Resource Management Committee **ICES CM 2003/D:05**
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REPORT OF THE

International Bottom Trawl Survey Working Group

Lorient, France
25.– 28 March 2003

International Council for the Exploration of the Sea

Conseil International pour l'Exploration de la Mer

Palægade 2–4 DK–1261 Copenhagen K Denmark

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1 TERMS OF REFERENCE AND PARTICIPATION

The **International Bottom Trawl Survey Working Group** [IBTSWG] (Chair: A.W. Newton, UK) will meet in Lorient, France from 25–28 March 2003 to:

a) co-ordinate and plan North Sea and North Eastern Atlantic surveys for the next twelve months;

b) review and comment on progress in DATRAS;

c) review and prepare responses to the outcome of the EU funded EVARES, MIQES, FINE and other relevant projects aimed at evaluation of the effectiveness and usage of stock abundance surveys;

d) propose new projects to evaluate purpose, sampling strategies and gear design with particular reference to surveys of the North Sea;

e) review biological data acquired and co-ordinate the collection and analysis of such data (with particular reference to the EU data collection regulation);

f) co-ordinate, review and plan inter-calibration and gear trials in North Eastern Atlantic;

g) further review the species identification and maturity stage photographic collection;

h) produce a review of recent publications involving IBTS data and surveys. Participants should poll their institutes for all publications and also any use of IBTS data in other applications than index calculation;

i) develop protocols and criteria to ensure standardization of all sampling tools and survey gears.

IBTSWG will report by 11 April 2003 for the attention of the Resource Management and Living Resources Committees and ACFM and ACE.

The meeting was attended by:

Helle Andersen	Denmark
Robert Bellail	France
Trevor Boon	UK (England)
Ken Coull	UK (Scotland)
Jorgen Dalskov	Denmark
Siegfried Ehrich	Germany
Brian Harley	UK (England)
Henk Heessen	Netherlands
Joakim Hjelm	Sweden
Lena Larsen	ICES Secretariat
Jean-Claude Mahe	France
Andrew Newton (Chair)	UK (Scotland)
Rick Officer	Ireland
Gerjan Piet	Netherlands
Odd Smedstad	Norway
David Stokes	Ireland
Francisco Velasco	Spain
Yves Verin	France

Presentations on recent developments on gear design at IFREMER, Lorient were made by:

Benoit Vincent
Gerard Bavouzet
Jean-Philippe Vacherot

Participants from Portugal were unable to attend.

2 INTRODUCTION

The International Bottom Trawl Working Group (IBTSWG) has its origin in the North Sea, the Skagerrak and the Kattegat where co-ordinated surveys have occurred since 1965. Initially these surveys only took place during the first quarter of the year, but between 1991 and 1996 co-ordinated surveys took place in all four quarters of the year. Pressure on ship time caused the number of surveys to be reduced and currently co-ordinated surveys in the North Sea are only undertaken in the first and third quarters.

The IBTSWG assumed responsibility for co-ordinating western and southern division surveys in 1994. Initially progress in co-ordination was slow but in the last few years there has been a marked improvement and whilst data exchange etc. is not at the level of that enjoyed in the North Sea, there is excellent co-operation between the participating institutes. However, the particular problem of data exchange is now being addressed through the EU funded project DATRAS (Database TRAwl Surveys Project) – see section 4.

At the last meeting (Dublin, April 2002) it was deduced that a considerable part of the actual work on the co-ordination of the surveys was being done outside the Working Group meeting. It was felt that part of this co-ordination could be done more efficiently during the actual WG and the current meeting attempted to tackle this problem with a mixture of plenary sessions (to address common problems) and dedicated sub-groups for the North Sea and eastern Atlantic. In addition, during the course of the last 12 months there had been a number of significant developments e.g. the establishment of a Study Group for the development of a new gear for the eastern Atlantic and the implementation of the EU Data Collection Directive which required particular attention. A further issue was the concern in many quarters about the lack of documentation on the protocols followed in many areas of fisheries biology. Thus the meeting had a full agenda but all the Terms of Reference were addressed and the work and comments are to be found under the relevant sections.

3 PLANNING OF NORTH SEA AND EASTERN ATLANTIC SURVEYS

3.1 North Sea

3.1.1 Timing of surveys

Concern was expressed about the timing of the surveys. Originally the quarter 1 survey was carried out in February, but much of the effort has now shifted over to January. The different countries are encouraged to ask for ship time in February.

The quarter 3 surveys are carried out from July through September, but should ideally be undertaken in August.

3.1.2 Participation in 2004

Most countries have not allocated their precise ship time for 2004 yet, but it was anticipated that Denmark would participate in quarter 1 and quarter 3, the Netherlands in quarter 1, France in quarter 1, Germany in quarter 1 and quarter 3, Scotland in quarter 1 and quarter 3, Sweden in quarter 1 and quarter 3, England in quarter 1 and quarter 3. Norway was not able to say anything about their participation in 2004 at the moment.

Based on the experience of 2003 the preliminary review of ship time indicates a good coverage of the North Sea in both quarters in 2004. At the moment it does not seem necessary to change the allocation of rectangles except for some overlap in the Skagerrak.

3.1.3 Contact during survey

There is a need for more frequent contact between the ships and the co-ordinator during the surveys, especially if some ships have problems in sampling in any of the assigned statistical squares. Contact by e-mail or satellite should be done at least once a week. The message should contain current position, work done since last message and any encountered problems.

3.1.4 Exchange of staff

It was agreed to exchange one person per vessel in 2004. Jørgen Dalskov will co-ordinate this exchange.

3.1.5 Special requests

Denmark asked for maturity data on sole in the Skagerrak. It was stressed by the Working Group that any special request should be submitted timeously to the appropriate co-ordinator followed by proper information and instructions.

3.1.6 Exchange of Trawl Positions

All participants should send their clear tow data to Trevor Boon by 30 April 2003 and thereafter 31st December of each year.

3.1.7 Sampling efficiency.

The Working Group expressed the need to have an overview of the number of otoliths per length group per strata and also plots of the geographical distributions of the samples. This would help the Group in planning and improving a proper sampling scheme.

3.1.8 Depth stratification in the Skagerrak

In the Skagerrak the depths within a rectangle differ considerably. It might therefore be better to have a depth stratification of the trawl stations here. Sweden is willing to look into the problem and prepare a suggestion.

3.1.9 MIK Trawls

Peter Munk (MIK-data coordinator) has requested IBTSWG to recommend that all countries participating in the Quarter 1 survey in the North Sea, the Skagerrak and the Kattegat to use a MIK as specified in the IBTS Manual. It should also be stressed that all MIK user should also only use well balanced and calibrated flow-meters and that the flow-meter is attached to the MIK-frame correctly. Experiences have shown that a General Oceanics Mechanical Flowmeter 2030 performs well and can be recommended.

Therefore, IBTSWG recommends that all countries participating in the Quarter 1 survey in the North Sea, the Skagerrak and the Kattegat to use a MIK as specified in the IBTS Manual and to use a well balanced and calibrated flow-meter.The flow-meter should be attached to the MIK-frame correctly.

3.2 North Eastern Atlantic

During 2003 two new vessels (Ireland and UK-England & Wales) will be introduced in the North Eastern Atlantic Area The commencement of new surveys time series is a good moment to review the plans and organization of the surveys in the area. It is also considered a good opportunity to address the need for overlap between the surveys with two purposes:

- To allow the comparison and standardization between surveys.

- To obtain, in the mid-term where feasible, combined abundance survey indices for some species and management areas.

3.2.1 Area covered by the surveys and inter-calibration experiences for 2003

A revision of the area covered by each country/survey has been performed and the areas covered by the new vessels have been defined to fill up the gaps in the North Eastern Atlantic area and to allow overlap in the surveyed areas. The geographical distribution, shown in Figure 3.2.1, provides overlap areas between several surveys. If it is possible to co-ordinate them, inter-calibration experiences will be attempted during this year surveys by:

- R|V *Celtic Explorer* and R|V *Scotia* Western Scotland Area (see Figure 3.2.1)

- R|V *Thalassa*, R|V *CEFAS Endeavour* and R|V *Celtic Explorer* in northern or central Celtic sea areas.

Given that the GOV is the gear used in most of the surveys in Celtic and Irish Sea, it is recommended that this gear is adopted for the English survey series starting this year by R|V *CEFAS Endeavour* and for the Celtic Explorer for the continental margin. The convenience of the use of an exocet kite or extra-flotation will be evaluated.

In the case of Porcupine area, there is no time overlap between the Spanish and Irish Surveys (Table 3.2.1) in the area, but comparison hauls using *Porcupine baca* are proposed. Spain will provide Ireland with positions of hauls performed during Porcupine survey and Ireland will repeat those hauls at the beginning of their survey.

Table 3.2.1 Schedule of the 4th quarter North Eastern Atlantic IBTS surveys in 2003.

Survey	Starting	Ending
UK-Scotland Rockall	13th Aug	12th Sep
UK-Scotland Western Survey	12th Nov	4th Oct
UK-Northern Ireland	dates not available	
Ireland	17th Oct	30th Nov
Porcupine (Spain)	9th Sep	8th Oct
UK-England & Wales	1st Nov	1st Dec
France – EVHOE	27th Oct	15th Dec
Spain north coast	24th Sep	27th Oct
Spain Gulf of Cadiz	1st Nov	15th Nov
Portugal	dates not available	

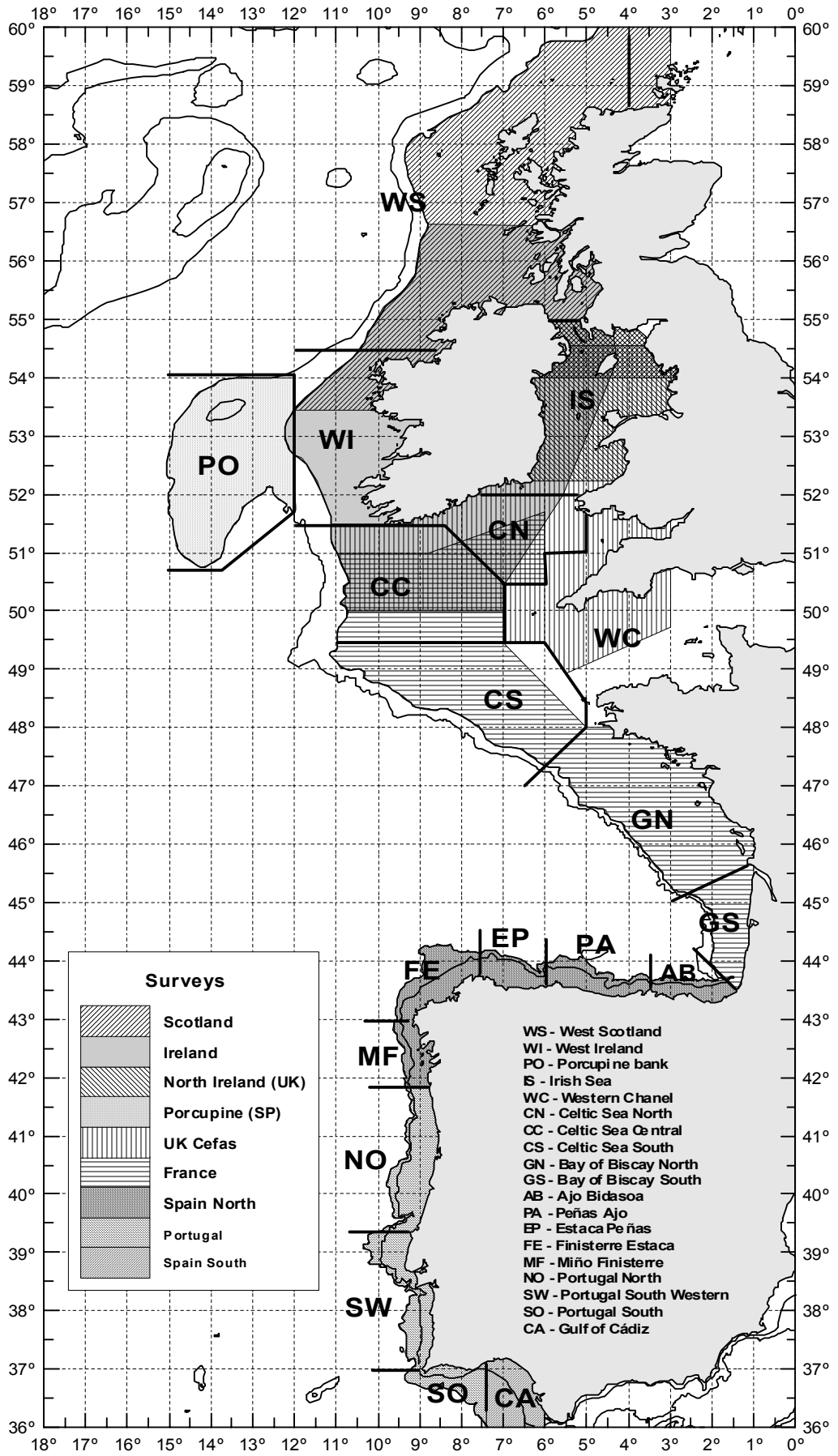

Figure 3.2.1 Coverage of the bottom trawl surveys included in the Western and Southern areas and general geographic stratification used

3.2.2 Combined abundance indices

In the mid-term it is considered desirable to obtain combined IBTS abundance indices for feasible management areas and species. Currently, all IBTS surveys in the Eastern Atlantic Area use depth stratification except the Scottish and Irish surveys (Irish surveys to be modified). Nevertheless the depth stratification used (Figure 3.2.2.) is not consistent between surveys and this problem has to be solved before combined abundance indices can be obtained.

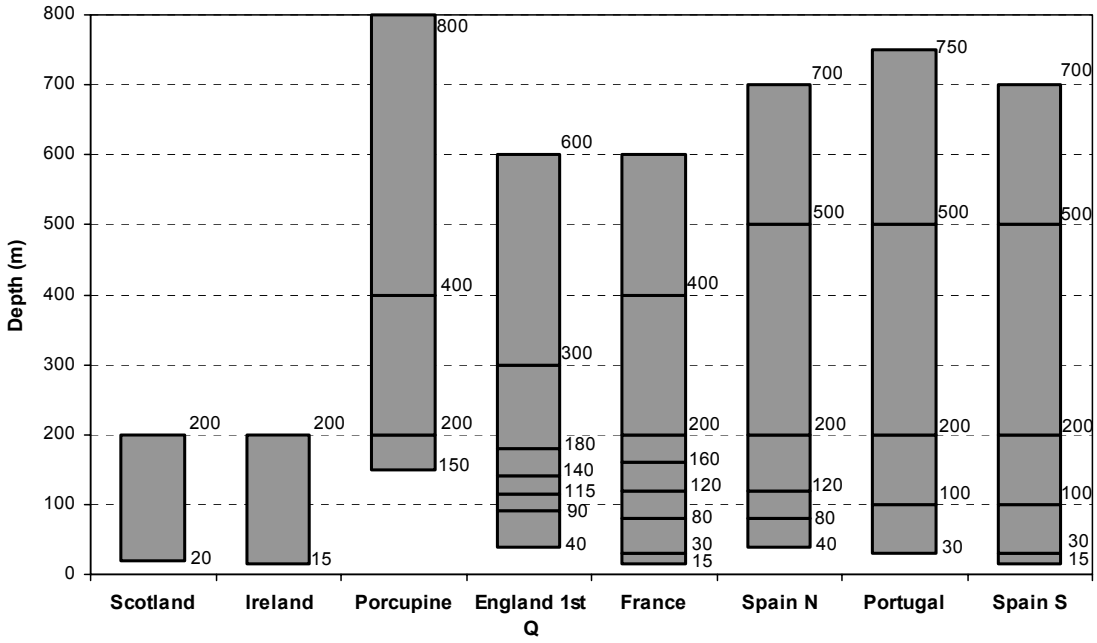

Figure 3.2.2 Depth stratification used in IBTS North Eastern Atlantic Area Surveys

To overcome this problem, French EVHOE depth stratification will be used initially for French, Irish and English surveys into overlapping areas, until new information is obtained, and further analyses are performed to test the suitability of this stratification for the area surveyed. A common geographical stratification will be agreed for Irish and English surveys into the Irish Sea area.

Although the Northern Ireland survey also covers this Irish Sea area, it uses a different gear and a different stratification, therefore this survey will not be considered for the estimation of combined abundance indices.

In order to use Scottish survey data in future estimation of combined indices, they will be post-stratified in a consistent way with the rest of the data. DATRAS provides an appropriate framework for the calculation of combined abundance indices for assessment working groups, but the data format to include information on strata has to be decided and provided to DATRAS by IBTSWG. Given the complexity of the stratification in North Eastern Atlantic Area, compared to the North Sea Area, it is considered a better procedure that if stratification is revised haul data will be re-coded by the responsible institute and re-sent to DATRAS.

3.2.3 Exchange of staff

Staff exchange between the different surveys within the IBTS North Eastern Area has been encouraged by IBTS WG (2002 IBTS WG report) as a way to improve standardization of surveys methodology and ensure the comparability of sampling protocols. Such exchanges are considered especially desirable during inter-calibration experiences. Given that several inter-calibration experiences will take place in 2003, if possible, staff will be exchanged during inter-calibrations taking place in the Celtic Sea between England, France and Ireland. As in previous years, staff will also be exchanged by Ireland on the Porcupine Survey. In future staff exchanges will be co-ordinated by regional co-ordinators and applications for funds will be made within the frame of the EU Data Collection Directive.

3.2.4 Exchange of trawl positions

Valid trawl positions are exchanged on a regular basis in the IBTS North Sea Area; this exchange provides valuable information to facilitate sampling design, especially in the case of surveys starting in new areas. In the near future the new DATRAS data base will be the appropriate tool for this information exchange. But, considering that two new vessels are starting new surveys this year, this information should be exchanged in advance, therefore the available information should be submitted to Trevor Boon before the end of April and he will distribute it among North Eastern Atlantic Area participants. Excel worksheet format supplied in IBTS manual will be used for this exchange including depth and validity of the hauls.

3.2.5 Stratification of Porcupine survey

Using the information of the two surveys performed in Porcupine Bank, distribution of bottom trawl faunal assemblages within this area has been studied to check the suitability of the original stratification, designed using previously available information on commercial catches in the area. The results of these analyses (Velasco and Serrano, Working Document II) confirm that depth and longitude are the main driving factors on species and bottom trawl faunal assemblages distribution, as assumed when the original stratification was defined. Nevertheless the results show that both bathymetric and geographical stratification can be improved. The effect of suitable stratification changes on intrastratum and interstrata abundance indices variability will be assessed with additional information on bathymetry in the area and a new stratification will be adopted before 2003 Porcupine survey. A similar approach will be used in the mid term to address the appropriate stratification in the Celtic Sea and Irish Sea for Irish and English surveys (See section 3.2.2).

4 REVIEW AND COMMENT ON PROGRESS IN DATRAS (TOR B)

Since last year's IBTSWG considerable progress has been made in DATRAS. Also other matters have come forward that are relevant for DATRAS. Two topics can be distinguished:

- Database development
- Data access policy

4.1 Database development

Most of the work relating to the (further) development of the Database was conducted by ICES. This included the development of the actual database structure and a checking program, the calculation of indices as well as changes in the exchange format to accommodate all surveys.

Exchange format:

A suggestion on a new exchange format was put forward by the DATRAS steering group. In the new exchange format all surveys delivering data to the DATRAS database are included. At the meeting the co-ordinators of the different surveys went through the exchange format and came up with corrections and filled in information. The latest version of the exchange format is listed in Appendix I.

Checking program:

The first beta version of the checking program was made available to the DATRAS steering group in November 2002 and so far only FRS has used it. Based on feedback the process of correcting programming errors has commenced and will be finalised within the coming weeks.

One of the problems that were encountered was related to the depth check. At present the depth check results in a (too) large return of errors messages for depth values that are probably correct. Therefore the procedure used for depth checks should be reconsidered.

During the next 2 months the checking program will be checked and corrected in ICES and ICES will make it publicly available in August 2003. This should give the institutes time to get confident with the program before they have to deliver data from the autumn survey.

To store all codes used by the checking program and the DATRAS database ICES have developed a database called RECO. The database includes all codes used in ICES. It is web based and can be used by the working groups to look up the legal codes for their dataset. The web page was presented and for the sake of user-friendliness it was suggested that the operator should be able to select either fisheries codes or environmental codes before entering the database. The RECO database can be found under www.ices.dk/reco.

It was decided that the checking program should be set up in such a way that data before 2004 would be checked as one dataset (historic) and data after 2004 would be checked as another dataset (current). This is in order to reduce the legal codes to the number of codes currently used whilst maintaining the possibility of resubmitting old data. The checking program can be found under www.ices.dk/datsu.

The DATRAS database:

The database design has now been implemented and the last 4 years of data (IBTS North Sea and BITS) have been loaded into the database with only minor problems.

DATRAS output:

Code for calculating the indices for herring and sprat in the North Sea first quarter 2003 was generated. Although this code was generated for a specific case (i.e. herring and sprat), the index calculation of most other species relies on the same algorithm where depending on the case the choice of index area, choice of strata and weighting of strata differs. This should allow the code to be easily transformed in order to calculate indices for other species.

4.2 Data access policy

Recently the "Commission Regulation (EC) No 1639/2001" has been getting attention and it's consequences both for the collection of data as well as access to those data by member states. The development of an extensive database of trawl survey data at ICES Headquarters that can be accessed through the web is in conformance with these regulations and can be considered a tool that facilitates the process of data access. However, this facilitation of data access necessitates a further formalisation of these rules and procedures. The aim of this proposal for a revised policy is to implement EU regulations, enhance transparency and ensure easy access to the data by authorised parties while restricting access by other parties.

In Article 11 the following regulations apply to the access to data by Member States

1. Member States shall take the measures necessary to facilitate access by the national correspondents of the other Member States, to the computerised database containing the aggregated data.

2. Member States shall communicate to the Commission and to other Member States the reasons that justify a suspension of access to data covered by this Regulation.

3. If a national correspondent wishes to have access to data held by another Member State, it shall send a request to the national correspondent responsible for access to this data. That national correspondent shall reply to the request within 10 working days following that request and must give reasons for any refusal.

4. Member States may conclude agreements or agree upon IT protocols relating to computer access in order to facilitate access to the databases. They shall inform the Commission without delay thereof. The expenses generated by access to the databases shall be borne by the national correspondent requesting it. ICES Policy on Access to DATRAS

The ICES policy on access to the trawl database distinguishes four user categories and three different types of data.

User categories:

1. Public
2. ICES working groups.
3. Institutes that have supplied data to the database.
4. Individuals that request data, typically for research purposes.

Data types:

Standard maps and graphs per survey/area combination for all relevant ages of species for which assessments are conducted. Maps will show bubble plots indicating abundance per ICES rectangle or per haul. Time series of the indices and a graph showing the proportion of the age-groups will be generated.

1. Aggregated data. A query of the database using pivot tables. Based on these tables, plots and graphs can be made on an interactive basis. The minimum level of aggregation differs between survey/area combinations.

    - ICES rectangle: IBTS in the North Sea, Skagerrak, Kattegat and the BTS in the North Sea, Channel and Irish Sea
    - Stratum: IBTS western and southern divisions
    - Sub-division and stratum: BITS Baltic Sea

2. Un-aggregated (raw) data. These are catch (numbers at length and/or numbers at age) data on a haul-by-haul basis and SMALK (Sex, Maturity, Age-Length-Keys) data per individual.

Data access per "User category" and per "Data type" can be organized according to the following matrix. F is the abbreviation for "free access", P for "password protected access" and R for "access after granted request".

Data type	User categories			
	Public	ICES WG[1]	Data supplier[2]	Individuals
Standard maps and graphs	F	F	F	F
Aggregated data		P	P	P/R[3]
Non-aggregated (raw) data		P	P	R[4]

Notes:

[1] ICES WGs will have access to data from only those survey/area combinations that are relevant for their recommendations and as such should be specified in those recommendations.

[2] Data suppliers will only have access to data of those survey/area combinations to which the institute has provided data.

[3] Per survey/area combination the members can decide whether individuals will have free access to aggregated data or only after request. In case of a request, access can be requested and allowed per survey/area combination

[4] Access can be requested and allowed per survey/area combination

The maps and graphs can be downloaded from the ICES website. All data (aggregated or non-aggregated) are protected by passwords. Different passwords will be applied for each survey/area combination. For ICES WGs the required passwords for those survey/area combinations that may be accessed will be issued to the chair of the WG. These passwords will only be valid for the duration of the WG. Institutes that have supplied data to the database will receive a password for access to that survey/ area combination to which they supplied the data. For access to other survey/ area combinations the same rules apply as for individuals.

Request for access to the database must be made through the ICES website. A standard form must be filled in to inform the institutes involved in the survey(s) on

- Who is requesting data, including partners in the research project
- The purpose of the data request
- Which data are requested
- Confirmation that the ICES rules for acknowledging the data source will be observed

Completing the form will automatically send a request to the relevant survey contact person of each institute involved with that survey/ area combination and this person will be requested to reply to ICES within 14 days. If a contact person does not reply within this time limit, it will be taken as acceptance of the request for data access. When after 14 days no

relevant data supplier has objected, ICES will provide a password to the requesting scientist. Using this password the data requester will be able to download the requested data. This password will only be valid for 7 days.

In Chapter III (Section I) of Commission Regulation (EC) No 1639/2001 there is a reference to "Other biological sampling". Dissemination of results of this biological sampling is expected in 2004 and applies to a large selection of species in areas of which many are covered by various surveys that are part of DATRAS (i.e. Baltic, North Sea and North-East Atlantic). According to the Commission Regulation, sampling programmes should be able to deliver:

- the growth curves by length and by weight
- the relations between age/length and maturity
- the relation between age/length and fecundity

Although for many of the species mentioned the data are not collected on a regular basis these data are collected for a number of species within the surveys that are part of DATRAS. At present much of these results are collected independently by the nations and there is not always agreement on the data collection procedures. It would, however, make a lot of sense to co-ordinate this activity, undertake a joint analysis of the data and provide a co-ordinated submission of these data. The workshops aimed at co-ordinating the task should result in a development of and agreement on procedures or algorithms that can deliver these results.

In this process DATRAS can not only be the tool to deliver the data needed as input for the workshops (after agreement has been achieved on the data collection part) but the procedures and algorithms developed there can be implemented into the DATRAS framework. This allows future calculations of the above results in a standardised manner and access to these results through the web thereby not only providing wider access to the results but also a yearly update of the results without much additional effort. Moreover, if considered necessary the existing DATRAS policy for data access can be used to regulate access to these results.

5 EVALUATION OF EU FUNDED PROJECTS IN RELATION TO IBT SURVEYS

ToR c states "Review and prepare responses to the outcome of the EU funded EVARES, MIQES, FINE and other relevant projects aimed at evaluation of the effectiveness and usage of stock abundance surveys". Four projects have been reviewed of which 3 have already finished.

5.1 MIQES

5.1.1 Introduction

MIQES is the abbreviation for the EU DG XIV Study No. 97/09: "The use of Multivariate data for Improving the Quality of survey-based stock Estimation in the North Sea". This study lasted from 1.7.1998 until 31.12.2000 and the participating institutions were:

1. Danish Institute for Fisheries Research, Hirtshals (Co-ordinator)

2. Centre de Geostatistique, Fontainebleau

3. ConStat, Hirtshals

4. Marine Laboratory, Aberdeen

5. Netherlands Institute for Fisheries Research, IJmuiden

6. Research Unit for Wildlife Population Assessment, Univ. of St. Andrews.

5.1.2 Objectives

This project aimed at enhancing the utility of the International Bottom Trawl Survey (IBTS) and the International Beam Trawl Survey (BTS) by delivering improved indices of year-class abundance based on multivariate and geostatistical analyses.

5.1.3 Methods

The trawl and hydrographic stations were linked in space and time in order to be able to combine trawl catches with the environmental variables. Also, additional co-variates like sun evaluation (as a proxy for level of daylight) and sediment grain size were introduced.

Various multivariate methods were used to analyse the relationships within and between the physical and the biological variables.

Sets of new survey based abundance estimates of different age groups of herring, haddock, whiting, cod, plaice and sole were derived using geostatistics (i.e. multivariate kriging) and generalized additive models (GAMs). Other IBTS target species like mackerel and Norway pout were excluded from the analysis due to the high variability in their catch data. The improvement achieved in calculating the indices was then tested by comparing it to the assessment results without tuning of the IBTS data.

5.1.4 Results relevant for the IBTS WG

- Establishing a coherent data set by combining trawl data with environmental information. Correction of numerous errors in the raw data set.

- Development of methodology that can incorporate external information (time of day, day of year, depth, sediment grain size, gear specifications etc.) to improve catches.

- A significant daylight effect on 1st quarter catches was found for herring and haddock at all ages and for cod age 2 and 3+.

- The IBTS data of the 3rd quarter data showed a pronounced vessel/gear effect in particular for the juveniles.

- The IBTS and BTS standard indices for herring, haddock, whiting and cod as well as for plaice and sole showed remarkably robustness against sampling irregularities in spite of the simple way they are calculated.

- In the case of herring and haddock where a significant daylight effect exists, External Drift kriging with a day/night indicator and especially with time of day proved superior to the standard indices.

- The assessment of herring was substantially improved by using improved indices based on GAMs. For the other species, it is unlikely that the new indices obtained by geostatistics and GAMs would change the assessment results substantially, considering the low weight that the 1st quarter IBTS receives under current practice.

5.1.5 Implications

- In the case of age 2 haddock the MIQES-participants recommend the External Drift kriging with a day/night indicator as a valuable alternative for the calculation of survey-based abundance indices. As an alternative (and in order to keep the present practice of index calculation), the number of hauls conducted outside the daylight period would need to be reduced further

- In the case of herring the assessment could be substantially improved by using improved indices based on GAMs

5.1.6 Comments and recommendations from the Working Group

- In general the Working Group welcomes thorough scientific analysis like MIQES for they help to improve the quality of results derived from survey datasets. Notably the methods developed offer the opportunity to provide an improved spatial distribution and higher consistency of catches between years by accounting for variation caused by other factors.

- These improvements, however, appear to have little effect on the indices of year-class strength of most species (except for herring) and it is therefore not likely that they will have a significant impact on the assessments

5.2 FINE

5.2.1 Introduction

FINE is the acronym for the EU DG XIV Study No. 98/029: "Survey-Based Abundance indices that account for fine spatial scale information for North Sea stocks". This study lasted from 1.4.1999 until 31.5.2002 and the participating institutions were:

1. Universität Hamburg, Institut für Hydrobiologie und Fischereiwissenschaft (Co-ordinator, first half)

2. Bundesforschungsanstalt für Fischerei, Institut für Seefischerei (Co-ordinator, second half)

3. Institut Francais de Recherche pour l´Exploitation de la Mer, Lab. ECOHAL&MAERHA

4. The Centre for Environment, Fisheries and Aquaculture Science, CEFAS

5. Marine Research Institute, Iceland

5.2.2 Objectives

This study aimed at investigating the value of using high-resolution spatial catch data, together with environmental and biological information, to improve the precision of model-based estimates of fish stock abundance in the North Sea. The main specific objective of the study was to produce model-based age disaggregated abundance indices that combine data from coarse- and fine-scale bottom trawl surveys. Another objective was to assess the performance of the proposed model-based indices and the currently used abundance indices under alternative scenarios of spatial variability.

5.2.3 Methods

High-resolution data for the analysis are from surveys performed every summer by the German Small-Scale Bottom Trawl Surveys in several areas ("boxes") of the North Sea. Selected data for the study are from 8 areas sampled from 1991 to 1998 and 10 areas in 1999. Coarse resolution data are from quarter 2 and 3 from 1991 to 1999 International Bottom Trawl Surveys covering the whole North Sea.

Data sets were assessed by application of multivariate techniques, generalized linear and additive models and geo-statistical techniques.

5.2.4 Results relevant for the IBTS WG

- Analysis of catch rates of 2-year old cod in the central North Sea from third quarter research vessel surveys undertaken in 1995 showed that the negative binomial distribution is suitable to describe the catch distribution at the different spatial scales considered and that the type of the frequency distribution is *inter alia* dependent upon the extent of the area in which the hauls took place. The estimated variances are assumed to be representative and different for the fine-scale and coarse scale surveys. Fine-scale surveys like the GSBTS provide information on within IBTS station variability; whilst the coarse scale EGFS/IBTS provide information on between station variability.

- Catch rates on cod varied significantly with time of day. In deep stratified waters, rates decreased throughout the day (diurnal vertical migration) and in shallow non-stratified waters rates increase in the early afternoon (semidiurnal vertical migration).

- The analysis of haddock ages 1 to 3 shows maximum catch rates are around mid-day. This result was also obtained when analysing data from a 24 hour fishing experiment conducted during November in a single area pooling data from fish larger than 20cm. Catch rates vary significantly with time of day, distance travelled and wind speed.

- For whiting most analysis done in relationship with diel migration indicate no significant differences of catch rates. The results suggest that diel migration exists but it is very variable. Catch rates of one year old whiting are not affected by the distance trawled and decrease significantly with wind speed, while rates of older fish are not affected by either of these co-variates.

- For herring it was found that catch rates varied with time of day with increasing levels from the morning hours to about noon and decreasing later on. The effect of the wind speed was not significant for all ages.

- Catch rates on Norway pout tend to be higher around mid day and no relationship of catch rates and distance trawled or wind speed were found. The analysis was conducted only with data from box D and must therefore be interpreted with caution.

- GLM proved to be an appropriate method to produce model-based abundance indices from GSBTS (catch data, geographic and environmental co-variates) for cod, haddock and partly for whiting (not for herring and Norway pout) by combining data from the fine and coarse surveys (GSBTS data for the model, time of day, depth and longitude as predictors from IBTS). These indices also show similar trends to the IBTS standard indices used in assessment with some differences in the relative magnitudes.

- The effect of reducing in IBTS sampling density on the resulting survey index is dependent upon both species and abundance. The distribution of survey indices changes in an unpredictable way with species and abundance. The effect of reducing sample size is minor in terms of the mean catch rates for all cases in the analysis. Nevertheless the variance suffers a many folds increase.

5.2.5 Implications

- Diel patterns in catch rates of cod, haddock and herring are significant and correcting for these changes to avoid bias in abundance indices due sampling is hindered by the variation of these patterns due to environmental-biological conditions. Survey should be limited within day time and sampling should be randomised by time of day.

- The IBTS standard abundance indices for cod, haddock and whiting are confirmed by the results of a second survey, independent from IBTS and based on a different survey design.

- The number of hauls can be reduced without substantial changes in mean abundance indices of year-classes for cod, haddock and whiting, but with a substantial increase in variance.

5.2.6 Comments and recommendations from the Working Group

- National representatives responsible for conducting IBTS expressed the impossibility of adjusting their current summer schedules to attempt randomising the haul timing. Nevertheless, the co-ordinator of the summer survey agreed to look at the frequency distribution of haul timing performed by each country to explore options.

- The relevant stock assessment working groups should be aware that data derived from the summer survey are not randomised with respect to time of day and that diurnal variation of catch rates can be a source of bias (upward or downward) when IBTS abundance indices are calculated.

- The problem of an uneven distribution of hauls over the day (notably the high number of hauls around 07.00) was acknowledged but the WG found that every solution for this problem would result in a reduction of the number of hauls that can be conducted over the day. Thus there is no possibility of keeping the same number of hauls and improving the distribution of hauls over the day without increasing costs.

5.3 EVARES

5.3.1 Introduction

EVARES is the abbreviation for Evaluation of Research Surveys in relation to management advice (FISH/2001/02 - Lot 1). Final report was in February 2003 and the participating institutions were:

1. Ecole nationale supérieure agronomique de Rennes (ENSAR), Rennes, France. (co-ordinator)

2. Fisheries Research Services, The Marine Laboratory (FRS), Aberdeen, Scotland UK

3. Instituto Español de Oceanografía, Centro Oceanografico de Vigo, Spain.

4. Centre for Fisheries, Environment and Aquaculture Science (CEFAS), Lowestoft, England UK

5. Instituto de Investigacao das Pescas e do Mar, (IPIMAR), Lisboa, Portugal.

6. Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER), Boulogne-sur-Mer France

7. Danish Institute for Fisheries Research, Charlottenlund, Denmark.

8. Netherlands Institute for Fisheries Research, (RIVO), IJmuiden, The Netherlands.

9. Institute for Marine Research (IMR), Bergen, Norway.

5.3.2 Objectives

The aim of EVARES was to evaluate some of the main European research vessel surveys in terms their use for stock assessments and how changes in the design of the surveys would impact the outcome of those assessments.

5.3.3 Methods

A common analysis framework was developed to evaluate the impact of Research Surveys on stock assessment and in particular to determine the relationship between sampling intensity (e.g. number of hauls or days at sea) and the quality of the stock assessment. The framework allowed basic statistical analyses to be conducted independently of the stock assessment procedure in order to:

- assess the ability of individual research surveys to track year-class strengths from year to year;

- assess the agreement about year-class strengths among different surveys of the same stock;

- estimate sampling variances of individual abundance indices.

Within this framework a number of statistics of interest were obtained from stock assessments (e.g. Spawning Stock Biomass, Status quo TACs) to indicate the effect of certain changes in the research surveys, namely: stopping one completely, switching to bi-annual instead of annual surveys, and alteration of sampling intensities. For each stock, the current ICES assessment procedure was followed as closely as possible, using the same method and the same choice of options as used by the relevant ICES WG.

5.3.4 Results relevant for the IBTS WG

The results of EVARES suggest that:

- Analysis of correlation within and between surveys, and between surveys and assessments showed that IBTS, like most other surveys, was able to track population changes over time.

- For most surveys part of the IBTS WG the sampling CV of estimated numbers-at-age was between 10 and 30%.

- Some assessment outputs were found to be robust e.g. the ratio of Current F : $\mathbf{F}_{0.1}$. However, assessment outputs for the recent and future period that are important for management and used in short term projections (e.g. current status, projected catches) are by nature more sensitive to research survey abundance indices. They tend to be systematically more strongly influenced by changes in the frequency of the survey frequency (shifting from annual to biannual) than to within-year changes in sampling intensities (number of hauls or days at sea). In a number of cases adjustments in sampling intensities may have a low impact on the real substance of the assessments.

- Some surveys do not appear to impact on the assessment, and, if within-survey consistency correlations are low, the sampling strategy and the way basic data are processed to obtain annual abundance indices (including calibration problems) should be reviewed.

- For surveys where the analysis has revealed discrepancies (e.g. conflicting information from various surveys, or a strong influence of a survey over the final assessment despite a poor internal consistency) further analyses are desirable.

- Generally it is more problematic to carry out the survey in alternate years than to reduce the sampling intensity within a survey.

- The surveys do not play a critical role in determining yield and SSB per recruit.

- The surveys generally influence the evaluation of recent changes in stock abundance and fishing mortality.

- Because surveys often measure younger age groups more reliably than fisheries they have an even greater influence on short term prediction of SSB and TACs.

- Poor performances of some specific survey(s) (e.g. Portuguese Ground fish Surveys) could be due to the sampling design.

- It appeared to be more difficult than anticipated for various surveys (e.g. Eastern Baltic, Irish Sea) to reproduce the annual abundance indices used by the ICES WGs since the computational procedures used were not fully described.

- Changes in the choice of index area or the use of strata when calculating indices can have a marked impact on these indices

Note that when stating the above conclusions this was based on a quantification of the influence on the assessment of changing the survey time-series; no attempt has been made to look at the costs or other associated effects linked to any postulated changes.

5.3.5 Implications

- The indices provided by the surveys appear robust in that changes to the survey appear to have relatively little effect on the indices provided. However, depending on the survey or species, there appears to be scope for improvement in the way the indices are calculated or the survey designed.

- In general those surveys that are specifically directed at stocks, species or age classes, such as NS beam trawls surveys for flatfish and acoustic surveys for herring, outperform the more general trawl surveys which provide a wider range of indices. Considering that IBTS is directed at a large array of species (both demersal and pelagic) and age-groups it will be difficult to improve IBTS in such a way that it performs better for all of these groups.

5.3.6 Comments and recommendations from the Working Group

- These conclusions must be viewed within the broader context of data collection and sampling costs, and the benefits and full uses of research surveys (i.e. not simply providing indices to calibrate stock assessments but also ecosystem oriented or biodiversity studies, for a recent overview see chapter 10) should be reviewed before an overall value-for-money analysis is conducted. Also, not all sources of uncertainty that can impact tuning time series derived from research surveys have been systematically reviewed (e.g. uncertainties in age length keys) since the objective was to evaluate the impact of survey frequency and intensity. In this context, the costs and benefits of other sources of information, rather than just research surveys, such as harbour sampling, commercial fleet catch and effort need to be reviewed on a similar basis.

- Considering that many of assessments are driven by the commercial catches a weak correlation of a particular survey with the assessments does not necessarily mean that the survey is incorrect. Comparison of assessments solely driven by one survey in combination with some of the methodology used in this study should allow a better evaluation of the quality of the survey (and/or commercial) catches with regard to tracking population changes over time.

- Work on the standardisation of trawl surveys and the ways indices of abundance are calculated should be encouraged.

5.4 CATEFA

5.4.1 Introduction

CATEFA is the abbreviation for the EU project N° Q5RS-2001-02038 :" Combining Acoustic and Trawl data for Estimating Fish Abundance". This study started in November 2001 for 3 years. The participants are :

Centre de géostatistique, Fontainebleau (Co-ordinator)
Marine Laboratory (Aberdeen)
Institute of Marine Research (Bergen)
Centre for Environment, Fisheries and Aquaculture Science (Lowestoft)
Queen's University of Belfast
Institut Français de Recherche pour l'Exploitation de la Mer (Boulogne)

5.4.2 Objectives

The principal objective of this project is to develop and apply appropriate combination methodologies for the effective use of both acoustic and trawl data from bottom trawl surveys. This is in recognition that bottom trawl surveys are the most important, fisheries independent, data source used in stock assessment of commercial groundfish in European waters. The inclusion of simultaneously collected acoustic survey data, with its more resolved sampling structure, could potentially improve the precision and accuracy of these surveys at little extra cost.

Within this overall aim, the project has four main objectives:

- To determine the relationships between the acoustic and trawl data at various levels of disaggregation.
- To develop mathematical models to calculate new combined stock abundance indices.
- To test the performance of these new indices within the stock assessment process.
- To provide survey designs which allow optimum collection of both types of data.

5.4.3 Methods

The survey data sets available to the partners for the project are:

- The combined acoustic and bottom trawl survey for cod and haddock in the Barents Sea; 1985-2000.
- International bottom trawl survey (IBTS) in the North Sea (Scotland); 1995-2000
- International bottom trawl survey (IBTS) in the North Sea (France); 2000 - 2003
- International bottom trawl survey (IBTS) in the North Sea (England); 2000- 2002
- Northern Irish bottom trawl surveys in the Irish Sea; 1992-2000

For all surveys, a Simrad EK500 scientific echosounder was used, with a 38kHz split-beam transducer. Acoustic data were acquired both during and between stations. Elementary Sampling Distance Units (EDSU) – the horizontal (along track) bins for integration of the acoustic data - were set at approximately 2 nautical miles for the on station data, and at 0.5 or 0.1 nautical miles for the between station data.

The fish capture data from all hauls carried out during the surveys was stored in the formats required for the project. Fish catch data were analysed to provide five quantities per species; Number Caught, Root Mean Square Length, Mean Target Strength, Mean Weight and NASC equivalent (Nautical Area Scattering Coefficient).

Before being stored in a common CATEFA data base, the acoustic data quality was controlled. Finally, some preliminary analysis for the preparation of the data for the modelling activities were carried out during the first year of the project.

5.4.4 Preliminary results

At the end of the first year of this project, the first 3 work packages were achieved and presented in the progress report submitted to the EU in December 2002.

- Determination of spatio-temporal sampling inhomogeneities in the data

- Definition and selection of appropriate relationships for modelling.
- Development of procedures for handling acoustic data collected both during and between trawl stations.

There are no results available at the moment relevant to the Working Group.

5.4.5 Comments and recommendations from the Working Group

The working group will comment on the project only after a final report has become available

6 NEW PROJECTS

ToR (d) states " propose new projects to evaluate purpose, sampling strategies and gear design with particular reference to surveys in the North Sea". An open discussion ranged and the group put forward the following proposals.

On the subject of evaluating the purpose of the surveys, an investigation into the use of the IBTS data is needed (Section 10 of this report and appendices II and III describes and list the historic uses of the data) and it was suggested that potential users of the data be warned about its limitations. It was recommended that a 'health warning' be attached to any data extracted from the IBTS database in the future. This would be in the form of a text file sent out with any data extraction, explaining the history of the surveys, the nature of the data and the possible limitations for its use. Following on from this an analysis of data from beam trawl and GOV hauls carried out at the same time in the same areas is suggested, allowing a comparison of the different catchabilities of the various gears. This would provide a better understanding on the actual abundance of various commercial species, as well as the overall composition of the fish community in the areas covered.

The discussion on sampling strategies highlighted the fact that many institutes have limited knowledge of another's sampling regimes. Staff exchanges on all IBTS cruises are being encouraged and this will facilitate this transfer of knowledge. See also Section 11 of this report.

7 REVIEW BIOLOGICAL DATA

In fish stock assessments, estimates of spawning stock biomass (SSB) are one of the key elements. It is used for instance in stock-recruitment models, calculation of reference points and as a parameter in harvest control rules. Therefore, information on size, age, sex, maturity, fecundity and other biological information are essential. Often it is not possible to obtain this information from the landings as most species are landed gutted, thus it is only possible to collect this information on the research surveys.

According to the Commission Regulation 1639/2001 ("Data Directive") the EU member countries are obliged to collect biological information. The Data Directive prescribes that member countries, according to the minimum programme, shall collect information so it is possible to produce growth curves by length and by weight and that the relations between age/length and maturity can be made. Information on relation between age/length and fecundity must also be provided for a specified number of stocks. Additionally, for stocks which are not subject to an annual estimation of the age composition of the catches, age composition should be made triennially.

The EU member countries are also obliged to structure their sampling scheme in order to estimate sex ratio from their commercial catches. However, the Data Directive prescribes that in cases in which this task is impossible, samples obtained during scientific surveys may be used.

At the meeting of the Study Group on Growth, Maturity and Condition in Stock Projections (SGGROMAT) in 2002 one of the TORs was to "Summarise the availability of data and information on weights, maturity, condition, fecundity, and age-length and length-weight keys for stocks in the North Sea, Irish Sea, Barents Sea and the Baltic Sea in the form of standardised tables". The purpose of this request was to provide an overview of available information and existing data, which can be applied to the estimation of stock reproductive potential (SRP), including some aspects relevant to modelling growth. The overview can be found in the SGGROMAT report (ICES CM 2003/D:01). The SGGROMAT has stated that considering that fish condition influences fish productivity in multiple ways (recruitment, adult mortality, growth, fecundity, maturation, etc), condition data should be routinely collected from the fishery and from surveys. Therefore, *the SGGROMAT recommends that the International Bottom Trawl Survey Working Group and the Baltic International Fish Survey Working Group consider ways in which this could be achieved*.

At the IBTSWG a broad discussion developed on how to handle these obligations and, in general, how to deal with additional demands for data needs from various interested parties. According to the IBTS manual sex ratio, maturity and information on the age distribution shall only be given for 8 species; herring, sprat, mackerel, cod, haddock, whiting, Norway pout and saithe. The WG found that though improvements and standardizations on the maturity staging and age readings could be achieved, the quality of the estimation of these parameters is considered to be good. On the other hand, for many of the other species which have to be analyzed, for instance according to the Data Directive, problems in obtaining this information were encountered. Some of these problems could be listed as:

- The need to significantly increase manpower on IBTS surveys.
- Expertise development in age reading of some of the non commercial species.
- Expertise development in maturity staging of some of the non commercial species.
- Lack of guidelines on data collecting procedures and data handling of the biological information.

Overview of collection of biological data on surveys and/or of commercial landings

L = Data collected from landings or at discards sampling

S = Data collected during surveys

Species	Area	Length											Weight (per individual)										Age readings										Sex and maturity									
											UK										UK										UK										UK	
		DK	ES	FR	GE	IR	NL	NO	PT	SE	EN	SC	DK	ES	FR	GE	IR	NL	NO	PT	SE	EN	SC	DK	FR	FR	GE	IR	NL	NO	PT	SE	EN	SC	DK	ES	FR	GE	IR	NL	NO	PT	SE	EN	SC
Baltic ICES AREA III (excl. Skagerrak)																																													
Herring	IIIa S	L/S			S					L/S			L/S			S					L/S			L/S			S					L/S			L/S			S					L/S		
Cod	IIIa S	L/S			S					L/S			L/S			S					L/S			L/S			S					L/S			S			S					S		
Norway lobster	Functional unit	L								L																						L												L		
Plaice	IIIa	L/S			S					L/S			L											L																						
Sole	IIIa	L/S								L/S			L								S			L																						
Sprat	IIIa S	L/S			S					L/S			L/S			S					L/S			L/S			S					L/S			L/S			S					L/S		
North Sea (Skagerrak) ICES AREA IIIa(north)																																													
Sandeel	IIIa N	L/S						S		S			L						L					L						L												L			
Herring	IIIa N	L/S						L/S		L/S			L/S						L/S		L/S			L/S						L/S		L/S			L/S						L/S		L/S		
Cod	IIIa N	L/S						S		L/S			L/S						S		L/S			L/S						S		L/S			S						S		S		
Haddock	IIIa N	L/S						S		S			L/S						S		S			L/S						S		S			S						S		S		
Hake	IIIa N	L/S						S		S			L											L																						
Blue Whiting	IIIa N	L/S						S		S			L											L																						
Norway lobster	Functional unit	L						L/S		L																																			
Northern prawn	IIIa N	L						L/S		L																																		L		
Plaice	IIIa N	L/S						S		L/S			L								L/S			L								L/S											S		
Saithe	IIIa N	L/S						L/S		S			L/S						L/S		S			L/S						L/S					S						L/S		S		
Mackerel	IIIa N	L/S						L/S		S			L/S						L/S					L/S						L/S					S						L/S				
Sole	IIIa N	L/S						S		S			L											L																						
Sprat	IIIa N	L/S						S		L/S			L/S								L/S			L/S								L/S			L/S								L/S		
Norway pout	IIIa N	L/S						L/S		S									L/S		S									L/S		S									L/S		S		
North Sea & Eastern Channel ICES AREAS IV, VIId																																												
Sandell	IV	L/S			S		S	L/S			L/S		L						L/S					L						L/S												L/S				
Herring	IV,VIId	L/S		S	L/S		L/S	L/S			L/S	S	L/S			L/S		L/S	L/S			S	S	L/S			L/S		L/S	L/S			S	S	L/S			S		L/S	L/S		S	S
Seabass	IV, VIId	S		L/S	S		S	S			L/S				L							S			L								S										S	
Cod	IV, VIId	L/S		S	L/S		L/S	S			L/S	S	L/S			L/S		L/S	S			L/S	S	L/S	S		L/S		L/S	S			L/S	S	S		S	L/S		S	S			L/S	S
Four-spot megrim	IV,VIId	S			S		S	S			L/S																																		
Megrim	IV,VIId	S			S		S	S			L/S	S						S					S										S										S	S
Black-bellied angler	IV,VIId	S			S		S	S			L/S	S										S	S											L/S										L/S	S
Anglerfish	IV,VIId	L/S		S	S		S	S			L/S	S	L			S			S			L/S	S	L						S				L/S				S			S			L/S	S
Haddock	IV, VIId	L/S		L/S	S		S	S			L/S	S	L/S			S		S	S			L/S	S	L/S	S		S		S	S			L/S	S	S		S	S		S	S			L/S	S
Whiting	IV, VIId	S		L/S	S		L/S	S			L/S	S	S		L	S		L/S	S			L/S	S	S	L/S		S		L/S	S			L/S	S	S		S	S		S	S			L/S	S

Table 7.1 (Cont'd)

Blue whiting	IV,VIId	L/S			S		S	L/S			L/S		L			S			L					L						L						
Lemon sole	IV,VIId	L/S		S	S		L/S	S			L/S							L/S				L/S							L/S				L/S				
Mullet	IV, VIId	S		S	S		S	S			L/S																										
Red mullet	IV, VIId	S		L/S	S		S	S			L/S				S							S			S												
Norway lobster	Functional unit	L					L/S	L/S			L/S																										
Northern prawn	IV	L						L/S																													
Scallops	VIId	S		L/S							L/S				S										S												
Plaice	IV	L/S		L/S	L/S		L/S	S			L/S		L			L/S		L/S				L/S		L	L/S		L/S		L/S				L/S				
Plaice	VIId			L/S							L/S											L/S			L/S									L/S				
Saithe	IV, VIId	L/S		L	L/S		S	L/S			L/S	S	L/S			L/S		S	L/S			L	S	L/S			L/S		S	L/S				L	S			
Turbot	IV, VIId	S		S	L/S		L/S	S			L/S	S				L/S		L/S				L/S	S						L/S				L/S				
Thornback ray	IV, VIId	S		S	S		L/S	S			L/S	S				S		L/S				S	S														
Starry Ray	IV, VIId	S		S	S		S	S			L/S	S				S						S	S														
Cuckoo Ray	IV, VIId	S		S	S		S	S			L/S	S				S						S	S														
Spotted Ray	IV, VIId	S		S	S		L/S	S			L/S	S				S						S	S														
Other Rays & Skates	IV,VIId	S		S	S		S	S			L/S	S				S						S	S														
Mackerel	IV,VIId	L/S		L/S	L/S		L/S	L/S			L/S	S	L/S			L/S		L/S	L/S			S	S	L/S					L/S	L/S					S	S	
Brill	IV, VIId	S		S	S		L/S	S			L/S	S				S		L/S				L/S	S						L/S				L/S				
Sole	IV	L/S		S	L/S		L/S	S			L/S		L			L/S		L/S				L/S							L/S				L/S				
Sole	VIId			L/S							L/S				L							L/S			L								L/S				
Sprat	IV,VIId	L/S		S	S		S	L/S			L/S		L/S			S		S	L/S					L/S	S		S		S	L/S				S			S
Horse mackerel	IV,VIId	L/S		S	L/S		L/S	L/S			L/S	S	L/S			L/S		L/S	L/S				S	L/S			L/S		L/S	L/S							
Norway pout	IV	L/S		S	S		S	L/S			L/S	S	L/S			S		S	L/S				S	L/S	S		S		S	L/S					S	S	
NE Atlantic & Western Channel ICES AREAS II, V, VI, VII (exc d) VIII IX X XII XIV																																					
Scabbardfish	IXa, X																																				
Alfonsinos	X																																				
Edible crab	all areas			L/S		S					L/S						S											S									
Herring	VIa, VIIabcj				L	S	L				L/S	S				L	S	L					S				L	S	L				S	S		
Conger	X																					S														
Roundnose Grenadier	all areas			L	S						L														L	L										
Seabass	all areas, ex. IX			L/S							L/S														L	L							S			
Anchovy	IXa, only Cadiz		S/L											S/L								S														
Anchovy	VIII		S/L	L/S							L			S/L											L/S	L/S										
Cod	VIa, VIb,VIIa, VIIb-			L/S		S					L/S	S			S		S						S		L/S	L/S		S					L/S	S		
Bluemouth rockfish	Vif-j, VIIIab, IXa, X			S							L											L/S														
Lobster	all areas			L							L/S																										
Orange roughy	all areas			L							L/S																										
Four-spot megrims	Vb,VI,XII,XIVVII,VIIIa-		S/L	S							L/S	S		L									S													
Megrim	Vb,VI,XII,XIVVII,VIIIa-		S/L	L/S		S					L/S	S		L	L		S						S			L/S		S					L/S			
Common squids	VIIIc, IXa		L																			L/S			L/S											

Table 7.1 Cont'd

Black-bellied angler	Vb,VI,XII,XIV					S						S					S						S				S																		S
Black-bellied angler	VIIIc,IX										S																						S												S	
Anglerfish	Vb,VI,XII,XIV		L	L/S		S						S			L/S		S					S	S			L/S		S									S								S
Anglerfish	VIIIc,IX		S/L								S			L											L/S								S			S/L								S	
Haddock	Vb,VI,XII,XIV			L								S										S	S											S											S
Haddock	VIa, VIb,VIIa,			L/S		S					L/S	S			L		S						S			L/S		S					S	S			S							S	S
Whiting	IX																					S			L/S																				
Whiting	Vb, VI, XII, XIV, VIIa,			L/S		S					L/S	S			L/S		S						S			L/S		S					S	S			S							S	S
Hake	IIIa,IV,VI,VII,VIIIab,VIIIc		S/L	L/S		S		S			L/S	S		L	L/S		S					S	S		L/S	L/S		S					L/S			S/L	S							L/S	S
Blue whiting	I-IX,XII,XIV		S/L	S	L/S	S	L	L/S						L		L	S	L	L/S			L/S			L/S		L	S	L	L/S						S/L	S	L	S	L	L/S				
Blue ling	X			L																																									
Ling	all areas			L/S	L						L/S	S			S								S			S											S								S
Red mullet	all areas			L/S							L/S				L/S										S	S											S								
Norway lobster	Functional Unit		S/L	L/S							L/S			L	L/S										S											S/L	L/S							S	
Common octopus	VIIIc, IXa		L											L																						L									
Shrimp	VIIIc, IXa		S/L																																										
Common scallops	VIId										S															S											S								
Forkbears	X																								S																				
Plaice	VIIa, VIIe-g			S		S					L/S						S											S					L/S											L/S	
Saithe	Vb,VI,XII,XIV			L	L	S					L	S			L	L	S					L/S	S			L	L	S						S				L							S
Saithe	VII,VIII			L/S		S					L/S	S					S						S		L	L/S		S						S			S								S
Wreckfish	X																								L/S																				
Blond Ray	all areas			S							L/S	S			S								S														S							L/S	S
Thornback ray	all areas			S							L/S	S			S							L/S	S														S							L/S	S
Spotted Ray	all areas			S							L/S	S			S							L/S	S														S							L/S	S
Cukoo ray	all areas			L/S	S						L/S	S			S							L/S	S														L/S							L/S	S
Other rays and skates	all areas			S	S						L/S	S			S							L/S	S														S							L/S	S
Greenland halibut	Va,XII,XIV				L/S											L/S						L/S					L/S											L/S							
Sardine	VIII,IX		S/L	L/S							L			S/L												L/S										S/L	L/S								
Spanish mackerel	VIII,IX			S							L														L/S																				
Mackerel	II,IIIa,IV,V,VI,VII,VIII,IX		S/L	S	L	S	L				L/S	S		S/L		L	S	L					S				L	S	L				L/S	S		S/L		L	S	L				L/S	S
Redfish	Va,XII,XIV				L/S											L						L					L											L							
Cuttlefish	VIIIc, IXa										L																																		
Sole	VIIa/VIIe VIIfg/VIIIab			L		S					L/S						S									S		S					L/S				S							L/S	
Sole	VIIIabcd, VIIhjk,IXa			S		S					L/S						S					L/S				L/S		S					L/S				S							L/S	
Seabreams	VIIIc, IXa, X		S/L	L/S							L											L/S			S											S/L									
Horse mackerel	X																								L/S																				
Horse mackerel	IIa,IVa,V,VI,VII,VIII,IX		S/L		L	S	L	L/S			L/S	S		S/L		L	S	L					S				L	S	L				L			S/L		L	S	L				L	S
Pouting	IXa, VIIIc			S																		L																							

Table 7.1 shows by country, species and area an overview of the present sampling of biological information. As can be seen in Table 7.1 all species are measured by length. On the other hand not all the listed species are individually weighed or aged or analysed for sex and maturity.

The IBTSWG anticipated it as impossible to start to include collection of biological information of more species than the present number of species. Partly because of the need to significantly increase manpower on IBTS surveys and this increase of manpower is not expected to be an option and partly because no sampling design or guidelines is given.

Therefore, the IBTSWG recommends that, until guidelines have been provided and sampling schemes and protocols for this biological activity have been developed, institutes should continue sampling according to their national sampling schemes, whether these schemes are in accordance with the EU Data Directive or the sampling is carried out as part of national interest. As part of this strategy IBTSWG will seek guidance from SGGROMAT.

IBTSWG recognises the Commission's desire to have a combined analysis and the willingness of the Commission to fund a dedicated Workshop but this procedure will have to await a response from the SGGROMAT before being developed further. Such an eventuality could occur in 2004 but recommend that it should be undertaken in conjunction with the ICES Planning Group on Commercial Catch, Discards and Biological Sampling (PGCCDBSC.)

8 REVIEW OF THE SGSTG REPORT

In its 2002 report (ICES 2002a), the International Bottom Trawl Working Group (IBTSWG) acknowledged the need for a new standard gear in the IBTS Eastern Atlantic Area. This need was based on a number of factors:

- There is no widely used common gear outside of the North Sea. Gear currently used within the IBTS co-ordinated area includes; GOV (in various configurations), scaled down GOV, Standard Baca 44/60, Porcupine Baca, Norwegian Campelen trawl, rockhopper and PHHT.

- The standard (North Sea) GOV is expensive and is not very robust. It is also known to exhibit variability in catching some species, particularly flat fish (SESITS, 1999; (See also Section 5.2.4)

- The GOV has been definitively rejected as suitable for Spanish and Portuguese coasts, and also is known to have limited value in many rough areas of the western shelf.

The IBTSWG believes that any standard gear should ideally be robust, cheap (to maintain as well as purchase), capable of deployment on rougher/harder seabeds than the GOV, and non selective for as many species as possible. Given the growing interest in ecosystem aspects, the gear should ideally also be suitable for sampling benthic species.

The idea of developing a standard gear *de novo*, due to the need of design, field trials and intercalibration, would be unlikely to produce a usable gear in less than five years. Given the current time series and the introduction of two new research vessels (Ireland and UK-England & Wales) in the western area, this time scale is not conducive to a complete revision and replacement of current gears. The delay in identification of potential new gears is problematic in that it means the development and modification of new surveys in the Western Division will be proceeding without a standard gear. Therefore it was considered that, rather than develop a new gear in less than one year, the SGSTG would focus its review on the survey trawl gears currently used in the IBTS Eastern Atlantic Area, or in other areas. The SGSTG identified a few suitable candidates that can fulfil the sampling requirements in all the surveyed area, including target species and ground types as main concerns and proposed modifications and field trials of these candidates trawl gears. Looking to the future, the group also discussed the general criteria to design a standard gear *de novo* for the IBTS North Eastern Atlantic area.

8.1 Overview of IBTS Eastern Atlantic Area data uses and needs

Estimates of abundance indices for assessment purposes are one of the most important objectives of IBTS surveys. However, geographical distribution of the species and marine ecosystem applications are becoming more important and their requirements are growing steadily, together with its complexity.

Gadoid abundance indices stand out as the most used from northern surveys (UK-Sco, UK-EW and UK-NI), whilst from southern and western surveys (IRWC, EVHOE and SP) flatfish and angler abundance indices are also used in several stocks assessments. These geographical differences arise from the variability in ground types and target species, and thus a geographical approach was applied to identify homogenous areas with common sampling requirements Table

8.1. (equivalence to areas identified in Fig 3.2.1: CS: Celtic sea central and south; BB: Bay of Biscay north and south; NS: all areas in northern coast of Spain; PT: all areas in Portuguese coast).

Besides the estimates of abundance indices for commercial species, there is currently a growing interest in ecosystem information, and multispecies or ecosystem models are becoming more common in fisheries resource management. In order to provide information for this approach a standard gear should ideally be suitable for sampling as much of the different macrofauna compartments as possible. Nevertheless, the SGSTG considered that the main current objective of IBTS surveys is to estimate abundance indices of commercial species for their assessment. Thus, whilst the sampling of benthic species should be addressed in designing the standard gear, it should not compromise this main objective, and it should not entail any impoverishment in the abundance indices.

Other approaches could be considered to supplement short falls in trawl only samples, so as to obtain the maximum benefit from the bottom trawl surveys. For example, other smaller scale sampling with small beam trawls or grabs during IBTS survey vessel time, or more detailed investigation of currently collected samples such as gut contents, would be beneficial.

Table 8.1 Main and secondary target species by each survey area considered (see Figure 8.1 for area codes). IBTS surveys covering each area as well as a first estimation of percentage ground type within each area. Bold figures in ground type indicate the interest of surveys in covering that ground type, though not necessarily being covered by the survey presently.

Area	Main target species	Other species of interest	IBTS Surveys (Quarters)	% ground type			
				1	2	3	4
WS	Cod, haddock, whiting, mackerel	Anglers, megrim, plaice, saithe, pollack, *nephrops*, elasmobranchs, pelagic species	SCOGFS (1&4) NIRGFS (1&4), IRGFS (4)	**20**	**50**	**24**	6
WI	Cod, haddock, whiting, plaice, sole	Anglers, megrims, hake, *Nephrops*, saithe, pelagic species	IRGFS (4)	**80**	**20**		
PO	Hake, megrims, anglers, *Nephrops*	Witch, Deep water species, elasmobranchs	SPGFP (4)	**30**	**45**	**15**	10
IS	Cod, haddock, whiting, plaice, sole	*Nephrops*, elasmobranchs, pelagic species	SCOGFS (1&4) NIRGFS (1&4) IRGFS (4) CEFAS (4)	**70**	**20**	**10**	
WC	Cod, haddock, whiting, plaice, sole, mackerel	Anglers, herring, lemon sole, cephalopods, elasmobranchs, pelagic species	CEFAS (1&4) EVHOE (4)	**10**	**20**	**50**	20
CN	Cod, haddock, whiting, hake, megrim, plaice, sole, anglers	*Nephrops*, turbot, Pollack, ling, elasmobranches, lemon sole, pelagic species	CEFAS (1), IRGFS (4) EVHOE (4)	**10**	**30**	**50**	10
CS	Cod, haddock, whiting, hake, megrims, anglers, sole	*Nephrops*, Pollack, elasmobranches, ling, lemon sole, pelagic species	CEFAS (1&4) IRGFS (4) EVHOE (4)	**60**	**30**	**10**	
BB	Hake, megrims, anglers, whiting, horse mackerel, blue whiting, sole	*Nephrops*, elasmobranchs	EVHOE (4) RESGASC (2&4)	**70**	**20**	**10**	
NS	Hake, megrims, anglers, *nephrops*, horse mackerel, blue whiting	Mackerel	SPGFN (4)	**70**	**10**		20
PT	Hake, horse mackerel, blue whiting, rose & red shrimps, mackerel, spanish mackerel	Megrim, anglers, *Nephrops*	PGFS (3&4)	**20**	**40**	**20**	**20**
CA	Hake, horse mackerel, rose & red shrimps, *Nephrops*, Wedge sole	Mackerel, sea breams, cephalopods	PGFS (3&4) SPGFS (2&4)	**80**	**10**		10

Ground type codes: **1**: Sandy, muddy: trawlable with wire synthetic coat. **2**: Gravel, bed rocky: trawlable with wire with double coat. **3**: Moderate rocky: trawlable with rubber discs or bobbins. **4**: Hard rocky: hostile trawling grounds trawlable with rockhopper gear.

8.2 Ideal features of the Standard Gear

Basic Design: an uncomplicated gear design would be essential to enable ease of handling, deployment and repair on differing vessels. Rigging adjustment should also be as simple and steady as possible to avoid differing adjustments leading to differences in trawl performance.

Ground gear contact: looking at table 8.1 a good contact of the ground rope with the ground is essential for most of the species considered, but critical for *Nephrops*, anglers and flatfish. Nevertheless, the ground gear must also be adaptable to different seabed conditions.

Vertical and horizontal opening: for some target species it is essential that the vertical opening must be high enough to collect representative samples. Horizontal opening must be adequate to collect sufficient but not excessive samples, and compatible with the vertical opening for the stability of the net.

Mesh size: in the lower part of the sampling trawl, the mesh size must be small enough to catch *Nephrops* and flatfish. To maintain geometry and efficiency of the trawl it is recommended to use larger meshes in the upper wings and square. However, to maintain good water flow in the body of the trawl, the meshes in the top panels must reduce gradually to equal the meshes in the lower panel before the extension piece.

Robustness and durability: the material used in construction of the trawl must be chosen to ensure the strength and minimise the damage to the trawl. The design must incorporate guard meshes and tearing strips to minimise potential damage to the small mesh. There should be no slack netting in any panels of the trawl, especially in the lower wings and the belly.

Towing speed: the towing speed must be adapted to the behaviour of the different target species and remain constant for the duration of the survey tow. The trawl design must be compatible with the required towing (ground) speed and the actual speed through the water to maintain the geometry, stability and groundgear contact.

Herding effect: the herding effect of the rigging must remain constant at all times. The sweep angle and length must be chosen with reference to the behavioural characteristics of the target species.

Stability: geometry of the trawl gear must be maintained for different water depths, water $\mathbf{F}_{low}$ on the trawl, sea state and seabed conditions to ensure a stable catchability of the sampling trawl.

Costs: the costs of gear construction and maintenance should also be balanced against all the previous considerations.

8.3 Review of *a priori* candidate gears

Gears currently used in IBTS Eastern Atlantic Area were reviewed, and in considering what had been identified as the ideal characteristics for a standard gear, two different gears currently in use (Porcupine baca and GOV) were considered as potential candidates due to the following reasons:

- The good ground contact characteristics of the Porcupine Baca were felt to be more suitable to target species on the clear ground of the western shelf, slope and Porcupine area such as monkfish, nephrops, megrim and other flatfishes.

- The importance of the time series and spatial continuity of the GOV surveys was recognised. As well as this, the shorter wings and heavier ground gear of the GOV were considered currently to cope better with the rougher grounds encountered outside of these areas.

Besides these gears, a review of other *a priori* suitable candidates presented to the Study Group was carried out:

- The GOC 73 trawl gear is currently the standard gear used in the surveys of 'MEDITS' EC Co-operative projects. It is a four-panel gear with 35.7m headline length, a 7.4m side rope and a 40m groundrope length with coated wire and 55 kg of chains. The disadvantages of the GOC were a relatively low vertical opening of 2.5 m, instability when fishing on irregular grounds, and that the ground rope configuration would not be appropriate for rough grounds.

- Four members of the SGSTG met at the Sea Fish Industry Authority (SFIA, UK) flume tank in Hull on 29-30th Jan 2003, to discuss survey trawl designs and review existing commercial trawls. Scale models of several trawl designs were demonstrated in the flume tank, two of which were presented as general purpose trawls with characteristics suitable for the survey objectives we identified: the **Boris Goshawk** and **Stuart 360** trawls each had features desirable for a survey trawl. For example, the good wing shape of the Boris Goshawk and the long tapering cut of the Stuart 360. However, neither trawl had all of the features identified by the SGSTG (see Section 8.4). Nevertheless, the tank demonstrations indicated that commercial manufacturers have the expertise to design a net with most or all of these features.

- A new survey gear, **NOAH**, is being studied in a one year EU project called Surveytrawl, and will be finished in December 2003. This project and the concepts being developed have been presented to this Working Group and a summary can be found in Section 12. Nevertheless given that this is an ongoing project and that the final design is still not defined, it is not considered as a suitable standard gear candidate for the IBTS North Eastern Area.

8.4 Candidate nets and ground configurations, field trials

Taking into consideration the variability of target species and ground types in the IBTS Eastern Atlantic Area, and the various gears currently used in this area, the group agreed that two gears, GOV and Porcupine baca, should be considered as suitable candidates to be used as standard gear. Nevertheless, both gears have pros and cons if adopted in all the IBTS surveys in the Eastern Atlantic Area. The GOV has potential fragility and cost problems stated above, and it is not suitable for collecting adequate benthic target species. The Porcupine baca has a vertical opening that *a priori* is not considered large enough to sample some pelagic target species, and preliminary trials in rough grounds have posed doubts on its suitability to work such areas. Therefore these gears will be modified (see below) to try overcoming these problems and trials will be performed during 2002.

The SGSTG will consider the results of these trials in its next meeting. If no agreement is achieved to adopt a single general standard gear, it is expected that these two modified gears (easier to inter-calibrate, given its similar geometry, than the present variety of gears) will cover all the sampling necessities in the area. An appropriate survey design for multi-vessel/gear permutations, a SGSTG term of reference to be addressed in the next meeting, will then allow estimating indices of abundance and biodiversity and any other appropriate indicators of stock and regional scales.

8.4.1 Porcupine Baca

8.4.1.1 Proposed modifications

The modifications proposed to the Porcupine Baca trawl were generally intended not to alter the original trawl geometry or efficiency, but only to strengthen the trawl and reduce the costs of its construction and maintenance. Modifications proposed were:

1. Mesh size: change the current design with 90 mm mesh throughout the net with a graduation mesh size from 90 mm in the anterior two panels to 70 mm in the posterior panels.

2. Groundrope: replace the current wrapped with a double coat nylon design with a ground rope separated from the fishing line and with 8.5 cm rubber discs ballasted at intervals with lead to achieve the same overall weight in the water. The groundrope will be fastened to the fishing line such that there is very little vertical gap between the groundrope and the fishing line.

3. Wings and belly: both are made of Polyethylene twine throughout and relatively prone to damage and tend to tear extensively when damaged. In the wings lower, most forward section of the side panels and in the most forward panels of the lower wings it is proposed to substitute the Polyethylene twine with a stiffer, high tenacity twine of the same diameter as in the original design. Suggested twine types include “Euronet”, “Brezline”, or “Compact” twines. And the same modification is proposed for the forward 10 meshes in the belly.

4. Trawl doors: doors with different doors are used in different vessels at the moment, what means that institutes using different doors should obtain door rigging settings that retain the desired trawl geometry.

5. Sweep length: 250 m sweeps are used, but sweep length may not maintain the same trawl geometry when the net is used with doors other than the specified 800 kg Oval Polyvalent doors or in waters shallower than 200 m. If

appropriate door rigging settings that retain the desired trawl geometry cannot be obtained for doors other than 800 kg Oval Polyvalent doors it is proposed to alter the sweep length.

8.4.1.2 Trials schedule

Modifications to the ground rope, sweeps length and mesh size will be tested as a first step. The trawl geometry will be tested in sea trials aboard the *Celtic Explorer* in March 2003 if a modified net is available at that time. After these tests, comparative hauls will be carried out between the modified Porcupine baca (R/V *Celtic Explorer*) and the GOV (R/V *Cirolana*). Another opportunity for testing the modified net, more focused on testing efficiency for flatfish and nephrops, will be on the Spanish Porcupine survey in autumn 2003. At this time repeated tows over the same grounds with the original and modified nets may also provide data on relative efficiency.

If vessel time is available at the end of Porcupine survey, comparison experiments between the standard baca trawl (R/V *Cornide de Saavedra*) and Porcupine baca (R/V *Vizconde de Eza*) will be performed on the Spanish coast by the IEO.

A model of the Porcupine baca trawl is being constructed by SFIA, and should be available from March 2003 for testing at the Hull flume tank.

8.4.2 GOV

Problems were identified deploying and fishing the GOV in a working document presented to the Study Group (Bellail and Meillat, 2003), which results in damage to the body of the trawl. The consequence of this is that confidence has been lost in this trawl design. With some minor modifications it may be possible to restore confidence in this gear and reduce lost fishing time. All modifications must be carried out with due consideration to existing trawl geometry, with a view to maintaining the time series index. The distribution in the water column of pelagic or semipelagic target species will be investigated in the literature, with a view to reviewing headline height parameters to standardise GOV deployment across nations and surveys. Any potential changes will be taken with due consideration to target species.

8.4.2.1 Proposed modifications

After experiments made using the SFIA model of the GOV 36/47 (MarLab specification) at the Hull flume tank, in order to reduce loose netting and ground contact in the lower wings and belly, and considering the problems stated above, the following modifications were proposed:

1. Replace kite with flotation.
2. Incorporate new twine technology – Replace low tenacity with high tenacity twine.
3. Strengthen the belly with tearing strips and/or belly lines.
4. Develop ground gear D (Rockhopper) experimental design (direct observations).
5. Investigate the effect of removing the middle bridle (Maintain geometry).
6. Alter flotation to compensate for instrumentation.

8.4.2.2 Trials schedule

CEFAS has planned to conduct some gear trials aboard RV *Cirolana* in the North Sea by the end of February 2003. The aim is to collect data to evaluate the observations made using model trawls in the SFIA flume tank. The gear deployed during the trials is planned to include a Porcupine baca trawl, a standard GOV, and a GOV with modifications following the recommendations from the SFIA flume tank visit in January 2003 (section 8.8.1). If initial trials to modify the GOV prove successful, then the performance of the GOV with different ground gears may also be tested.

MARLAB is planning to conduct GOV gear trials in the North Sea during May and November 2003. The possibility will exist to test some of the proposed modifications e.g. flotation, removing the middle bridle, use of Rockhopper Groundgear. Net parameters and direct observation would be recorded on all trawls to assess implications of net configuration to gear geometry. All modifications will be undertaken with reference to results from the CEFAS trials during February 2003.

8.5 Trials methodology

Trials will follow if possible the standard methodology for IBTS surveys described in the Manual for The International Bottom Trawl Surveys in the Western And Southern Areas (ICES, 2002b), but applying the proposed modifications.

However it is understood that to make the most of ship-time, trawl duration can be reduced while studying gear geometry. Nevertheless when comparative fishing experiences between two gears are performed, trawling duration will be the standard in the corresponding area/gear and consecutive hauls will be carried out in the same direction to avoid the possible effect of strong currents in the catches.

It is considered essential that as many as possible gear parameters are monitored and logged during the trials. Vertical opening, ground contact, wing and door spread and trawling speed with GPS are considered the minimum required information to assess the performance of the gear regarding its geometry.

8.6 Funding

A Working Document (Cardador and Chaves, 2003) presented to the SGSTG acknowledged the necessity and advantages of adopting a standard gear for the IBTS Eastern Atlantic Area, but stated some of the problems involved in such a decision. The cost of this decision in terms of trials, gear construction and acquisition, intercalibration with former gears, is large and needs to be planned and considered carefully to ensure the general adoption of the Standard Gear(s) by all the surveys involved in the IBTS Eastern Atlantic Area.

At present some countries face the replacement of their research vessels, and have assigned extra-funding for the associated trials and inter-calibrations. This circumstance will favour carrying out trials of the modified gears previous to the decision on the final standard gear(s) and will provide information on the sampling performance of the candidate gears. Nevertheless further funding will be required to test their suitability for each survey and carry out the necessary inter-calibrations to maintain continuity in time series. The possibility of applying for an Intercalibration project has to be addressed by Institutes carrying out surveys within the IBTS Eastern Atlantic area. Future calls of The Community Initiative Programme Interreg III B «Atlantic Area» should be considered as an appropriate frame for such a project, although other sources of budget should also be explored.

8.7 Recommendations from the SGSTG

- That a review of gear parameters being logged on surveys be made for inclusion in the IBTS manual to facilitate quality control in deployment of the gear. Such a review should include parameters such as sweep length, tide/current strength, placement and buoyancy compensation for net sensors. As a minimum requirement headline height, wing spread and door spread should be logged; the issue of groundgear contact during the haul should also be addressed.

- A study should be conducted to examine the definition of a valid haul with regard to weather conditions, gear damage and environmental factors effecting trawl performance.

- In the short term, surveys should concentrate on strengthening and small deployment modifications to their current gears (sweep length, bridles, buoyancy etc), without jeopardising their time series. These modifications should attempt to address the problems with the current gears identified by the SGSTG. Suitable modifications should be discussed at IBTS or SGSTG and adopted by all the surveys using the gear prior to its implementation.

- Over the current survey year the suggested modifications to the Porcupine Baca ground gear and the GOV bridle and buoyancy arrangements be tested by the relevant countries, and results reported back to this SGSTG.

- That the specific requirements of a standard gear(s) identified by the SGSTG be discussed with a number of commercial net manufacturers to get some tangible designs for a multi-purpose net. In the mid term these designs should form the basis for discussion, simulations should follow using flume tank trials, and Dynamit computer simulations and ad-hoc sea trials carried out where possible.

- In the long term, where a gear(s) can be identified, that appropriate resources should be sought for comprehensive sea trials and intercalibration prior to the adoption of such a gear. After adoption, trials should determine for which part of the fish assemblage the proposed standard gear delivers representative catches.

- Given that key decisions have to be taken in a short time its considered essential that information on trials and results of these should be exchanged between the SGSTG during the year.

9 SPECIES IDENTIFICATION

TOR (g) asked the Working Group to "further review the species identification and maturity stage photographic collection".

Since the last meeting a lot of new material has become available. A manual to determine gonadal maturity of Baltic cod (Tomkiewicz et al., 2002) has been prepared by the Danish institute, and similar manuals for sprat and herring are in preparation. In the Marine Laboratory, Aberdeen the collection of photographs of deep-water species was considerably extended, RIVO extended its collection of photographs of both fish and benthos, CEFAS collected photographs of maturity stages of different species.

The WG considered it essential that a workshop, as already suggested in its last meeting, should be held as soon as possible. Attendance at the Workshop is eligible for EU funding under the EU Data Collection Directive. Therefore IBTSWG recommend that a workshop should be held in IJmuiden early in 2004, and its main tasks would be to agree on a common approach and common storage formats.

10 RECENT PUBLICATIONS

TOR (h) asked the WG to "produce a review of recent publications involving IBTS data and surveys".

Appendix II lists the formal requests that were made for IBTS data since 1999, but some details on the purpose of these requests are lacking, especially for the earlier years.

Appendix III lists publications since 1999 for which data from the IBTS are known to have been used but the list should not be considered exhaustive. These publications are of a mixed nature and vary from publications in peer reviewed journals, journals without peer review, contributions to symposia, posters, PhD thesis, Msc thesis, to working documents. It should, of course, be realized that the usage of IBTS data for some of these publications was only marginal whereas for others they formed a major part.

Reports of ICES working groups that regularly use IBTS data (for indices of recruitment or for tuning the VPA), such as the North Sea Demersal WG, the Herring Assessment WG, and the Southern and Northern Shelf working groups, have not been included.

The list however does show the very wide use that is made of IBTS data for all sorts of studies.

11 PROTOCOLS

Institute's generally have developed protocols that describe individual institute's application of IBTS procedures and their sampling strategies. IBTSWG considered that such protocols provide guidelines that enable standardisation of sampling tools and survey gears but that better procedures are needed to ensure adherence to these protocols.

To achieve this need IBTSWG proposed that:

- **A gear checklist is used by all Institutes.** This will ensure that the correct properties of survey gears are standardized and adhered to from survey to survey. A GOV checklist was circulated (Appendix IV). IBTS members undertook to use the checklist prior to all subsequent surveys. It was proposed that gear checklists be developed for all survey gears used by IBTS members. IBTSWG recommended that a term of reference for the next IBTSWG be to review checklists developed for all survey gears and the adherence of each institute's survey gears to the defined parameters.

- **The IBTS manual is revised.** It was agreed that the manual could be more explicit in certain areas. Furthermore, the development of technologies, survey designs and increased demands on IBTS data demand that the manual include new sections. It was suggested that there be revision/inclusion of chapters on:

- Gear configuration,

- Survey design,

- Sampling strategies,

- Identification procedures (Maturity staging & Species identification),
- Data management (Checking & storage, DATRAS), and,
- Trawl monitoring (Deployment of sensors, Definition of tow validity, Definition of tow duration).

  Agreement on a revised manual was proposed as a term of reference for the next IBTSWG. In the meantime it was agreed that members would indicate areas of the manual requiring improvement and propose new sections. The UK (CEFAS) offered to co-ordinate these submissions and draft a new manual for agreement at the next IBTSWG.

- **The Survey Manuals produced by each Institute be circulated.** Some manuals include:
- The history of the survey,
- Gear requirements,
- Checklists for the correct layout of the gear,
- Information on the area covered,
- Descriptions of the day to day running of the survey,
- Protocols for fish handling,
- Sampling strategies,
- Biological sampling targets, and,
- Data handling.

  The Scottish survey organisational Flowcharts are included in Appendix V as an example. IBTS considers that the circulation of such descriptions will provide:

- An opportunity for Institutes to update their manuals,
- A means of maintaining standardisation from survey to survey, and,
- An instruction manual that can be followed and used by new scientists in charge of the survey, ensuring continuity throughout the time series.

- **Exchange of staff between surveys is continued.** Past exchanges have been very beneficial to all Institutes involved. IBTSWG considered that continuing such exchanges provides great opportunity for harmonisation of procedures between surveys and the transfer of improved methodologies between Institutes. Exchanges in the next 12 months are proposed during inter-calibration work (See Section 3). IBTSWG notes that funding to enable the transfer of staff during exchanges is an eligible cost under the EU Data Collection Regulation 1639-2001. IBTSWG encourage EU member states to include the costs of such co-ordination in subsequent National Programs submitted under this Regulation.

12 GEAR STUDIES AT IFREMER LORIENT

12.1 The SURVEYTRAWL project

12.1.1 Presentation of the project

A new survey trawl, is being studied in a one year AM EU project called **SURVEYTRAWL**, and will be finished in December 2003. The partners are:

- IFREMER (Co-ordinator)
- IMR Bergen
- NCMR Athens.

The trawls used to sample demersal fish are normally slightly modified commercial fish or shrimp trawls. Such trawls are designed to capture commercial species, and do not lend themselves well to representative sampling, mainly due to the herding effect of trawl doors, sweeps and bridles. The impact of herding is different on different species and size groups of the same species, and both inter- and intra-specific effects can be quite large.

The **SURVEYTRAWL** project intends to provide the strategic basis and initial design for a new survey trawl, which will represent a good compromise in terms of being non-herding and non-selective, and with stable and consistent operation. The final objective is to produce a new trawl with the characteristics of a beam trawl (no herding effect, stability), but with no beam.

To avoid the herding effect, three different trawls and associated rigging concepts will be studied. The netting part of the three trawls should be very similar for each concept, but the riggings will be very different. The three designs will be tested by means of numerical simulation, using Dynamit (commercial software), to verify whether the designs represent hydro-dynamically viable options.

Particular attention will be paid to:

• The gear simplicity.
• The net openings and geometry variations versus the towing speed and depth.
• The gear geometry variation for different friction intensities on the ground.

The comparison of both standard survey trawls and the new trawl concept will be made on the basis of engineering performance. In that respect, a technical comparison between existing and developed gears will be aided through expert advice.

12.1.1.1 SURVEYTRAWL preliminary results

Benoit Vincent (IFREMER) has made some simulations on the GOV to test an example of a new concept. The rigging used was with four doors: two doors connected to the lower wing ends and two pelagic doors connected to the upper wing ends. Fishermen in the Mediterranean commonly use this simple rigging.

With the standard rigging the vertical opening decreases from 4,3m to 2,7m (horizontal opening increases from 16,8m to 20,2m) when depth increases from 50m to 500m.

Using the four doors rigging, in the same depth range, the vertical opening decreases only from 4,4m to 4,3m (horizontal opening increases from 15,2m to 15,6m).

Some work remains to be done, but these preliminary results show that it is possible to produce a new trawl gear (specifically new rigging) which has potentially no herding effect and good stability of geometry at all times.

12.2 Designing a trawl for the new French survey ORAGO

The design of a new survey in the Bay of Biscay aimed principally at estimating abundance of *Nephrops* and Sole has lead to a revision of the gear previously used in a related survey in the same area of the Bay of Biscay.

The trawl is based on a 25m twin trawl and was modified in order to reduce herding effects. The first small-scale prototype was presented in a demonstration at the Lorient flume tank. Actual trials at sea will start at the beginning of April 2003.

13 REVIEW OF CO-ORDINATION

13.1 Quarter 1 North Sea

General

In January and February 2003 eight vessels participated in the quarter-1 IBTS in the North Sea. A gradual shift can be observed in the timing of the survey. Whereas in the past the IBTS used to be almost completely restricted to the month of February, nowadays several vessels start their survey well in January.

MIK-net

Altogether 507 MIK hauls were reported, made by 7 of the 8 vessels. Coverage (Figure 13.1) was very good, since only in one single rectangle were no hauls made. It should be noted that all vessels except one fish with the standard MIK plankton net. One vessel uses a rectangular instead of a ring version of the MIK net.

From the catches it is apparent that the larvae of year-class 2002 have a rather westerly distribution. The 2003 index is much lower than the indices for the proceeding three years.

GOV-trawl

GOV coverage of the survey area was complete, with 1 to 5 hauls per rectangle. Figure 13.2 shows time series of 1-group indices for 7 of the 8 target species.

The preliminary indices for the youngest year classes of herring and sprat are approximately twice the average of the last 25 years. In contrast, the catches of gadoids were extremely poor. The preliminary indices for cod and haddock were less than 10 % of the average values, for whiting the index is approximately 25 % and for Norway pout 70 % of the average.

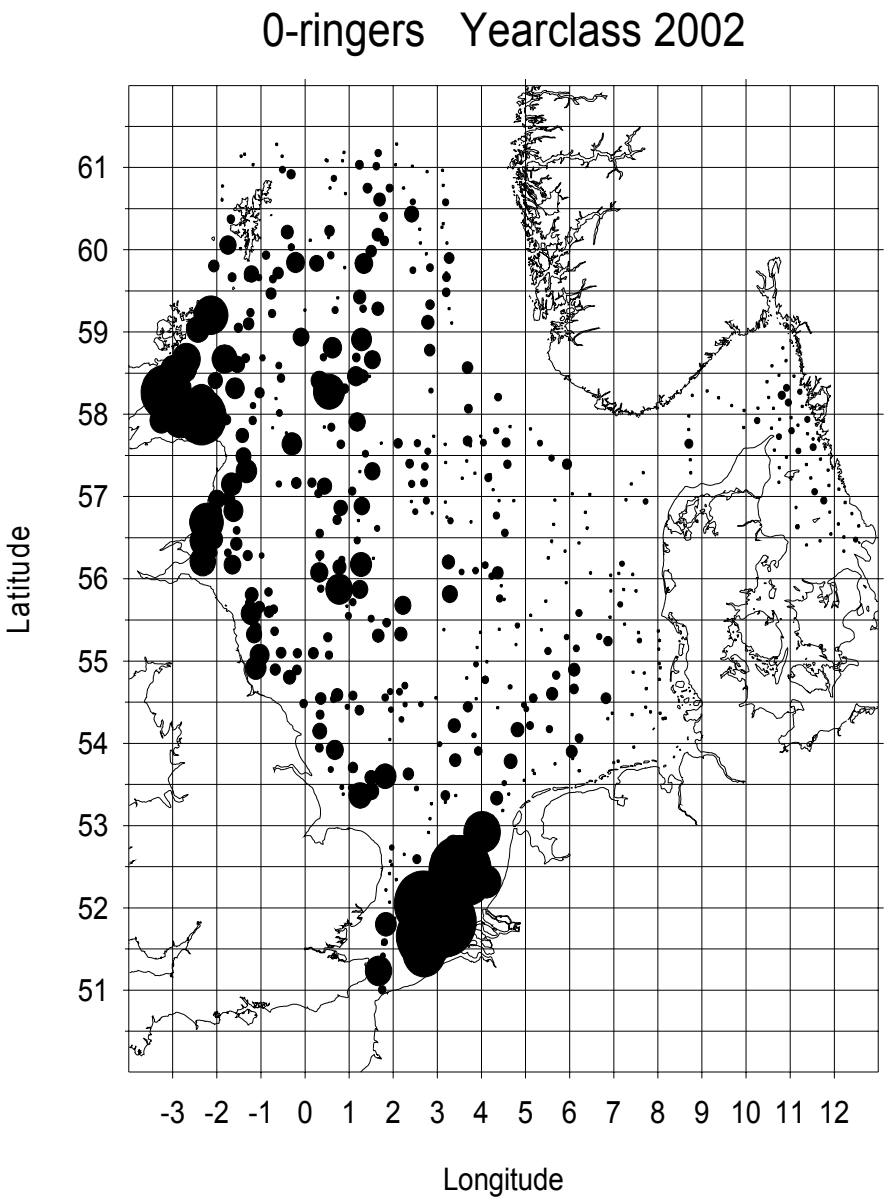

Figure 13.1 Herring larvae caught by MIK during the quarter 1 IBTS survey in 2003. Most of the catches in the Southern Bight are not included in the overall final MIK index for North Sea herring, since these belong to the Downs component.

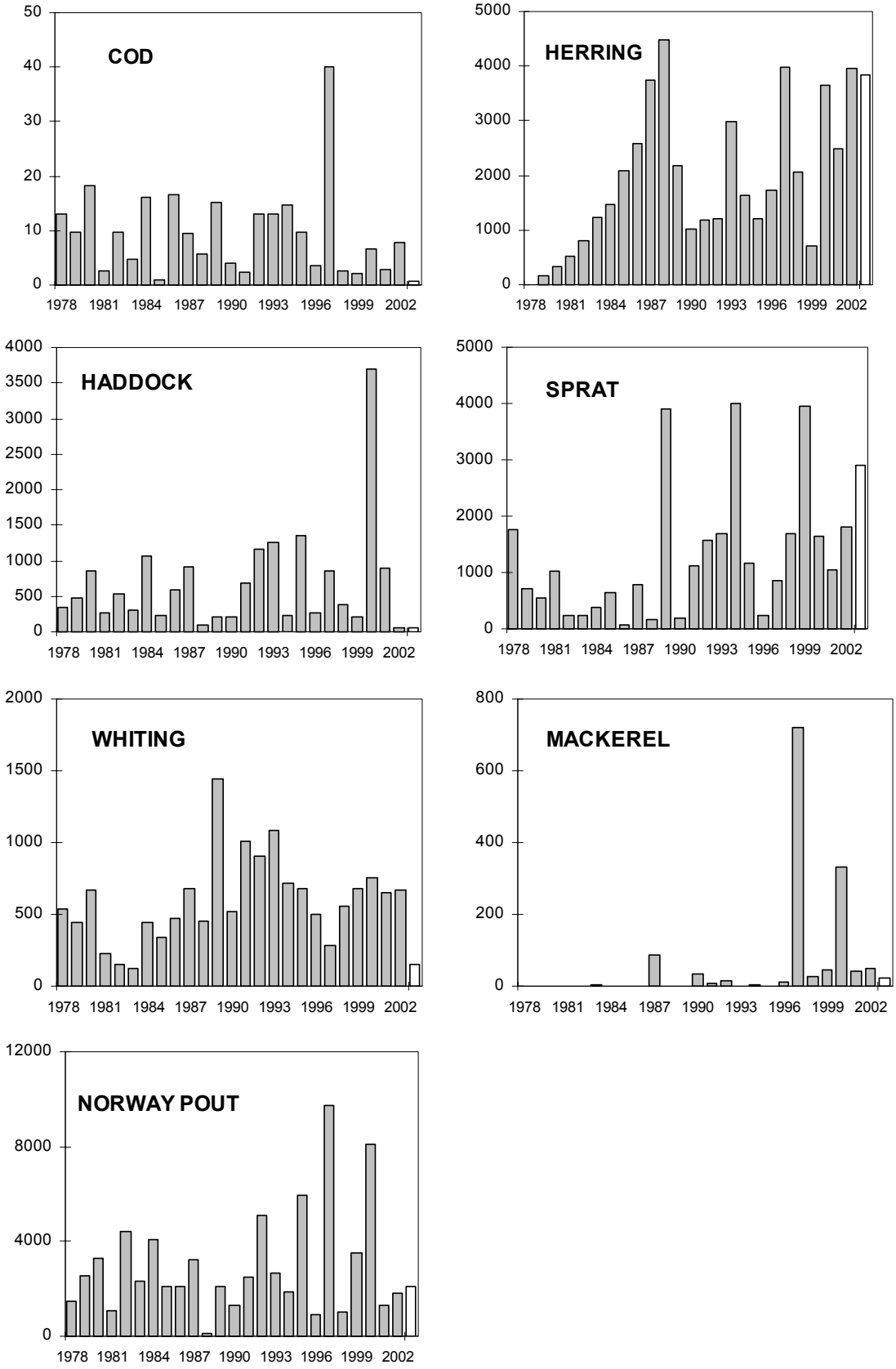

Figure 13.2 Time series of indices for 1-group fish caught during the quarter 1 IBTS in the North Sea. Indices for the last year are preliminary, and based on a length split of the catches.

13.2 Q3 in North Sea

The North Sea, Skagerrak and Kattegat quarter 3 survey has now completed 12 years in its co-ordinated form. Table 13.2.1 shows the effort ascribed to this survey over the time series. Good coverage of the area had continued until 2000 when, unfortunately Sweden withdrew their vessel at very short notice. As a consequence the Skagerrak and Kattegat were not surveyed that year. Up to present only data from the separate Scottish and English elements of this survey have been used each year in the North Sea Demersal Working Group (NSDWG). This is because of their longer time series. Now there are 12 years of the more extensive combined data, it is expected that ICES will be able to provide indices from the combined data set for use by the NSDWG when they meet in 2003. Towards satisfying a recommendation from the last report of this working group, a spreadsheet has been made available containing preliminary data for the target species for the years 1998 to 2002.

Table 13.2.1 Number of valid hauls and days at sea per country for quarter 3 surveys 1991-2002 and number of days proposed for 2003.

Year		Denmark	France	Germany	N.lands	Norway	Sweden	UK England	UK Scotland	Total
1991	Days				19		15	27	20	81
	Hauls				73		52	87	90	302
1992	Days		17	12	11		15	31	20	106
	Hauls		61	48	32		52	72	87	353
1993	Days		19		17		15	27	20	98
	Hauls		70		65		53	71	87	346
1994	Days		19		10		15	23	20	87
	Hauls		55		42		53	73	89	312
1995	Days				9		15	30	20	74
	Hauls				34		53	74	89	250
1996	Days		32	8	5		15	27	20	107
	Hauls		56	32	17		53	79	85	323
1997	Days			8	8		15	26	20	77
	Hauls			32	18		46	74	88	258
1998	Days	14		8			15	28	18	83
	Hauls	51		28			48	74	77	278
1999	Days	15		9		26	15	28	21	114
	Hauls	53		32		75	47	74	83	364
2000	Days	15		7		21		28	18	89
	Hauls	60		26		69		75	87	317
2001	Days	16		8		20	15	28	22	109
	Hauls	56		29		49	46	74	87	341
2002	Days	18		13		28	15	32	23	129
	Hauls	47		32		57	46	75	85	342
2003	Days	18		10		25	23	32	26	134

13.3 Review of Eastern Atlantic Co-ordination

During 2002 in the Eastern Atlantic, 664 valid tows were made by the countries regularly participating in IBTS surveys (UK (Scotland), France, Ireland, Spain and Portugal). In addition 37 hauls (17 with the Baca trawl and 20 with the Portuguese High Headline trawl) were made by *R.V. Cirolana* (England) in the Celtic Sea during a reconnaissance voyage made in preparation for the new CEFAS survey. The Spanish survey of the Porcupine included staff from Ireland's Marine Institute. Other areas of co-ordination are described in other sections of the report, including Sections 3.2 and 8.

Country	Survey	Vessel	No. of days	No. of valid hauls
Spain	Porcupine	Vizconde de Eza	31	86
	Spain north (Galicia & Cantabrian Sea)	*Cornide de Saavedra*	44	110
	Spain south (Gulf of Cadiz)	*Cornide de Saavedra*	11	39
Portugal	Portuguese GFS	*Noruega*		66
France	EVHOE	*Thalassa*	48	152
Ireland	ISCSGFS	*Celtic Voyager*	29	58
	WCGFS	*Marliona & Regina Ponti*	11	69
UK (Scotland)	Scottish GFS	*Scotia*	23	84
UK (Northern Ireland)	Northern Ireland GFS	*Lough Foyle*	No information received	
		ALL SURVEYS	**197**	**664**
UK (England)	Experimental reconnaissance	Cirolana	22	37

14 NEW VESSELS

Three new research vessels are due to be commissioned at the beginning of 2003 and the following gives a brief oversight of the specifications of these new research platforms.

14.1 RV Celtic Explorer

Celtic Explorer is 65.5m in length and accommodates 31 personnel, including 17-19 scientists. The new vessel is, in gross terms, six times the size of the *Celtic Voyager* and will be able to carry out marine research further offshore and will be able to stay at sea for much longer periods of time. The vessel is based in Galway, Ireland. The vessel was designed:

- To exceed the noise requirements of the ICES 209 CRR Report. As such the vessel is silent in fish survey terms,
- As a multipurpose vessel, being able to change from a survey programme to a fisheries programme with relative ease,
- With large laboratory spaces and IT rooms fitted with scientific equipment, and,
- With a full compliment of survey equipment and winches.

More information on the *Celtic Explorer* is available from the website of Ireland's Marine Institute (www.marine.ie).

Specifications:

Designed by:	Skipsteknisk AS
Length overall:	65.5 m
Beam:	15.0 m
Draught:	5.7 m
Type:	Steel hull, single screw
Speed:	>/= 14 knots M.C.R.
Range:	45 days
Classification:	Lloyds +100A1 Ice Class 1D +LMC +UMS SCM Multipurpose Research Vessel, Occasional Oil Recovery Capability
Propulsion:	2 x 1500 kW, 1 x 1000 kW DC 690V, 50 Hz Omni-directional bow thruster 700 kW
Deck Machinery:	1 A-frame 25t SWL in stern 1 A-frame knuckle, over side 10t SWL 1 knuckle boom crane of 8t/15m 1 telescope crane of 1.5t/10m 2 trawl winches of 30t each 2 Gilson winches of 12t each

	1 Demersal net drum 25t/10m3
	1 Pelagic net drum 35t/10m3
	1 Net sounder slip-ring winch 6t
	1 CTD slip-ring winch 6t/6000m
	1 Hydrographic winch 4t/2000m
	2 General purpose winches 20t/5t
Accommodation:	Crew - 12 single cabins
	Scientists - 11 single cabins, 4 two-man cabins
Scientific Offices:	1 Chemical lab
	1 Wet lab/fish lab with connecting freezer
	1 Water lab
	1 Dry lab
	1 IT Room
	1 Scientists' office/meeting room
General:	Fitted with a range of scientific equipment
	Drop keel for echo sounders/transducers
	Facility to carry containerised labs
	Passive and Active (Interring) anti-roll stabilisation systems
	Exceeds the noise requirements of the ICES 209 CRR Report
	Acoustically insulated

14.2 CEFAS Endeavour

The Centre for the Environment, Fisheries and Aquaculture Science, (CEFAS) Lowestoft will replace one of it current research vessels, Cirolana, in April 2003 with a new vessel, CEFAS Endeavour.

Specifications:

Designed by: BAE, UK.

Built by: Fergusons Shipbuilders, Scotland.

Outfitted and prepared for following tasks:
1. fishery research operations
2. acoustic research operations
3. environmental research operations

Gross tonnage: 2983GT

Length overall: 73.92m

Design draft: 5m

Width: 15.8m

Total power: 3000 kW
(diesel-electric propulsion, DC propulsion motors, fixed propeller)

Accommodation: 37 persons + infirmary (33 single cabins, 2 double cabins, all with separate bathrooms, 16 crew, 21 scientific)

Survey speed: up to 13.8 knots

Gear trials on the new vessel commenced on Monday 10 March 2003. Various types of sampling gear were trialed over the next 7 days. Unfortunately the full program of trials was not completed when one of the pistons in the aft A-frame failed. The GOV, Granton, FOTO and beam trawls were all successfully tested for shooting, hauling and recovery. The vessel, which is 73m in length, with 3000Kw engine power, can carry a complement of 16 crew and 21 scientists.

14.3 G.O. Sars

The Institute of Marine Research (IMR) and the University of Bergen (UiB) have joined forces to build a new research vessel. The vessel will be delivered early April 2003

Specifications:

Designed by: Skipsteknisk AS

Outfitted and prepared for following tasks:
1. fishery research operations
2. acoustic research operations
3. environmental research operations

Gross tonnage: 3800GT

Length overall: 77.5m

Depth to design loadline: 6.2m

Width: 6.4-18.6m

Class: DnV + 1A1, Ice C, E0, Dynpos AUT, Clean

Total power: 6000 kW
(diesel-electric propulsion, DC propulsion motors, fixed propeller)

Accommodation: 45 persons + infirmary (25 single cabins, 10 double cabins, all with separate bathrooms, 15 crew, 30 scientific)

Service speed: 17.0 knots (at 5.8m draft)
Survey speed: up to 13 knots

Pulling force: 50 tonnes (at 5 knots)

Noise reduction: according to ICES Co-operative research report #209

Trawl rigging: rigged for both pelagic and bottom trawls,

Acoustic sensors: two independent drop keels equipped with a number of acoustic sensors, double sonar

15 REGIONAL CO-ORDINATORS

There are three regional co-ordinators within the IBTS WG – one for the quarter 1 survey in the North Sea (Henk Heessen, RIVO), one for the quarter 3 surveys in the North Sea (Trevor Boon, CEFAS) and one for the eastern Atlantic (Rick Officer, MI-Ireland). Both the North Sea co-ordinators were willing to continue but Rick Officer tended his resignation due to other commitments. The WG appointed David Stokes, from the Marine Institute, Ireland as the new eastern Atlantic co-ordinator but in recognition of the extra work involved in this large survey area Francisco Velasco (IEO) was appointed as his deputy.

16 NOMINATIONS FOR A NEW CHAIR.

Andrew Newton is retiring as a member of IBTS and thus also Chair. The situation was discussed within the Working Group and two members presented themselves as nominees for the vacant post. A vote was held and Jean-Claude Mahe (IFREMER) was selected as the Group's preferred choice for new Chair. This selection will be presented to the Resource Management Committee for ratification in September 2003.

17 RECOMMENDATIONS

Recommendations are made at the appropriate places in the fore-going text where they can be viewed in context. However, a summary of IBTSWG recommendations is provided, together with a reference to the appropriate section.

Section 3

That all countries participating in the Quarter 1 survey in the North Sea, the Skagerrak and the Kattegat to use a MIK as specified in the IBTS Manual and to use a well balanced and calibrated flow-meter. The flow-meter should be attached to the MIK-frame correctly.

Given that the GOV is the gear used in most of the surveys in Celtic and Irish sea, it is recommended that this gear is adopted for the English survey series starting this year by R|V *CEFAS Endeavour* and for the Celtic Explorer for the continental margin.

Section 5 (Comments and recommendations)

MIQES

- In general the Working Group welcomes thorough scientific analysis like MIQES for they help to improve the quality of results derived from survey datasets. Notably the methods developed offer the opportunity to provide an improved spatial distribution and higher consistency of catches between years by accounting for variation caused by other factors.

- These improvements, however, appear to have little effect on the indices of year-class strength of most species (except for herring) and it is therefore not likely that they will have a significant impact on the assessments

FINE

- National representatives responsible for conducting IBTS expressed the impossibility of adjusting their current summer schedules to attempt randomising the haul timing. Nevertheless, the co-ordinator of the summer survey agreed to look at the frequency distribution of haul timing performed by each country to explore options.

- The relevant stock assessment working groups should be aware that data derived from the summer survey are not randomised with respect to time of day and that diurnal variation of catch rates can be a source of bias (upward or downward) when IBTS abundance indices are calculated.

- The problem of an uneven distribution of hauls over the day (notably the high number of hauls around 07.00) was acknowledged but the WG found that every solution for this problem would result in a reduction of the number of hauls that can be conducted over the day. Thus there is no possibility of keeping the same number of hauls and improving the distribution of hauls over the day without increasing costs

EVARES

- These conclusions must be viewed within the broader context of data collection and sampling costs, and the benefits and full uses of research surveys (i.e. not simply providing indices to calibrate stock assessments but also ecosystem oriented or bio-diversity studies) should be reviewed before an overall value-for-money analysis is conducted. Also, not all sources of uncertainty that can impact tuning time series derived from research surveys have been systematically reviewed (e.g. uncertainties in age length keys) since the objective was to evaluate the impact of survey frequency and intensity. In this context, the costs and benefits of other sources of information, rather than just research surveys, such as harbour sampling, commercial fleet catch and effort need to be reviewed on a similar basis.

- Considering that many of assessments are driven by the commercial catches a weak correlation of a particular survey with the assessments does not necessarily mean that the survey is incorrect. Comparison of assessments solely driven by one survey in combination with some of the methodology used in this study should allow a better evaluation of the quality of the survey (and/or commercial) catches with regard to tracking population changes over time.

- Work on the standardisation of trawl surveys and the ways indices of abundance are calculated should be encouraged.

Section 6

It was recommended that a 'health warning' be attached to any data extracted from the IBTS database in the future. This would be in the form of a text file sent out with any data extraction, explaining the history of the surveys, the nature of the data and the possible limitations for its use. Following on from this an analysis of data from beam trawl and GOV hauls carried out at the same time in the same areas is suggested, allowing a comparison of the different catchabilities of the various gears. This would provide a better understanding on the actual abundance of various commercial species, as well as the overall composition of the fish community in the areas covered.

Section 7

Until guidelines have been provided and sampling schemes and protocols for this biological activity have been developed, institutes should continue sampling according to their national sampling schemes, whether these schemes are in accordance with the EU Data Directive or the sampling is carried out as part of national interest. As part of this strategy IBTSWG will seek guidance from SGGROMAT.

IBTSWG recognises the Commission's desire to have a combined analysis and the willingness of the Commission to fund a dedicated Workshop but this procedure will have to await a response from the SGGROMAT before being developed further. Such an eventuality could occur in 2004 but recommend that it should be undertaken in conjunction with the ICES Planning Group on Commercial Catch, Discards and Biological Sampling (PGCCDBSC).

Section 8

This section was a review of the Study Group on Survey Trawl Gear for the IBTS Western and Southern Area (SGSTG). Some recommendations were made but they are best viewed in the context of the SGSTG report.

Section 9

Institutes should apply for funding under Data Collection Regulation 1639/2001 in order that a Workshop can be held in IJmuiden in 2004 to finalise the format of a photographic collection to aid identification of species and maturity stages.

Section 11

During the next 12 months the existing IBTS manual should be revised and re-written by correspondence so that the new draft version can be submitted for approval at the next IBTS meeting. This activity will be co-ordinated by Brian Harley who should approach individual participants for contributions.

A term of reference for the next IBTSWG be to review checklists developed for all survey gears and the adherence of each institute's survey gears to the defined parameters.

18 SUGGESTED TERMS OF REFERENCE FOR 2004

That IBTSWG meets in Lisbon for 4 days starting on 23rd March 2004 under the Chair of J-C Mahe (France) to:

(a) Co-ordinate and plan North Sea and North Eastern Atlantic surveys for the next twelve months
(b) Review the work completed by the SGSTG on gear standardisation in the eastern Atlantic
(c) Review the outcome of the SURVEYTRAWL project
(d) Review and comment on the outputs from the new DATRAS data base
(e) Agree on the intersessional revisions to the new IBTS manual
(f) Further develop protocols and criteria to ensure standardization of all sampling tools and survey gears and review institutional checking lists.
(g) To review the outcome of the PBCCC Workshop in be held in Nantes, January 2004
(h) To make a detailed check of the age/length/sex/maturity data for the last 3 years from the ICES data base (data to be supplied by ICES Secretariat).
(i) To consider and agree on depth stratification in the eastern Atlantic and Skagerrak.

The first day will be devoted to north-eastern Atlantic surveys; the final three days will discuss all IBTS matters.

19 REFERENCES

Bellail, R. and Meillat, M. 2003. The problems in using GOV 36/47 during EVHOE surveys in Bay of Biscay and Celtic Sea. Working document presented to the SGSTG, 12-14 Feb 2003. Vigo

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ICES, 2002a. Report of the International Bottom Trawl Survey Working Group. ICES CM 2002/D:03. Dublin, Ireland 8–11 April 2002.

ICES, 2002b. Manual for The International Bottom Trawl Surveys in the Western And Southern Areas. Revision II. Addendum to ICES CM 2002/D:03. Dublin, Ireland 8–11 April 2002.

Tomkiewicz J, L Tyberg, N Holm, A Hansen, C Broberg and E Hansen 2002. Manual to determine gonadal maturity of Baltic cod. DFU-rapport nr. 116-02, Charlottenlund, Danish Institute for Fisheries Research, 49 p.

Working Documents presented to IBTS.

I Ehrich, S. Looking for a new standard gear: Experiment and reflections.

II Velasco, F and Serrano, A. Distribution patterns of bottom trawl faunal assemblages in Porcupine bank; implications for Porcupine surveys stratification design.

APPENDIX I – DATRAS NEW EXCHANGE FORMAT

Table 1. Field name, field description, field type and requirement

RECORD TYPE 1 (Haul information - HH)			**M/O****			
Field name	**Field description**	**TYPE**	**BITS**	**IBTS NS**	**IBTS Atlantic**	**BTS**
RecordType	Record type	2A	M	M	M	M
Quarter	Quarter	1N	M	M	M	M
Country	Country	3A	M	M	M	M
Ship	Ship	4AN	M	M	M	M
Gear	Gear	10AN	M	M	M	M
SweepLngt	Sweep length	3N	O	O	O	Not
GearExp	Exceptions	2A	O	O	O	O
DoorType	Door type	2A	O	O	O	Not
StNo	Standard station number	6AN	M	M	M	M
HaulNo	Haul number	3N	M	M	M	M
Year	Year	4N	M	M	M	M
Month	Month	2N	M	M	M	M
Day	Day	2N	M	M	M	M
TimeShot	Time shot	4N	M	M	M	M
Stratum	Stratum	4A	Not	Not	M	O
HaulDur	Haul duration	3N	M	M	M	M
DayNight	Day/night code	2A	M	M	M	M
ShootLat	Shooting latitude decimal	3N. 4D	M	M	M	M
ShootLong	Shooting longitude decimal	+/-3N. 4D	M	M	M	M
HaulLat	Hauling latitude decimal	3N. 4D	M	M	M	M
HaulLong	Hauling longitude decimal	+/-3N. 4D	M	M	M	M
StatRec	ICES statistical rectangles	4AN	M	M	O	M
Depth	Depth	4N	M	M	M	M
HaulVal	Haul validity	1A	M	M	M	M
HydroStNo	Hydrographic station number	8AN	M	M	M	M
StdSpecRecCode	Standard Species Recording Code	1N	M	M	M	M
BycSpecRecCode	By Catch Species Recording Code	1N	M	M	M	M
DataTypes	Data type	1A	M	M	M	M
Netopening	Netopening (bottom trawl) / Beam width(beam trawl)	2N. 1D	O	O	O	M
Rigging	Rigging	2A	Not	Not	Not	O
Tickler	Number of tickler chains	1N	Not	Not	Not	M
Distance	Distance	4N	O	O	O	O
Warplngt	Warp length	4N	O	O	O	O
Warpdia	Warp diameter	2N	O	O	O	O
WarpDen	Warp density	2N	O	O	O	O
DoorSurface	Door surface	2N. 1D	O	O	O	Not
DoorWgt	Door weight	4N	O	O	O	Not
DoorSpread	Door spread	3N.1D	O	O	O	Not
WingSpread	Wing spread	2N.1D	O	O	O	Not
Buoyancy	Buoyancy	4N	O	O	O	Not
KiteDim	Kite dimensions	1N. 1D	O	O	O	Not
WgtGroundRope	Weight ground rope	4N	O	O	O	Not
TowDir	Towing direction	3N	O	O	O	O
GroundSpeed	Ground speed	1N.1D	O	O	O	O
SpeedWater	Speed through water	1N.1D	O	O	O	O
SurCurDir	Surface current direction	3N	O	O	O	O
SurCurSpeed	Surface current speed	2N.1D	O	O	O	O
BotCurDir	Bottom current direction	3N	O	O	O	O
BotCurSpeed	Bottom current speed	2N.1D	O	O	O	O

WindDir	Wind direction	3N	O	O	O	O
WindSpeed	Wind speed	3N	O	O	O	O
SwellDir	Swell direction	3N	O	O	O	O
SwellHight	Swell height	2N.1D	O	O	O	O
SurTemp	Surface temperature	2N.1D	O	O	O	O
BotTemp	Bottom temperature	2N.1D	O	O	O	O
SurSal	Surface salinity	2N.2D	O	O	O	O
BotSal	Bottom salinity	2N.2D	O	O	O	O
ThermoCline	Thermo cline	1A	O	O	O	O
ThClineDepth	Depth of thermo	4N	O	O	O	O

RECORD TYPE 2 (Length frequency distribution - HL)

			M/O**			
Field name	**Field description**	**TYPE***	**BITS**	**IBTS NS**	**IBTS Atlantic**	**BTS**
RecordType	Record type	2A	M	M	M	M
Quarter	Quarter	1N	M	M	M	M
Country	Country	3A	M	M	M	M
Ship	Ship	4AN	M	M	M	M
Gear	Gear	10AN	M	M	M	M
SweepLngt	Sweep length	3N	O	O	O	Not
GearExp	Exceptions	2A	O	O	O	O
DoorType	Door type	2A	O	O	O	Not
StNo	Standard station number	6AN	M	M	M	M
HaulNo	Haul no	3N	M	M	M	M
Year	Year	4N	M	M	M	M
SpecCodeType	Species code type	1A	M	M	M	M
SpecCode	Species code	10A	M	M	M	M
SpecVal	Validity code	2N	M	M	M	M
Sex	Sex	2A	O	O	O	O
TotalNo	Total number	7N	M	M	M	M
CatIdentifier	Category identifier	1N	M	M	M	M
NoMeas	Number measured	3N	M	M	M	M
SubFactor	Subsampling factor	3N.3D	M	M	M	M
SubWgt	Sub sampling catch weight	5N	M	M	M	M
CatCatchWgt	Category catch weight	5N.3D	M	M	M	M
LngtCode	Length class code	1N	O	O	O	O
LngtClass	Min. length class	3N.1D	M	M	M	M
HLNoAtLngt	No at length	3N	M	M	M	M

RECORD TYPE 3 (SMALK's - CA)

			M/O**			
Field name	**Field description**	**TYPE***	**BITS**	**IBTS NS**	**IBTS Atlantic**	**BTS**
RecordType	Record type	2A	M	M	M	M
Quarter	Quarter	1N	M	M	M	M
Country	Country	3A	M	M	M	M
Ship	Ship	4AN	M	M	M	M
Gear	Gear	10AN	M	M	M	M
SweepLngt	Sweep length	3N	O	O	O	Not
GearExp	Exceptions	2A	O	O	O	O
DoorType	Door type	2A	O	O	O	Not
StNo	Station number	6AN	M	M	M	M
HaulNo	Haul no	3N	M	M	M	M
Year	Year	4N	M	M	M	M
SpecCodeType	Species code type	1A	M	M	M	M
SpecCode	Species code	10A	M	M	M	M

AreaType	Area type	2N	M	M	M	M
AreaCode	Area code	4 AN	M	M	M	M
LngtCode	Length class code	1AN	M	M	M	M
LngtClass	Min. length class	3N.1D	M	M	M	M
Sex	Sex	1A	M	M	M	M
Maturity	Maturity	2AN	M	M	O	M
PlusGr	Plus group identifier	2A	O	O	O	O
age	Age	2N	M	M	M	M
CANoAtLngt	Number	3N	M	M	M	M
IndWgt	Individual weight (g)	5N	O	O	O	O

Table 2. Legal values

RECORD TYPE 1 (Haul information - HH)

Field name	BITS	IBTS NS	IBTS Atlantic	BTS
RecordType	HH	HH	HH	HH
Quarter	1 to 4	1 to 4	1 to 4	1 to 4
Country	See Appendix III	See Appendix III	See Appendix III	See Appendix III
Ship	See Appendix III	See Appendix III	See Appendix III	See Appendix III
Gear	See Appendix IV	See Appendix IV	See Appendix IV	See Appendix IV
SweepLngt	000-999, -9	000-999, -9	000-999, -9	-9
GearExp	B, D, -9	B, D, -9	B, D, -9	B, D, -9
DoorType	P, V, F, K, -9	P, V, F, K, -9	P, V, F, K, -9	-9
StNo	-9	-9	-9	-9
HaulNo	1 to 999	1 to 999	1 to 999	1 to 999
Year	1900-2099	1900-2099	1900-2099	1900-2099
Month	1 to 12	1 to 12	1 to 12	1 to 12
Day	1 to 28/29/30/31	1 to 28/29/30/31	1 to 28/29/30/31	1 to 28/29/30/31
TimeShot	1 to 2400, 9999	1 to 2400, 9999	1 to 2400, 9999	1 to 2400, 9999
Stratum	See Appendix (to be created)	See Appendix (to be created)	See Appendix (to be created)	See Appendix (to be created)
HaulDur	5 to 150	5 to 90	5 to 90	5 to 90
DayNight	D, N, space	D, N	D, N	D, N
ShootLat	53.0000 to 66.0000	50.0000 to 64.0000	50.0000 to 64.0000	50.0000 to 64.0000
ShootLong	0.0000 to 59.0000	0.0000 to 59.0000	0.0000 to 59.0000	0.0000 to 59.0000
HaulLat	53.0000 to 66.0000	50.0000 to 64.0000	50.0000 to 64.0000	50.0000 to 64.0000
HaulLong	0.0000 to 59.0000	0.0000 to 59.0000	0.0000 to 59.0000	0.0000 to 59.0000
StatRec	Appendix	Appendix	Appendix	Appendix
Depth	10 to 150, space5 to 150 in Sub-div. 22 + 24, -9	10 to 300, -9	10 to 600	5 to 150, -9
HaulVal	I, V, N	I, V	I, V	I, V
HydroStNo				
StdSpecRecCode	See Appendix V	See Appendix V	See Appendix V	See Appendix V
BycSpecRecCode	See Appendix V	See Appendix V	See Appendix V	See Appendix V
DataTypes	R, C, S	R, C, S	R, C, S	R, C, S
Netopening	1.5 to 10.0, -9	2.5 to 10.0, -9	2.5 to 10.0, -9	2.5 to 10.0, -9
Tickler	-9	-9	-9	0 – 8
Rigging	-9	-9	-9	S, M, FM
Distance	1850 to 9999, -9	1850 to 9999, -9	1850 to 9999, -9	1850 to 9999, -9
Warplngt	100 to 999, -9	100 to 999, -9	100 to 999, -9	10 to 500
Warpdia	10 to 60, -9	10 to 60, -9	10 to 60, -9	10 to 60, -9
WarpDen				
DoorSurface	1.0 to 10.0, -9	3.0 to 10.0, -9	3.0 to 10.0, -9	-9
DoorWgt	50 to 2000, -9	500 to 2000, -9	500 to 2000, -9	-9
DoorSpread	25 to 200, -9	48 to 180, -9	48 to 180, -9	-9

WingSpread	12 to 30, -9	12 to 30, -9	12 to 30, -9	12 to 30, -9
Buoyancy	50 to 200, -9	50 to 200, -9	50 to 200, -9	-9
KiteDim	0.5 to 2.0, -9	0.5 to 2.0, -9	0.5 to 2.0, -9	-9
WgtGroundRope	0 to 800, -9	0 to 300, -9	0 to 300, -9	-9
TowDir	1 to 360, -9	1 to 360, -9	1 to 360, -9	1 to 360, -9
GroundSpeed	2.0 to 6.0, -9	2.0 to 6.0, -9	2.0 to 6.0, -9	2.0 to 6.0, -9
SpeedWater	1.0 to 9.9, -9	1.0 to 9.9, -9	1.0 to 9.9, -9	1.0 to 9.9, -9
SurCurDir	0 to 360, -9	0 to 360, -9	0 to 360, -9	0 to 360, -9
SurCurSpeed	0 to 10.0, -9	0 to 10.0, -9	0 to 10.0, -9	0 to 10.0, -9
BotCurDir	0 to 360, -9	0 to 360, -9	0 to 360, -9	0 to 360, -9
ButCurSpeed	0 to 10.0, -9	0 to 10.0, -9	0 to 10.0, -9	0 to 10.0, -9
WindDir	0 to 360, -9	0 to 360, -9	0 to 360, -9	0 to 360, -9
WindSpeed	0 to 100, -9	0 to 100, -9	0 to 100, -9	-9
SwellDir	0 to 360, -9	0 to 360, -9	0 to 360, -9	0 to 360, -9
SwellHight	0 to 25.0, -9	0 to 25.0, -9	0 to 25.0, -9	0 to 25.0, -9
SurTemp	-1.0 to 30.0, -9	-1.0 to 30.0, -9	-1.0 to 30.0, -9	-1.0 to 30.0, -9
BotTemp	1.0 to 20.0, -9	1.0 to 20.0, -9	1.0 to 20.0, -9	1.0 to 20.0, -9
SurSal	10.00-38.00, -9	10.00-38.00, -9	10.00-38.00, -9	10.00-38.00, -9
BotSal	20.00-38.00, -9	20.00-38.00, -9	20.00-38.00, -9	20.00-38.00, -9
ThermoCline	y=yes, n=no, -9	y=yes, n=no, -9	y=yes, n=no, -9	y=yes, n=no, -9
ThClineDepth	5 to 100, -9	5 to 100, -9	5 to 100, -9	5 to 100, -9

RECORD TYPE 2 (Length frequency distribution - HL)

Field name	BITS	IBTS NS	IBTS Atlantic	BTS
RecordType	HL	HL	HL	HL
SpecCodeType	N, T	N, T	N, T	N, T
SpecCode	See Appendix VII	See Appendix VII	See Appendix VII	See Appendix VII
SpecVal	See Appendix VIII	See Appendix VIII	See Appendix VIII	See Appendix VIII
Sex	M, F, U, -9	M, F, U	M, F, U	M, F, U
TotalNo	0 to 9999999, -9	., 0, 1, 5, 9	., 0, 1, 5, 9	., 0, 1, 5, 9
CatIdentifier	1 to 5	1 to 999, -9	1 to 999, -9	1 to 999, -9
NoMeas	0 to 999, -9	0 to 9999999, -9	0 to 9999999, -9	0 to 9999999, -9
SubFactor	1 - 999.999	1 to 5	1 to 5	1 to 5
SubWgt	0 to 40000, -9	0 to 999, -9	0 to 999, -9	0 to 999, -9
CatCatchWgt	0 to 10000000, -9	1 - 999.999	1 - 999.999	1 - 999.999
LngtCode	., 0, 1, 2, 5, 9	0 to 40000, -9	0 to 40000, -9	0 to 40000, -9
LngtClass	1 to 999, -9	0 to 10000000, -9	0 to 10000000, -9	0 to 10000000, -9
HLNoAtLngt	1 to 999999, -9	1 to 999999, -9	1 to 999999, -9	1 to 999999, -9

RECORD TYPE 3 (SMALK's - CA)

Field name	BITS	IBTS NS	IBTS Atlantic	BTS
RecordType	CA	CA	CA	CA
AreaType	22 to 32, see Appendix IX	0 to 3	0 to 3	0 or 4
AreaCode	See Appendix IX	See Appendix IX	See Appendix IX	See Appendix IX
LngtCode	., 0, 1, 2, 5, 9	., 0, 1, 5, 9	., 0, 1, 5, 9	., 0, 1, 5, 9
LngtClass	1 to 999, -9	1 to 999, -9	1 to 999, -9	1 to 999, -9
Sex	M, F, U, -9	M, F, U	M, F, U	M, F, U
Maturity	1 to 5, -9	1 to 4, space	1 to 4, space	1 to 4, space, UK; I, M, H, R, S
PlusGr	+, -9	+, -9	+, -9	+, -9
age	0 to 99, -9	0 to 99, -9	0 to 99, -9	0 to 99, -9
CANoAtLngt	1 to 999	1 to 999	1 to 999	1 to 999
IndWgt	0 to 99999, -9	0 to 99999, -9	0 to 99999, -9	0 to 99999, -9

Table 3. Comments to fields

RECORD TYPE 1 (Haul information - HH)

Field Name	COMMENTS
RecordType	Fixed value: HH
Quarter	
Country	ICES alpha codes for countries
Ship	
Gear	Preliminary code 1)
SweepLngt	
GearExp	S = Bobbins, D = Double sweeps, -9 = unknown
DoorType	P = Polyvalent, V = Vee, F = Flat, K = Kram Waco, -9 = unknown
StNo	National coding system
HaulNo	Sequential numbering by cruise
Year	
Month	
Day	
TimeShot	In UTC
Stratum	
HaulDur	In minutes 2)
DayNight	Not known = -9
ShootLat	Shooting position: latitude decimals
ShootLong	Shooting position: longitude decimals
HaulLat	Hauling position: latitude decimals
HaulLong	Hauling position: longitude decimals
StatRec	
Depth	Depth from surface in metres, Unknown = -9
HaulVal	Invalid =I, Valid =V or no oxygen = N, C = calibrated
HydroStNo	Station no as reported to the ICES hydrographer
StdSpecRecCode	Standard species recording code
BycSpecRecCode	Bycatch species recording code
DataTypes	R = raw data by haul, C = calculated no/hour, S = Sub sample
Netopening	In metres.
Rigging	Only applying to BTS survey; F = Flip-up rope , M = Chain mat
Tickler	Only applying to BTS survey; number of tickler chains
Distance	Distance towed over ground (m)
Warplngt	in metres
Warpdia	In millimetres
WarpDen	Kg/linear meter.
DoorSurface	In squaremetres
DoorWgt	In kilogrammes
DoorSpread	In metres
WingSpread	In metres
Buoyancy	In kilogrammes
KiteDim	In squaremetres
WgtGroundRope	In kilogrammes
TowDir	
GroundSpeed	Ground speed of trawl. Knots
SpeedWater	Trawl speed through. Knots
SurCurDir	Slack water =0
SurCurSpeed	Metres per sec
BotCurDir	Slack water =0
ButCurSpeed	Metres per sec
WindDir	**0 = calm or 360=north, 0=variable**
WindSpeed	Metres per sec
SwellDir	**360=north, 0=variable**
SwellHight	Metres

SurTemp	Degree Celsius
BotTemp	Degree Celsius
SurSal	
BotSal	
ThermoCline	Defined as 2 degrees change in temperature over 10 meters
ThClineDepth	Depth from surface in metres

RECORD TYPE 2 (Length frequency distribution - HL)

Field Name	COMMENTS
RecordType	Fixed value: HL
SpecCodeType	N = NODC or T = TSN
SpecCode	Official NODC code or TSN code
SpecVal	
Sex	Male = M, Female =F, measured but unknown = U, -9 not measured
TotalNo	Not known = -9, total number catch per species and sex. If Data type C then = total number per haul per hour
CatIdentifier	If DataType = C then category number = 1, else 1 to 5, per species and sex
NoMeas	No specimen measured per sub sample if data type = S or haul if data type = C or R. If Sex is measured NoMeas have to be per sex.
SubFactor	If data type=R or C then sub sampling factor = 1
SubWgt	In g. Not known = -9
CatCatchWgt	Catch weight per category or weight per haul per hour (if data type = C). If Sex is measured CatCatchWgt have to be per sex. In g. Not known = -9
LngtCode	0.5 cm length class = 0, 1 cm length class = 1
LngtClass	Identifier of lower bound of length distribution, eg. 65-70 cm=65 For classes less than 1 cm there will be an implied decimal point after the 2nd digit, eg. 30.5-31.0 cm=305
HLNoAtLngt	No at length is either by category or by haul and hour. Length classes with zero catch should be excluded from the record (Category catch number equals the sum of no at length).

RECORD TYPE 3 (SMALK's - CA)

Field Name	COMMENTS
RecordType	Fixed value: CA
AreaType	APPENDIX VI
AreaCode	APPENDIX VII
LngtCode	0.5 cm length class = 0, 1 cm length class = 1
LngtClass	Identifier of lower bound of length distribution, eg. 65-70 cm=65, For classes less than 1 cm there will be an implied decimal point after the 2nd digit, eg. 30.5-31.0 cm=305
Sex	Male = M, Female = F, measured but unknown = U, -9 not measured
Maturity	See Appendix I
PlusGr	Plus group = +, else space 4)
age	Unknown age/rings= -9 5)
CANoAtLngt	6)
IndWgt	The individual weight of the fish in the record (in gram).

ANNEX 1 – Maturity key

IBTS NS, IBTS Atl. And BTS

1. Virgin
   - a. Male — Testes very thin translucent ribbon along an unbranched blood vessel. No sign of development.
   - b. Female — Ovaries small, elongated, whitish, translucent. No sign of development.
2. Maturing
   - a. Male — Development has obviously started, colour is progressing towards creamy white and testes are filling more and more of the body cavity but sperm cannot be extruded with only moderate pressure.
   - b. Female — Development has obviously started, eggs are becoming larger and the ovaries are filling more and more of the body cavity but eggs cannot be extruded with only moderated pressure.
3. Spawning
   - a. Male — Will extrude sperm under moderate pressure to advanced stage of extruding sperm freely with some sperm still in the gonad.
   - b. Female — Will extrude eggs under moderate pressure to advanced stage of extruding eggs freely with some eggs still in the gonad.
4. Spent
   - a. Male — Testes shrunken with little sperm in the gonads but often some in the gonoducts which can be extruded under light pressure. Resting condition firm, not translucent, showing no development.
   - b. Female — Ovaries shrunken with few residual eggs and much slime. Resting condition, firm, not translucent, showing no development.

BITS

1. Virgin (Immature) — As IBTS
2. Maturing (Mature) — As IBTS
3. Spawning (Mature) — As IBTS
4. Spent (Mature) — As IBTS
5. Resting (Mature/immature) 1)
   - a. Male — Testes firm, not translucent, showing no development.
   - b. Female — Ovaries firm, not translucent, showing no development.

   1) Should be used when the investigation was during the prespawning and early spawning time (still no spent individuals). Individuals will not contribute stock in the present year.

BTS UK

- I Immature
- M Maturing
- H Hyaline
- R Running
- S Spent

ANNEX 2 – Country and ship codes

IBTS NS

COUNTRY	ICES' CODE	SHIP NAME	ICES' CODE
Sweden	SWE	Argos	ARG
United Kingdom (England and Wales)	ENG	Cirolana	CIR
Denmark	DEN	Dana (new)	DAN2
Norway	NOR	Haakon Vasby	HAV
United Kingdom (Scotland)	SCO	Scotia (new)	SCO3
France	FRA	Thalassa (new)	THA2
Netherlands	NED	Tridens (new)	TRI2
Germany	GFR	Walther Herwig III	WAH3

BITS

COUNTRY	ICES' CODE	SHIP NAME	ICES' CODE
Sweden	SWE	Argos	ARG
Denmark	DEN	Dana (new)	DAN2
		Havfisken	HAF
Germany	GFR	Solea	SOL
		Clupea	CLP
Estonia	EST		KOOT
Latvia	LAT	Commercial vessel	CLV
Poland	POL	Baltica	BAL
Russia	RUS		VSH

BTS

COUNTRY	ICES' CODE	SHIP NAME	ICES' CODE
Belgium	BEL		
Germany	GFR		
United Kingdom (England and Wales)	ENG	Corystes	COR
		CEFAS Endeavour	CEN

IBTS Atl.

COUNTRY	ICES' CODE	SHIP NAME	ICES' CODE
Ireland	IRL		
France	FRA	Thalassa (new)	THA2
United Kingdom (England and Wales)	ENG	Cirolana	CIR
United Kingdom (Scotland)	SCO	Scotia (new)	SCO3

ANNEX 3 – Gear codes

IBTS NS

Grand Ouverture Verticale	GOV

BITS

Small TV trawl	TVS
Large TV trawl	TVL

BTS

Beam Trawl	BT

IBTS Atl.

Grand Ouverture Verticale	GOV

ANNEX 4– Recorded species codes used in record type 1

Recorded standard species list codes
1 = All standard species recorded

Recorded bycatch species list codes
1 = Open ended by-catch list (all species recorded)

IBTS NS standard species

Species	NODC	TSN
Herring	8747010201	161722
Sprat	8747011701	161789
Mackerel	8850030302	172414
Cod	8791030402	164712
Haddock	8791031301	164744
Whiting	8791031801	164758
Norway pout	8791031703	164756
Saithe	8791030901	164727

BITS standard species

Species	NODC	TSN
Herring	8747010201	161722
Sprat	8747011701	161789
Cod	8791030402	164712
Flounder	8857041402	172894

BTS

Plaice
Sole

BTS Irish Sea

Plaice		
Sole		
Whiting	8791031801	164758
Cod	8791030402	164712

IBTS Atl.

Cod	8791030402	164712
Whiting	8791031801	164758
Megrim		
Hake		
Mackerel	8850030302	172414
Lophius spp		

ANNEX 5 – Species validity code

0 = Invalid information	Information lost
1 = Valid information	Length composition recorded; applies also when no per haul is zero.
4 = Total no per hour only	Catch sampled for No per hour only; no length measurements.

ANNEX 6 – Area types and sampling areas

0 = ICES Statistical Rectangles
2 = Standard Roundfish Areas
4 = Baltic Sub-division
5 = BTS Otoliths Areas

ANNEX 7 – Indices areas

IBTS NS
- Herring - *MAP*
- Sprat - *MAP*
- Mackerel - *MAP*
- Cod - *MAP*
- Haddock - *MAP*
- Whiting - *MAP*
- Norway pout - *MAP*
- Saithe - *MAP*

BITS
- Cod - *MAP*

BTS
- Plaice - *MAP*
- Sole - *MAP*

IBTS Atl.
- Cod - *MAP*
- Whiting - *MAP*
- Megrim - *MAP*
- Hake - *MAP*
- Mackerel - *MAP*
- Lophius spp - *MAP*

Appendix II – Requests for IBTS Data received by ICES (1999 -)

Name	Propose of Request	Request received in ICES
John Simmonds Aberdeen Else Torstensen Norway		25.01.1999
Werner Wosniok University of Bremen		09.02.1999
Mike Pawson Lowestoft		09.03.1999
Anna Rindorf Charlottenlund		09.04.1999
Holger Hovgaard Charlottenlund		28.06.1999
Niels Daan Ijmuiden		23.08.1999
Holger Hovgaard Charlottenlund		14.09.1999
Henk Heessen Ijmuiden		27.10.1999
Henk Heessen Ijmuiden		07.12.1999
Carl André Strömstad	Research on population ecology of Cod in Skagerak-Kattegatt	12.01.2000
Bengt Sjostrand Sweden		16.02.2000
Kai Wieland Hirshals		25.02.2000
Siegfried Ehrich Hamburg		07.03.2000
John Casey Lowestoft		19.05.2000
Jens Floeter University of Hamburg	PhD thesis on spatial-temporal changes in species distribution	31.05.2000
Dave Reid Marine Laboratory, Aberdeen		14.08.2000
Robin Cook Marine Laboratory, Aberdeen		15.08.2000
Phil Kunzlik Marine Laboratory, Aberdeen	Evaluating distribution of species with regard to North of Scotland Box	11.09.2000
Brian Rackham Lowestoft	To construct quarterly spatial species indices in relation to predator/prey combinations.	26.09.2000
Ruth Zühlke University of Wales	EU project – Monitoring biodiversity of epibenthos and demersal fish using groundfish surveys	17.10.2000
M-J Rochet France	Analysis in the trends in length and age at maturity of North Sea gadoids.	10.11.2000
Morten Vinther Charlottenlund		13.11.2000
Richard Hedger/Eddie McKenzie University of Strathclyde Glasgow	Tasks 4.1 and 4.2 of STEREO	12.12.2000
John Simmonds FRS Marine Laboratory	Development of GLM model to improve indices of abundance	13.12.2000

Henk Heessen IJmuiden	To prepare construction of new North Sea atlas and determine the occurrence of rare fish.	13.12.2000
Henrik Jensen Charlottenlund	Spatially disaggregated abundance of sandeels	15.01.2001
Frans van Beek IJmuiden		08.02.2001
Siegfried Ehrich Hamburg	Use of abundance indices for FINE scale information.	05.04.2001
Kjell Nedreaas Bergen	Extract of all monkfish (*Lophius* sp.) data for thesis	23.04.2001
Joachim Maes Katholieke Universiteit Leuven Laboratory of Aquatic Ecology Belgium	Modelling of fish migrations between the sea and estuaries	03.12.2001
Kristjan Kristinsson Department of Biology Dalhousie University Halifax Canada		28.01.2002
Helen Fraser/Simon Greenstreet FRS Marine Laboratory	PhD thesis	15.02.2002
Chris Rückert Hamburg	Analysis of spatial-temporal changes in context of LIFECO	
Morten Vinther Peter Lewy Bjarke Gløerfelt-Tarp Charlottenlund		
Vanessa Stelzenmueller Oldenburg	PhD thesis to compare with German small-scale bottom trawl surveys	
Astrid Espe Bergen	PhD thesis on cod management in North Sea	
G.J. Piet IJmuiden	Analysis for EVARES project	
Marco Kienzle FRS Marine Laboratory	Dynamic of population of North Sea herring (GADGET)	07.01.2003
Fiona M. Gibb Fisheries Research Services	Data for METACOD project	04.02.2003
Helen Fraser FRS Marine Laboratory	Fish consumption in North Sea and analysis of decision making process for closed areas	04.02.2003

APPENDIX III: PUBLICATIONS USING IBTS DATA, 1999 TO PRESENT

(Note. Due to other commitments Ireland was unable to provide a list of Irish publications.)

Adlerstein S and S Ehrich 2000. Effect of deviation from vessel target speed over ground, trawl speed through water and time of day on catch rates of several fish species in North Sea surveys. ICES, CM 2000/K:01, pp 20

Adlerstein S and S Ehrich 2001. Influence of hydrographic conditions on diel variation of cod catches in North Sea bottom trawl surveys. ICES, CM 2001/Q:02, pp 17

Adlerstein S and S Ehrich 2002. Effect of deviations from target speed and of time of day on catch rates of some abundant species under North Sea International Bottom Trawl Survey protocol conditions. ICES Journal of Marine Science, 59 (3): 594-603

Adlerstein S and S Ehrich 2003. Patterns in diel variation of cod catches in North Sea bottom trawl surveys. Fish. Res. (accepted Sept. 2002)

Afonso MH, Azevedo A, Cardador F, Duarte R, Farina C, Godinho ML, Jardim E, Landa J, Lucio P, Moguedet P, Morgado C, Pineiro C, Quincoces I, Sainza M, Santurtun M, and Trujillo V 2000. New assessment and biology of the main commercial fish species: Hake and Anglerfish of the Southern Shelf Demersal Stocks in the South Western Europe. Final Report DEMASSESS, Study contract 97/015.

Alagador D 2000. Comparação de técnicas de preparação de otólios para facilitar a determinaçãoo da idade. Relatório de estágio profissionalizante da Licenciatura em Recursos Faunísticos e Ambiente. Faculdade de Ciências da Universidade de Lisboa (degree thesis).

Alagador D, and Murta AG 2002. A comparison of staining techniques to improve precision of age estimation from fish otoliths. *Journal of Fish Biology*, 61: 839-841.

Anonymous 1999. Evaluation of Demersal Resources of Southwestern Europe from Standardised Groundfish Surveys. Final report to the *Commission of European Communities* Contract Ref.: DG XIV Study contract 96-029. 195 p.

Anonymous 200x. Reports of the EU and Norway meetings on the recovery of North Sea cod.

Anonymous 200x. Fifth International Conference on the protection of the North Sea, 20-21 March 2002, Bergen, Norway.

Anonymous 2000. Monitoring Biodiversity in the North Sea using groundfish surveys. Final Report, FAIR-CT-0817.

Anonymous 2000 and 2001. Monitoring biodiversity of epibenthos and demersal fish in the North Sea and Skagerrak.

Arvanitidis C, Koutsoubas D, Robin JP, Pereira J, Moreno A, Cunha MM, Valavanis V and Eleftheriou A 2003. A comparison of the fishery biology of three *Illex coindetii* Vérany, 1839 (Cephalopoda: *Ommastrephidae*) populations from the European Atlantic and the Mediterranean waters. Bull. Mar. Sci., xxx(xx): *in press.*

Beare D, J Castro, J Cotter, O van Keeken, L Kell, A Laurec, J-C Mahé, O Moura, S Munch-Petersen, J R Nielsen, G Piet, J Simmonds, D Skagen and P J Sparre, 2003. Evaluation of research surveys in relation to management advice (EVARES - FISH/2001/02 - Lot 1) Final Report to European Commission Director-General Fisheries

Bez N *et al.* 2002. Combining Acoustic and Trawl data for Estimating Fish Abundance CATEFA. Progress Report – N° Q5RS-2001-02038.

Bez N, Bouleau M, Godo O, Armstrong M, Gerristen H, Vérin Y, Massé J, Méhault S 2002. Comparison between "underway" and "on station" acoustic measurements made during bottom trawl surveys. ICES CM 2002 / J:03.

Bianchi G, H Gislason, K Graham, L Hill, X Jin, K Koranteng, S Manickchand-Heileman, I Paya, K Sainsbury, F Sanchez and K Zwanenburg 2000. Impact of fishing on size composition and diversity of demersal fish communities. ICES Journal of Marine Science. 57: 558-571.

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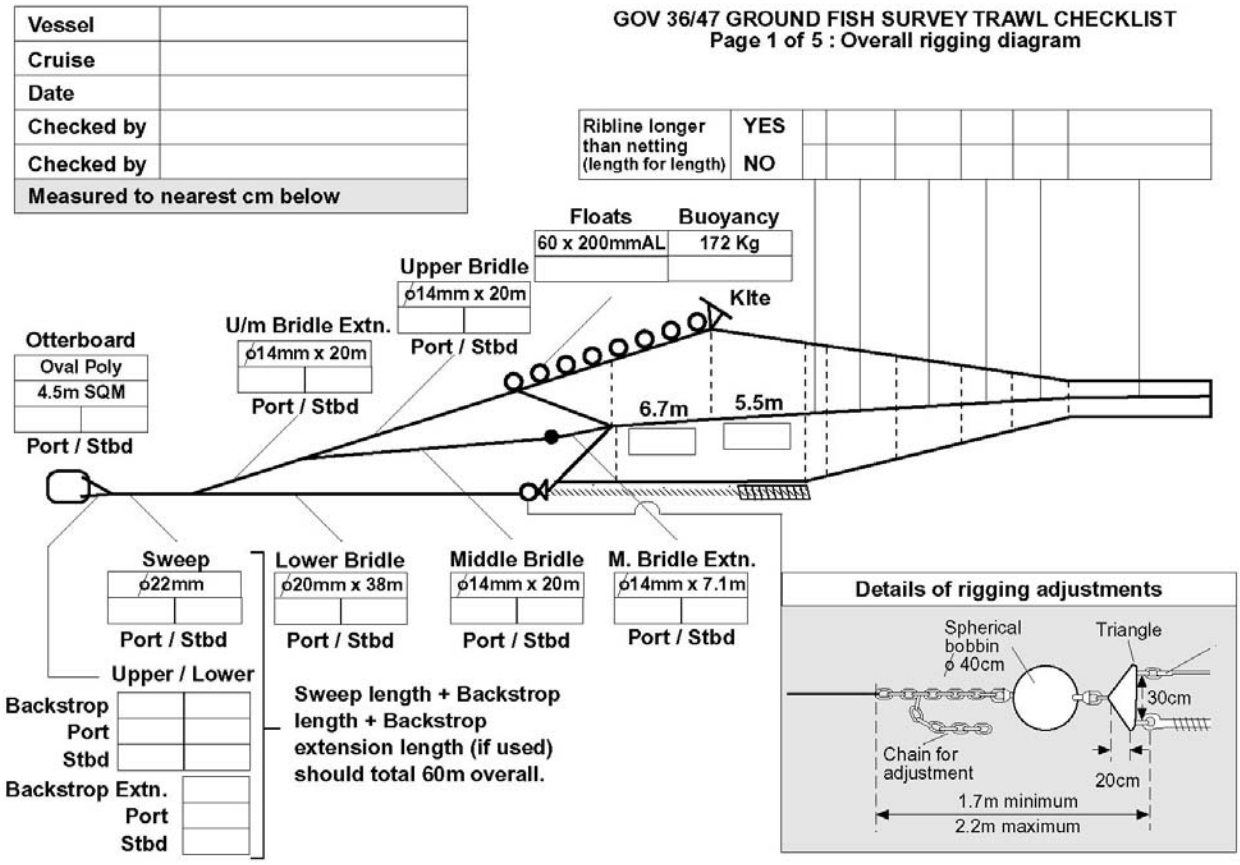
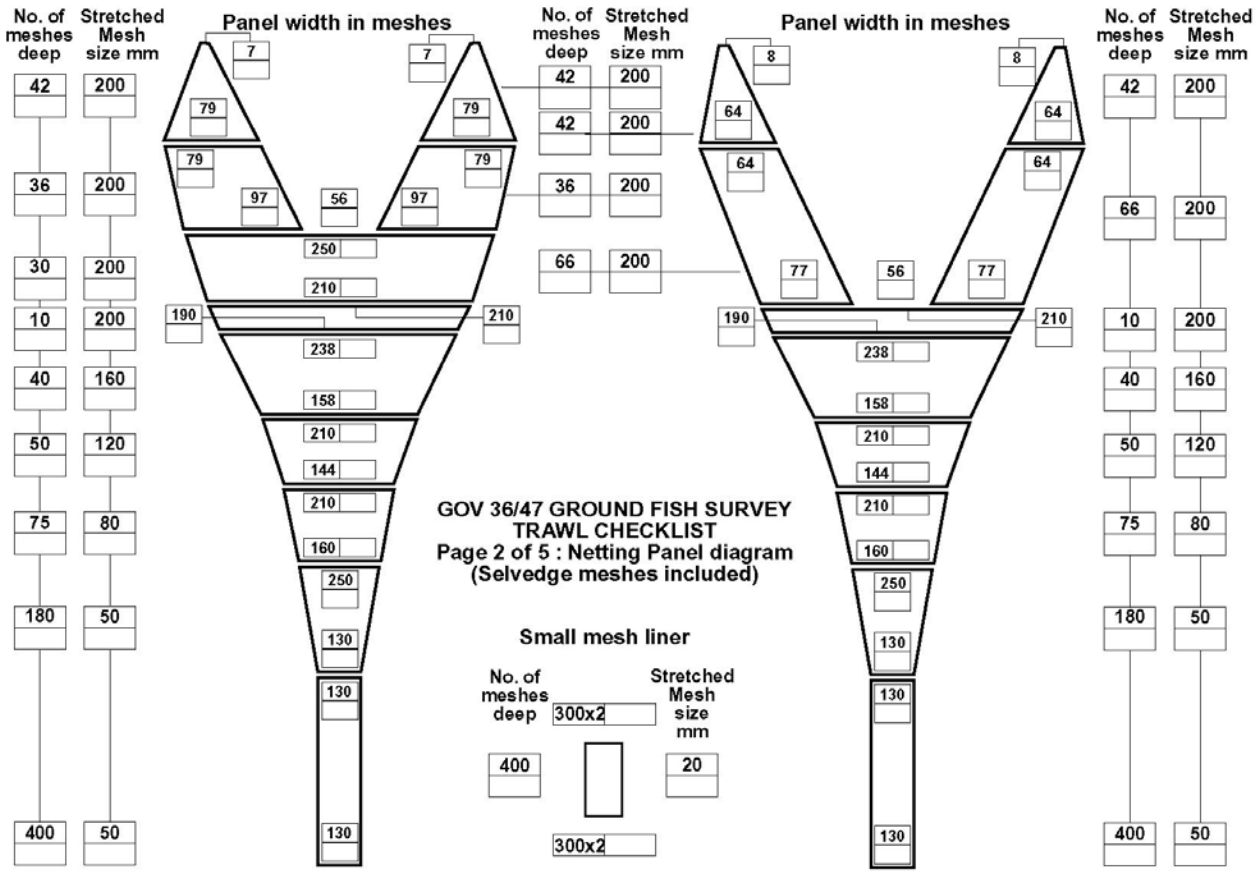
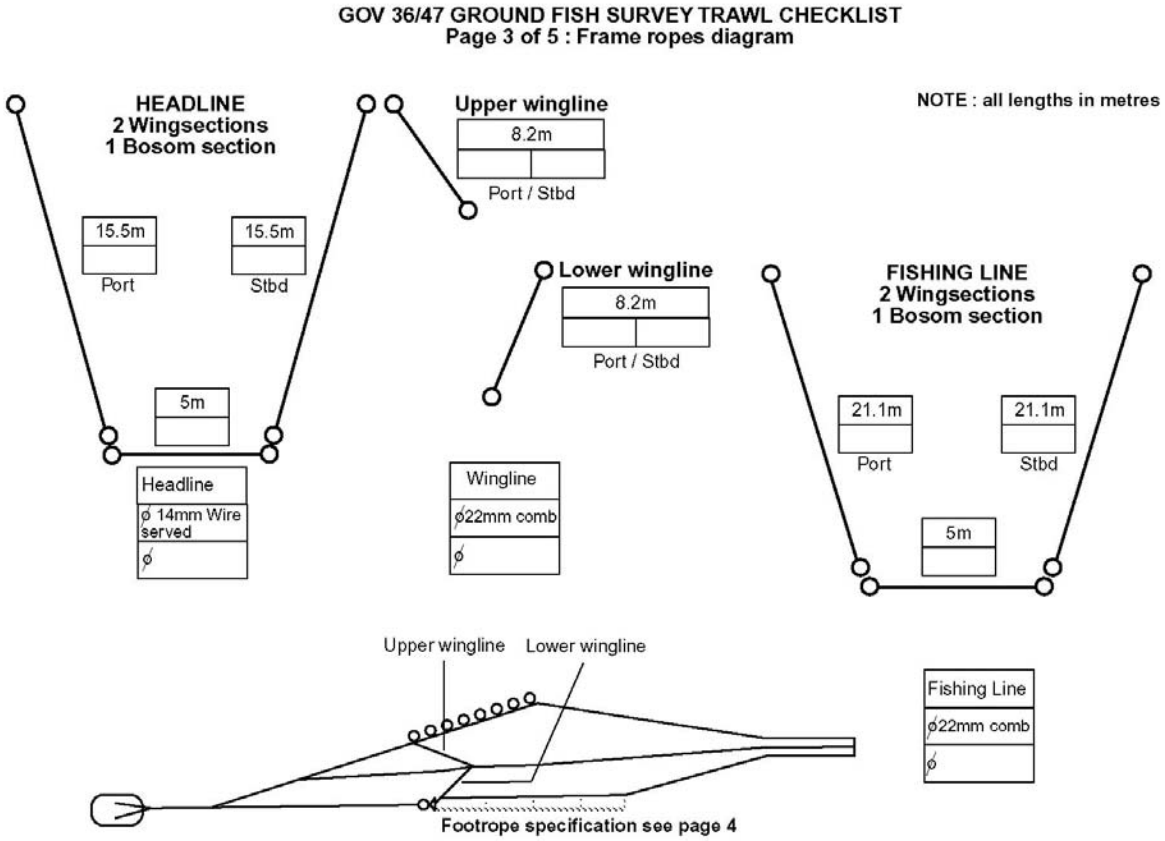
APPENDIX IV - GOV 36/47 GROUND FISH SURVEY TRAWL CHECKLIST DIAGRAMS



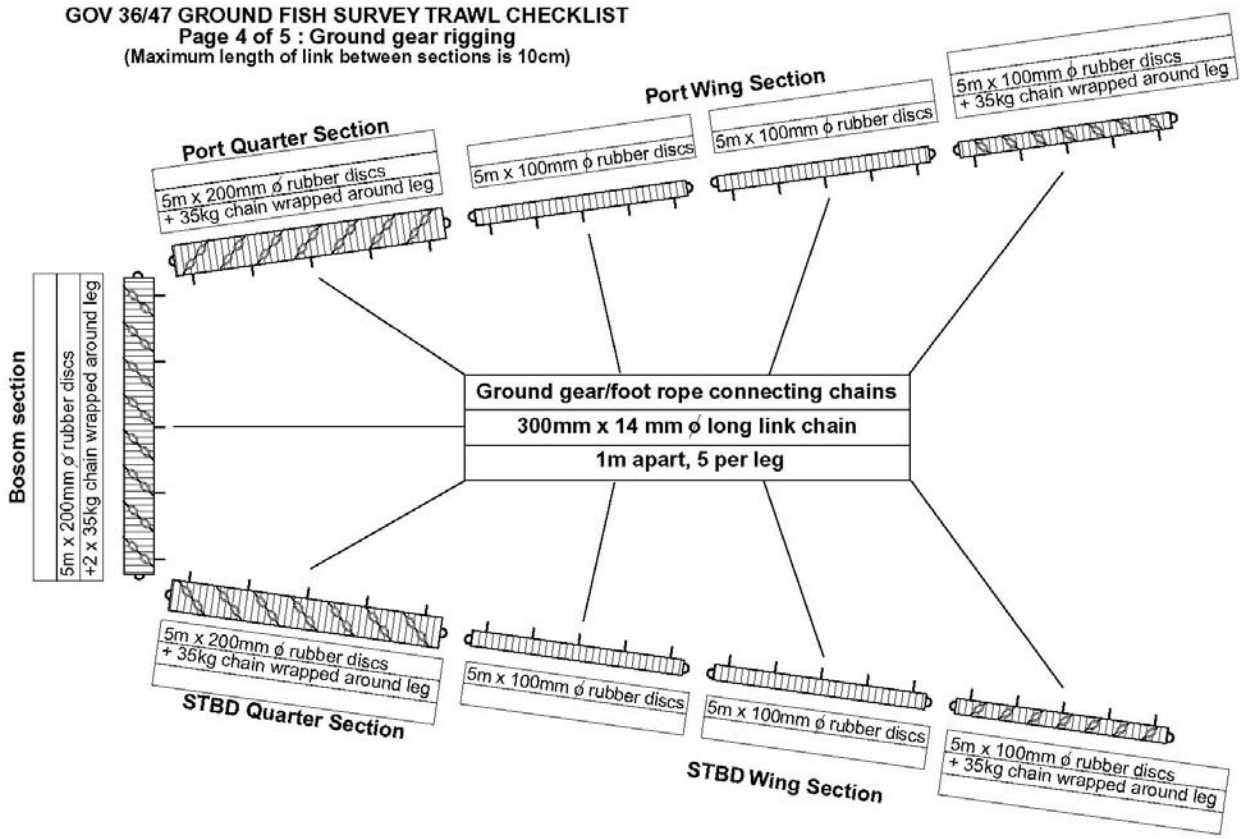
GOV 36/47 GROUND FISH SURVEY TRAWL CHECKLIST Page 1 of 5: Overall rigging diagram



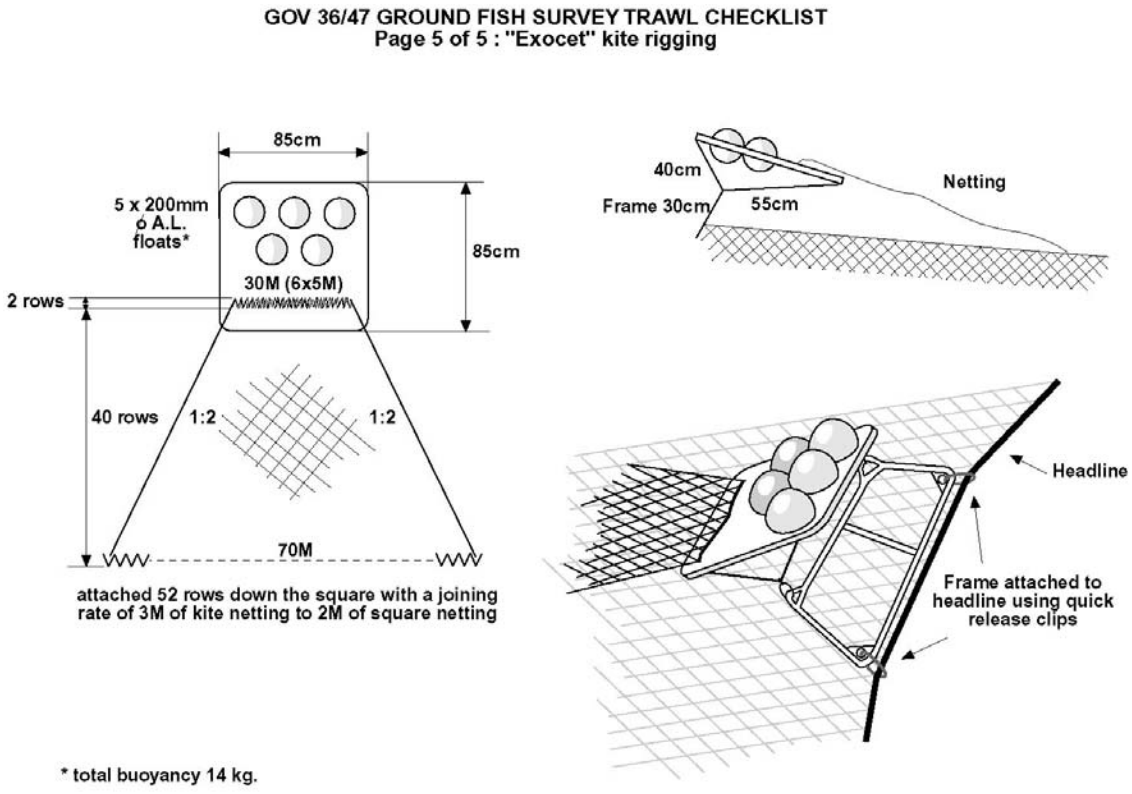
GOV 36/47 GROUND FISH SURVEY TRAWL CHECKLIST Page 2 of 5: Netting Panel diagram



GOV 36/47 GROUND FISH SURVEY TRAWL CHECKLIST Page 3 of 5: Frame ropes diagram



GOV 36/47 GROUND FISH SURVEY TRAWL CHECKLIST Page 4 of 5: Ground gear rigging



GOV 36/47 GROUND FISH SURVEY TRAWL CHECKLIST Page 5 of 5: "Exocet" kite rigging

APPENDIX V - DRAFT PROTOCOLS FOR DEPLOYMENT OF GOV ON IBTS SURVEYS

1) Ensure GOV and Groundgear are prepared onshore according to "IBTS–Manual (taking into account any national variation as previously advised to IBTS).

2) Senior (or appropriate) member of scientific staff to oversee / observe the gear being assembled onboard.

3) Appropriate member of scientific staff to monitor installation of Kite as described in IBTS manual and Scanmar units as illustrated in local instructions.

4) Ensure liner is free from holes and cod-lines are sealed in an acceptable way.

5) Experienced member of scientific staff to observe deployment of gear, ensuring that gear is free from any defects or obstructions.

6) Start Scanmar monitoring programme on PC.

7) Once gear has settled on seabed, record Block-Up on PC monitor system and inform Fishing Master of Block-Up time and position.

8) Monitor Scanmar display throughout haul, ensuring "IBTS-Scotland-Use of Scanmar" procedures are followed.

9) After 30 minutes towing, press Knock-Out on PC monitor system and advise Fishing Master of Knock-Out time and position.

10) Experienced member of scientific staff to observe retrieval of gear.

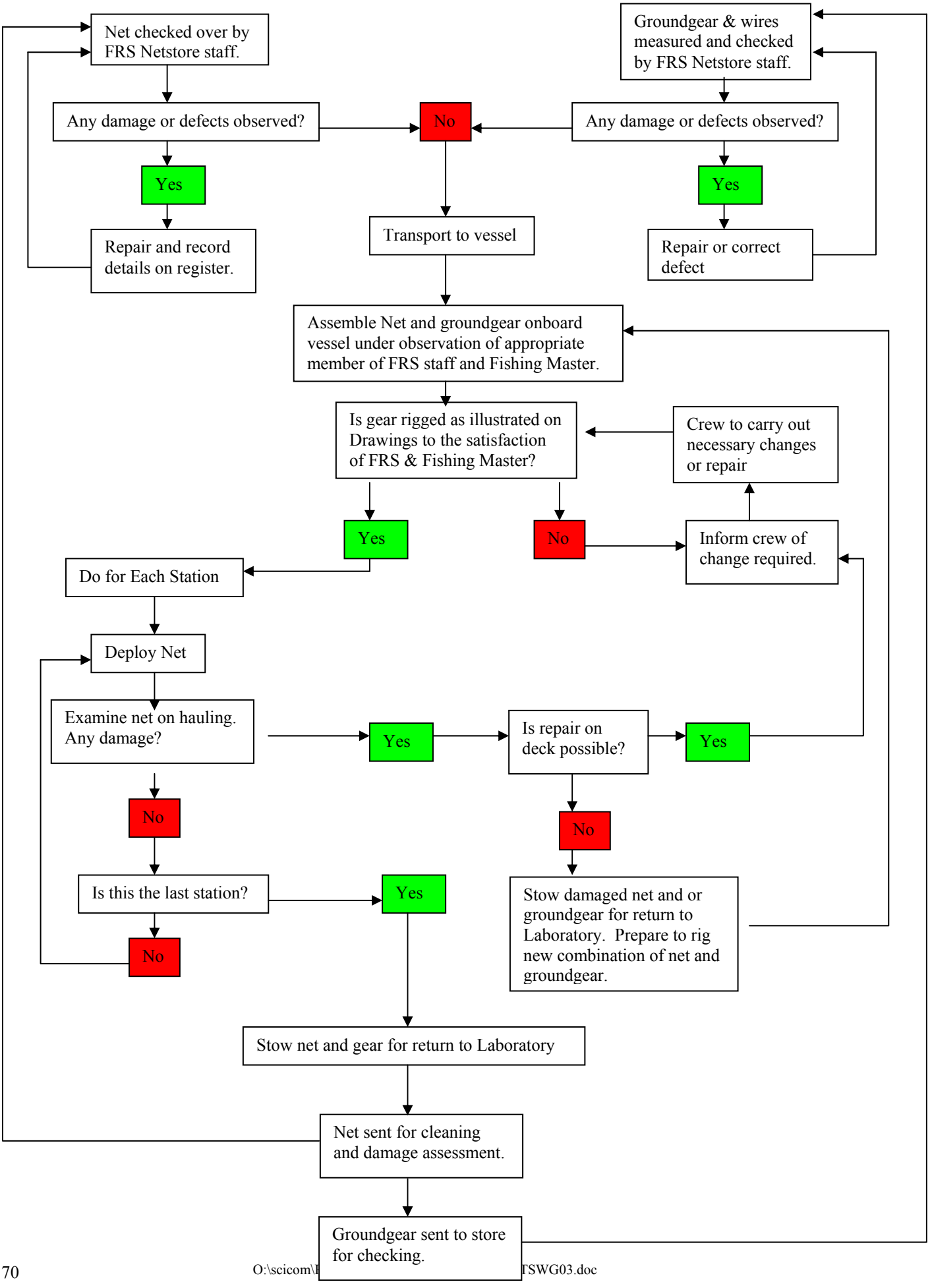
11) Examine GOV and Groundgear as it arrives back onboard to ensure that gear is still clear from obstruction.

12) Experienced member of scientific staff to examine catch in cod-end ensuring that no damage to small mesh liner has occurred and that the cod-end is sealed properly.

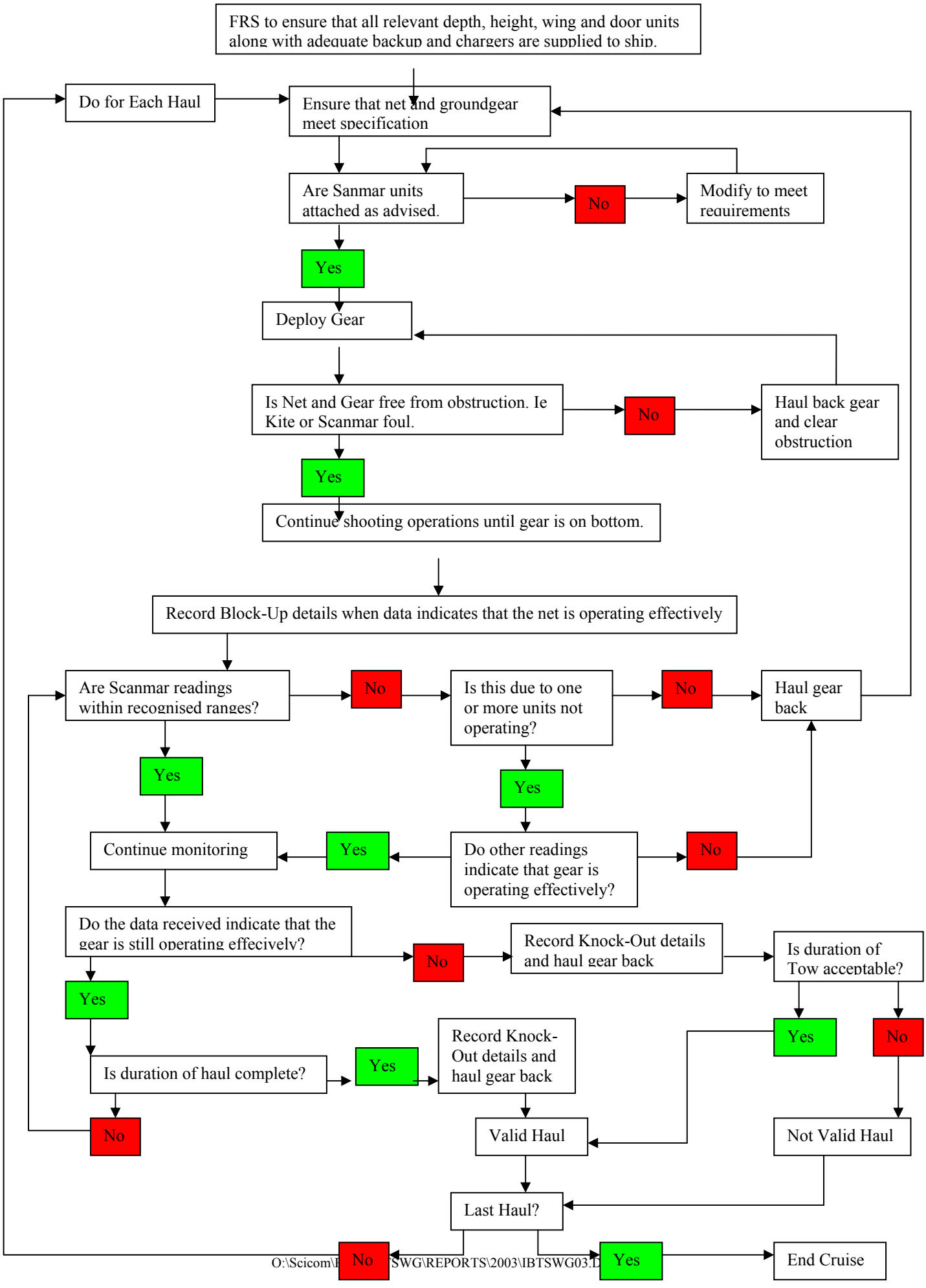
13) Transfer the catch to hopper.

14) Catch to be worked up according to "IBTS-Scotland-Catch Processing" procedures and relevant Research Vessel Standing Instructions.

IBTS – Scotland – GOV Preparation



IBTS – Scotland – Use of Scanmar



IBTS – Scotland – catch processing

1. Catch emptied into hopper and cod-end shaken clean.

2. Haul valid / invalid – but may be worked up so that a decision on validity can be reviewed once the Scanmar data and other factors are taken into consideration.

3. Total weight for catch noted.

4. Fishhouse manager to determine sampling strategy and relay this to all staff involved. Normally all fish are sorted, but sub-sampling may be required if:
   (i) Catch is too large.
   (ii) Catch composition is mainly small fish.

5. Fish for sorting is directed from conveyor to sorting benches where all fish are selected into individual species baskets or trays. No selection by size to take place.

6. Sorting continues until completion or adequate sub-sample is obtained. In some cases it may be necessary to draw the sub-sample from different stages of transfer from the hopper in order to ensure a representative sample is obtained. Sub-sample weights should be noted.

7. All baskets or trays of fish are weighed (and noted on fish weight sheets) in order to obtain a total weight for each species. If sub-sampling is envisaged, the weights should be noted on each individual basket.

8. For all species, the total catch or sub-sample are measured to the cm below (except for herring and sprat, which are measured to the 0.5cm below) and recorded on species length recording sheets. Where the number of fish for a species is more than normally required to provide an adequate length distribution, a sub-sample (typically, 200 – 250 fish per length range or 150 for small range such as Norway pout) may be selected. A detailed description of sampling procedures and variations is provided in the Marine Laboratory Sea-Going Manual.

9. All sub-samples weights are noted on the species length recording sheets to assist with raising to haul level.

10. For certain species additional biological data are required. Targets are described in IBTS Manual and, as a minimum we collect these targets. In addition we will collect data for species prescribed under EU Data Collection Regulations. The additional biological data are – fish weight (total), fish weight (gutted), sex, maturity stage and ageing material (otoliths). These should be noted on Biological Data Sheets.

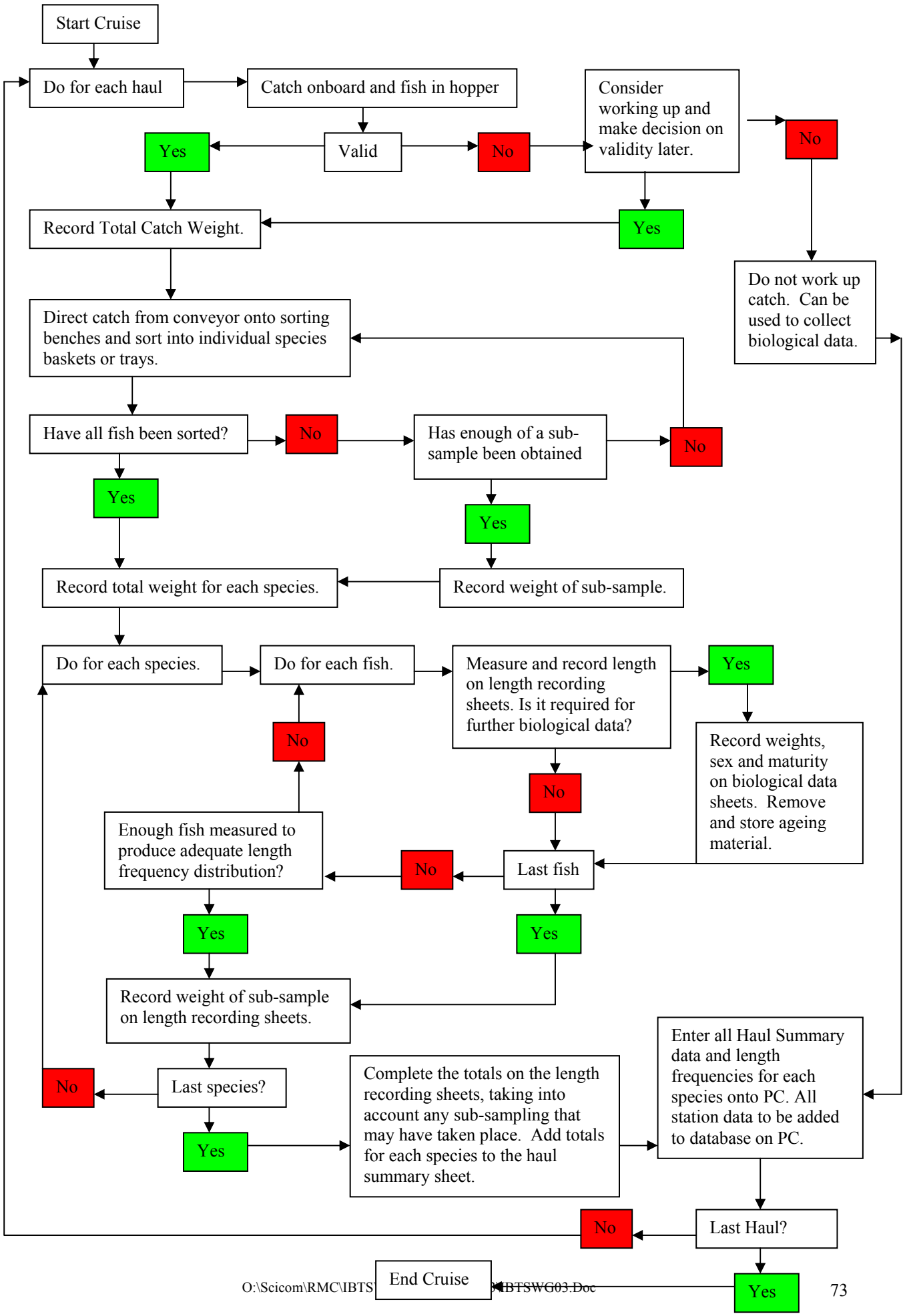
11. When all measuring and biological sampling has been completed, the species length recording sheets are totalled to provide a length frequency (taking into account any raising that may be required when sub-sampling took place). Total numbers for each species are recorded on the Haul Summary sheet.

12. All Haul Summary information and length frequencies for each species are entered and cheked on a PC system, using the Finfish programs.

13. All station detail data according to IBTS Exchange File Format record type HH are collected and stored on database on PC system.

14. Additional biological data are entered on Excel spreadsheet on a daily basis.

IBTS – Scotland – Catch Processing



APPENDIX VI - INTERNATIONAL BOTTOM TRAWL SURVEY WORKING GROUP

Lorient, 25-28 March 2003

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