plus group
HAKE		5	100	0	10
NEPHROPS,	M	19	50	1	10
CELTIC SEA	F	19	50	1	10
NEPHROPS,	M	19	50	1	10
PORCUPINCE	F	19	50	1	10
NEPHROPS,	M	13	50	0	9
BISCAY	F	13	50	0	9
LOPHIUS PISCATORIUS		6	100	0	9
LOPHIUS BUDEGASSA		6	70	0	9
MEGRIM		10	60	0	10
COD		15	100	0	7
WHITING		14	70	0	7
SOLE, BISCAY		3	50	0	8
SOLE, CELTIC SEA		10	50	8	8

- . Length data in 1 cm interval, except Nephrops in (1mm)
- . Age data : birthdate of January 1st assumed

