Resource Management Committee

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ACFM, ACE

REPORT OF

THE INTERNATIONAL BOTTOM TRAWL SURVEY WORKING GROUP

Dublin, Ireland
8–11 April 2002

International Council for the Exploration of the Sea

Conseil International pour l'Exploration de la Mer
Palægade 2–4 DK–1261 Copenhagen K Denmark

1 TERMS OF REFERENCE AND PARTICIPATION

The International Bottom Trawl Survey Working Group [IBTSWG] (Chair: A.W. Newton, UK) will meet in Dublin, Ireland from 8-11 April 2002 to:

a) review intersessional work on stratification, sampling, gear selection and standardisation etc. in western and southern divisions

b) critically review the format and quality of gear parameters supplied to ICES as described in the IBTS Manual and analyse net performance

c) review the recommendations arising from the IPROSTS (EU Contract 98/057) – International Programme of Standardized Bottom Trawl Surveys off North western Europe) project for on-going inter calibration of surveys

d) review and comment upon the DATRAS project specifications for integration of the databases in the North Sea, Skagerrak and Kattegat (IBTS), the trawl surveys in the Baltic (BITS) and the beam trawl surveys in the North Sea and Divisions VIIa and VIId-g and consider data integrity

e) present and document each institute's catch processing from initial sorting to final data storage

f) review relevant papers presented at theme sessions P, Q and T at the 2001 ASC which may have implications for IBTS surveys

g) evaluate the new standard indices and the implications in using new indices in assessments in collaboration with relevant assessment working groups

h) review the extent of institute's collections of identification and maturity stage photographs

i) review the co-ordination of surveys in the sampled divisions including the development of survey manuals

j) consider the additional collection of data on the condition of cod (liver weights) caught during the first quarter IBTS in the North Sea and recommend a protocol on how to collect such data

IBTSWG will report by 30 April 2002 for the attention of the Resource Management and Living Resources Committees and ACFM and ACE.

The meeting was attended by:

Mike Armstrong	UK (N Ireland) (part-time)
Sarah Adlerstein	Germany
Trevor Boon	UK (England)
Fatima Cardador	Portugal
Corina Chaves	Portugal
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
Dave Reid	UK (Scotland)
Francisco Sanchez	Spain
Odd Smedstad	Norway
David Stokes	Ireland
Francisco Velasco	Spain
Yves Verin	France

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. Much of this co-operation stems from two EU funded projects – SESITS (Contract 96/029), co-ordinated by IEO and reported in ICES CM 1999/D:2 and IPROSTS (Standardized Trawl Surveys in NW Europe – Contract 98/057) co-ordinated by IFREMER.

The original ICES database was created in an era when there were restrictions on computer memory etc and ever since the data have been held in a format that is restrictive for both accessing data and adding new fields, especially as the data acquisition process is expanded. This problem has been acknowledged for a number of years but there has been no apparent way of resolving this dilemma given staff and financial constraints within ICES. At the same time we now live in times which expect a wider distribution of aggregated data acquired during the surveys. These problems have now been addressed through an EU funded concerted action (DATRAS) and section 6 provides an update on progress made to date.

The co-ordination of such a large number of surveys on such a wide geographical area will always generate a number of points that have to be discussed at committee level. This year is no exception especially as DATRAS commenced in December 2001 and it had been previously decided that this meeting would provide a forum for an in-depth discussion on the requirements and construction of the new database. In the event almost half of the meeting time revolved around DATRAS topics. A digest of this and other viewpoints can be found in the appropriate sections that follow.

3 REVIEW OF PROTOCOLS IN SOUTHERN AND WESTERN DIVISIONS

ToR a) asked the Working Group to review work on the stratification, sampling, gear selection and standardisation in western and southern divisions. Much of this work was also debated under other Terms of Reference and is recorded in other sections, particularly section 11.3. However, the Working Group also tried to centralise all information for these divisions into one manual and this is now issued as an Addendum to this report.

4 GEAR PARAMETERS

ToR b) asked the Working Group to critically review the format and quality of gear parameters supplied to ICES and to analyse net performance. Due to the continued difficulties of extracting this data from the ICES database and the incomplete nature of the submission of this data to ICES this analysis has not been carried out.

In the context of gear surveillance, a number of systems for determination of bottom contact during tows have been introduced in the last year. Such systems have been produced by Simrad, Scantrol and NOAA. At the 2001 meeting of WGIBTS it was agreed that Fisheries Research Services (FRS) would test and evaluate one such system from NOAA. A report on this trial is presented below.

4.1 Bottom contact Sensor

A new sensor for determining the contact of bottom trawl gear on the seabed was trialed by FRS in November 2001. The sensor has been developed by the NOAA Alaskan Fisheries Science Center in Seattle USA, by Scott McEntire, who was kind enough to lend the gear for this trial. The sensor comprises a tilt angle meter housed in a steel shoe, and is mounted at the centre of the footrope of the trawl gear (see figure 4.1). When away from the seabed the sensor hangs straight down, and when the gear is in contact with the seabed, the unit adopts a shallower angle and trails behind the footrope. Data download is by means of an infra red optical shuttle system interfaced to a PC. It is not possible to collect data in real time, but down loading can take place immediately on recovery.

The trials showed that the system was robust and easy to use. The data output is straightforward, comprising time and angle. An example of the output is presented in Figure 4.2. The system allows an accurate determination of the time of touch down and lift-off. In addition it is possible to see brief periods of lift-off during the tow (also see figure 4.2). During the November survey the unit was monitored in action using a RCTV (remote control TV) system. Occasional, brief lift offs were seen during some tows, and these were accompanied by fish escapes under the footrope.

It was concluded by the scientists involved in the trial that the system represented a valuable addition to the net surveillance gear (Scanmar) currently in use. The ability to accurately plot landing and take off could be particularly useful in areas where long warp lengths were in use (deep water) as currently the determination is based on the vessel master's experience. The implications of brief lift-off during tows were less clear, as the impact on the catch rates has not been quantified.

It was agreed that even if the system was not used to determine validity of hauls, it would be useful as a quality indicator.

The Working Group considered that while the system could prove useful, there were a number of reservations:

- It was felt that a real time link would enhance the use of the system in deciding if a tow should be continued after a number of within tow lift-offs.

- Notwithstanding this it was also felt by some that the importance of such lift-offs was not established and that the likely impact on catch rates would be small. So they would be unlikely to use the system to determine the validity of the tow, even if lift-off was observed.

- Some members felt that the system could only determine if the centre of the footrope lifted off, and that there should be other units at points along the footrope to find out if the lift-off was local or along the whole footrope.

- Extension of the trailing arm may allow the scale of lift-off to be measured and this will be investigated.

- Finally, it was concluded that the system may be useful, and that members were encouraged to use such systems if they felt it would enhance their ability to carry out the surveys.

Figure 4.1. NOAA bottom contact sensor mounted on the footrope of a GOV trawl with C type ground gear.

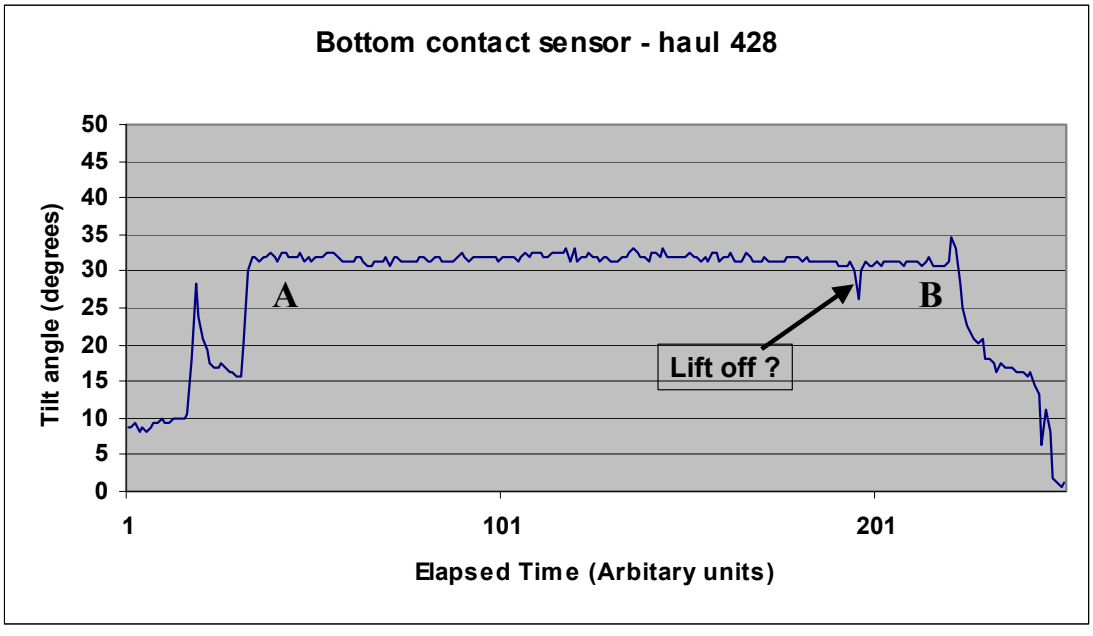


Figure 4.2. Example of data output from the sensor. The gear has touched down at point A, and is recovered at point B. Possible lift off is indicated towards the end of the haul.

5 PROSTS PROJECT

The International Program of Standardised Bottom Trawl Surveys off North Western Europe (IPROSTS – EU contract 98-057) officially started on 1st of April 1999 and ended on the 31st of March 2001. This project aimed to conduct surveys in 1999 and 2000 and pursue the standardisation process already started in the North Sea and in the south-western Europe to the North and involved France (IFREMER) for Divisions VIIg,h,j and VIIIa,b, Ireland (Marine Institute) and Scotland (MARLAB) for Divisions VI and VII. Integrated surveys were conducted during November of 1999 and 2000. The research vessels *Celtic Voyager, Scotia* and *Thalassa* were deployed in the area of study and half-hour tows using a GOV trawl were made according to a standardised stratification scheme taking into account the IBTS working group recommendations. Intercalibration was carried out between R/V SCOTIA and R/V CELTIC VOYAGER in 1999 and between the R/V THALASSA and R/V CELTIC VOYAGER in 2000. Studies were conducted on gear performance and ageing sampling strategies. These topics have been covered in the 2001 meeting of the WG.

The final report was accepted in October 2001. The main conclusions and recommendations from that study are given below.

- This project has allowed survey data gathered by three different institutes working in North-western European waters to be amalgamated for the first time.
- This has allowed a more coherent approach to be initiated in reviewing trawl survey data from the western division.
- Significant progress has been made towards standardising protocols for the collection and analysis of trawl survey data in the western division
- An innovative statistical analysis has been applied to two sets of comparative fishing experiments.
- This study found that important information could be obtained on inter-vessel variability using similar gear despite a limited number of paired tows.
- No conversion factors were adopted between the vessels as there was no conclusive evidence that such factors were required for the mapping of distribution and abundance.
- It was concluded that the vessels fished similarly for the six species analysed in detail.
- Basic mapping of numbers and weights of abundance undertaken within this project has provided a valuable insight into the distribution of species from the Orkney Isles to the Bay of Biscay
- Spatial and temporal patterns of abundance identified appear to be useful for stock discrimination
- The establishment of an inter-calibrated, spatially extended time series of trawl survey data offers new opportunities to the Northern and Southern Shelf Working Groups to tune VPAs for major commercial species.
- The project has provided a framework for improved co-ordination in the western division. If resources permit, areas of investigation for future years should include:
    - Depth stratification of the surveys
    - An analysis of the need for a standardised gear for the western division
    - An agreement on standardised protocols for sampling
    - An extension of the inter-calibration exercise for different areas, vessels and species.

6 DATRAS PROJECT

ToR d) requested the Working Group to review and comment upon the concerted action DATRAS project.

A working document describing the progress of DATRAS was presented at the meeting. In this report a number of questions were brought forward that needed to be addressed by the WG in order to further proceed with DATRAS. The three issues that emerged from these questions and which were dealt with by the group were:

- Exchange format
- Data quality checks
- Data output and access

6.1 Exchange format

The WG suggests a number of changes to the exchange format. Some of the changes are small adjustments, however, others will require data to be delivered in a new way and will affect the way the national institutes extract their data. The major changes to the format are described below with detailed information on the proposed format being provided in Appendix 1.

CSV files are more flexible with regard to the size of the fields and to accommodate all surveys in the exchange format it is suggested that the files in the future should be delivered in the CSV format.

In the future additional environmental data will be mandatory. To reduce redundant data HE records will be combined into the HH record.

Most national databases store longitude and latitude as degree decimals. This will also be the case for the DATRAS database. Furthermore, the position is often used for mapping of data and for this the position has to be in degree decimals. Therefore, the most logical, and also most precise, way of exchanging the position would be as degree decimals and it is suggested that the position should be delivered as degree decimals.

During IBTS surveys, when measuring single fish species length distributions, sub-sampling may be necessary. The raising factors for sub-sampling are either based on taking the total weight of the whole category and the weight of the sub-sample, or by volume. The information on sub-sampling is held on several databases of the individual institutes as numbers measured per category with either a sub-sampling factor or weights of the sub-sample and total weight that allows calculation of the factor. The new ICES database should be able to contain this information and hence requires additional fields. If an institute does not hold or cannot extract the data in this form then they can either deliver the data to ICES as numbers per haul or numbers per hour fishing. Thus in the future there will be three ways of delivering data, this should be indicated in the "data type" field:

- Sub sample (S): number measured per sub-sample and sub-sample factor or weight per sub-sample and total weight should be known, sub-sample factor = total weight/ weight sub-sample
- Raised data (R): number measured*sub-sample factor=catch per haul
- Calculated catch per hour trawling (C): catch per haul * 2

In case the data are delivered as type S or R the possibility exists to calculate the catch per hour trawling by multiplying with (60/haul duration).

The working group finds that combining IBTS data with the oceanographic data in ICES is problematic. To overcome this problem the working group will include surface and bottom temperature, surface and bottom salinity and whether or not a thermocline was observed in the database. The working group is aware that these data may also be included in the ICES oceanographic database. However, availability of these environmental data on a haul-by-haul basis outweighs any considerations as to the potential duplication of data.

The presently used COBOL checking program is not able to deal with commas and data have therefore been delivered as e.g. metres per second * 10 instead of metres per second with one decimal. Commas will not be a problem in the new checking program and in the new exchange format data will be delivered with decimals.

Unknown data have earlier been delivered as e.g. 9999 or space. To standardise how data are reported it is suggested that unknown values are reported as –9. For sex U means unidentifiable because it could not be determined (e.g. fish too small) as opposed to –9 when it was not recorded.

6.2 Data quality checks

All institutes participating on the IBTS will make the methods they use for data quality checks available to DATRAS. Based on this information one comprehensive data quality checking program will be developed and presented at next year's meeting of the Working Group.

6.3 Data output and access

With regard to the output of the new survey database in ICES and access to this output, three types can be distinguished:

1. Standard maps and graphs. Per survey/area combination (e.g. IBTS North Sea, IBTS southern division, IBTS western division, BTS and BITS) the following output will be generated (if possible) for age-groups 0-3+ (or different per species?) of all species for which assessments are conducted:
- Bubble plots indicating abundance per ICES rectangle (IBTS North Sea, BTS and Baltic) or per haul (IBTS southern and western divisions).
- Time series of the indices

- A graph showing the proportion of the age-groups

A method for calculation of the indices will be provided by the assessment WGs. An output will only be provided for those quarters that are used for assessments.

The selected species are:

- IBTS North Sea, Skagerrak, Kattegat:

cod (*Gadus morhua*)	haddock (*Melanogrammus aeglefinus*)
whiting (*Merlangius merlangus)*	herring (*Clupea harengus*)
Norway pout (*Trisopterus esmarki*)	sprat (*Sprattus sprattus*)
mackerel (*Scomber scombrus*)	saithe (*Pollachius virens*)

- IBTS western division:

In the western division different suites of species are aged per (national) survey. The graphs of the indices are generated for only those species in a survey that are aged.

Species/Country	UK Scotland	Ireland	France
Angler fishes (2 sp)			■
Cod	■	■	■
Haddock	■	■	■
Hake		■	■
Herring	■		
Ling			■
Mackerel	■		
Megrim		■	■
N Pout	■		
Plaice		■	
Pollock			■
Saithe	■		
Sole		■	■
Whiting	■	■	■

- IBTS southern division:

hake (*Merluccius merluccius*) blue whiting (*Micromesistius poutassou*)
horse mackerel (*Trachurus trachurus*) mackerel (*Scomber scombrus*)
two species of megrim (*Lepidorhombus whiffiagonis* and *Lepidorhombus boscii*)
two species of anglerfish (*Lophius piscatorius* and *Lophius budegassa*)

- BTS North Sea, Channel and Irish Sea:

plaice (*Pleuronectes platessa*) sole (*Solea vulgaris).*

Different areas are distinguished: North Sea, Eastern Channel, Western Channel, Bristol Channel and Irish sea

- BITS Baltic Sea:

cod (*Gadus morhua*) herring (*Clupea harengus*)

2. A query of the database using pivot tables. This can be done similarly to the new web-based database called BALTCOM which has been designed and implemented under the EU Study program International Baltic Sea

Sampling Program II (IBSSP II, EU study project 98/024). In connection with this database a data warehouse has been developed. The data warehouse offers the possibility to calculate all input tables of biological information necessary for the assessment WGs and to design several other tables on a pivot basis similar to what is possible in EXCEL. Based on these tables, plots and graphs can be made on an interactive basis. Furthermore, the data warehouse makes it possible to export data to a number of formats including EXCEL, SAS, and ASCII for additional analysis. The minimum level of aggregation differs between survey/area combinations:

- IBTS North Sea, Skagerrak, Kattegat: ICES rectangle
- IBTS western division: stratum (strata will be delivered)
- IBTS southern division: stratum (strata will be delivered)
- BTS North Sea, Channel and Irish Sea: ICES rectangle
- BITS Baltic Sea: sub-division

3. Unaggregated (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.

The output of type 1 will be publicly available. For access to type 2 and 3 data several rules and regulations may apply. First there is the Commission Regulation (EC) No 1639/2001 of 25 July 2001. This regulation lays down detailed rules on the collection of data in the fisheries sector for the application of Council Regulation (EC) No 1543/2000. In addition, ICES has adopted the FAO code of conduct of responsible fishing, article 7.4.7: "Sub regional or regional fisheries management organizations or arrangements should compile data and make them available, in a manner consistent with any applicable confidentiality requirements, in a timely and in an agreed format to all members of these organizations and other interested parties in accordance with agreed procedures". This may raise the question, what an 'applicable confidentiality requirements' is for the bottom trawl surveys.

Data access has been discussed several times in the IBTS working group and in 1994 an agreement on data access was stated in the Consultative Committee report (C.M.1994/Del:10). Wim Panhorst wrote in May 1997 an internal paper to clarify the Consultative Committee's statement on ICES data policy and it was referenced and agreed on once more at the WGIBTS meeting in 2001 (ICES CM 2001/D:05, Ref: ACFM).

During the BITS project data access was also discussed, however, a clear statement was never written down. After termination of this project all participating countries were asked if they would object to a data policy similar to the one practised by IBTS. As there were no objections ICES decided to follow the same guidelines for BITS as for IBTS. The aggregation level for BITS, however, is that of sub-division. As each of the delivering institutes has access to the database it is the responsibility of the national survey co-ordinator to ensure that data only are used in accordance with ICES policy. Wim Panhorst wrote the following in 1997:

'*Data from the International Bottom Trawl Survey carried out in the North Sea and Division IIIa. The data stored consist of the raw haul-by-haul data together with various levels of aggregation*.
Without restrictions the data are available to all usage in connection with ICES working groups or research projects within the ICES work programme. For all other users there is an important distinction between raw data and aggregated data.

For raw haul data the following is a summary of the procedure. Applicants have to fill out a form indicating the data requested, their level of aggregation or disaggregation, the reasons why the request is made, the title and description of the project for which the data are to be used, for whom the project is conducted and particularly whether the project is done under contract. Once the form is filled in and signed by the applicant, it will be sent to the national contact person of the countries responsible for supplying the data. In order for matters to move smoothly and efficiently, deadlines for responses will be given. Objections or specific requirements, when arising, will be handled by referring the applicant to the country, which had objected.

For aggregated data down to the level of statistical rectangle (but without identification of the country or haul) the IBTS working group has suggested that the data should be in the public domain but that all requests should go through the national contact persons to secure proper use of the data and guidance of the user. Until this has been accepted, all requests are directed to the national contact person by the Secretariat.'

The 2002 IBTSWG re-affirmed the previous statement but to what extent the EU regulations apply to data access in a central database at ICES HQ remains to be assessed. A request for a ruling on access to the data and to what extent the EU needs to be involved will be passed to ICES by the project co-ordinator. Several levels of data access can be implemented:

(a) total access to types 2 and 3 data

(b) total access to types 2 and 3 data for all in-house and/or ICES related work and access after request for work involving third parties not part of the collaboration,

(c) total access for type 2 data and access after request for type 3 data,

(d) only access to types 2 and 3 data after request.

Level d access may be considered a minimum level of access that may be improved by agreements between countries/institutes bilaterally or better still between all countries/institutes that participate in a particular survey/area combination. For the IBTS North Sea there is agreement on level b access.

Restrictions on the access of data limit the improvements in data access that the centralized database can provide, therefore it is recommended to avoid these limitations as much as possible. It should, however, be realized that DATRAS can accommodate every level of access or restriction that is considered necessary. But this can only be done if the requirements are made explicit by the parties involved. In general it was felt that there is a need to formalize the procedures and agreements that allow access to the data. This, however, should not necessitate an increased administration.

As a procedure to process requests for data access it was suggested to include a menu that requests an agreement to the rules that apply to the use of the requested data after which the request can be processed. For this information as to the type of work, partners involved etc. needs to be provided. This information will be sent by email directly to the relevant survey contact persons who need to reply to ICES before it can allow access by providing a password.

7 PROCESSING PROTOCOLS

ToR e) related to the documentation of each institute's catch processing from initial sorting to final data storage. Prior to the meeting participants were requested to prepare a flow chart of these stages but returns received suggested that this method was rather imprecise. Consequently during the meeting a series of questions were asked of each survey contact person in order to describe the way in which the catches made on their surveys are processed. The results are presented in tables 7.1 to 7.4, one for each of the four co-ordinated surveys – North Sea quarter 1, North Sea quarter 3, Western and Southern.

The following explanations may help to interpret the information. Most questions have yes (y) or no (n) answers. Where p appears this will mean partial unless a different meaning is given. In the species lists, '-' means that species is not normally encountered in the area surveyed. Some questions have superscripts to indicate the extended explanations given below.

a) This is to imply that a gross weight is recorded before any sorting takes place. It could also be a count of baskets. It will be essential for calculating a raising factor if some of the catch is discarded unprocessed.

b) Indicates that one person makes decisions such as the sort strategy and species categorisation.

c) If any part of the catch is discarded unprocessed the answer to this question will be yes. It means that no fish have been selected from that part of the catch nor has it been inspected for any specific species/size class. It will have been weighed or a volumetric estimate made in order to calculate a raising factor. If the answer to this question is yes the answer to 'all fish species measured' must be no as there may have been species in the discarded catch that do not appear in the retained catch. Conversely, if the answer is no, it implies that a representative sample of every fish species in the catch will have been selected out.

d) This will indicate that the species (identified elsewhere in the tables) are separated by sex before length measuring takes place. Even in the event of a large catch of these species, a sufficient number of individuals would be separated by sex to provide an adequate representative length distribution for each sex.

e) Length measurements for a species are generally accepted as being normally distributed, with a small number of fish at either end of the range. If either or both of these groups of smallest and largest individuals are selected out and treated as a separate category for length measurements, the answer to this question is yes.

f) If on inspection, a species appears to have two or more distinct modes in the length range, and you would separate these modes and treat them as different categories for length measuring, the answer to this question is yes.

Table 7.1
North Sea quarter 1

		Denmark	France	Germany	Netherlands	Norway	Sweden	UK(Eng)	UK(Scot)
Staffing	number available for catch processing	4	8/10	6/8	4	2/3	4/5	6/7	6
Hauls	Average number per day	3/4	4	4	4/5	3/4	5	3/4	4/5
Catch	retention in hopper or bin	y	y	y	y	y	y	y	y
	codend cleaned	y	y	y	y	y	y	y	y
	net cleaned	y	y	n	n	y	n	y	y
	cleanings added to catch	y	y	p	p	y	y	y	y
	total weight[a]	y	y	n	y	y	y	n	y
Sorting	'deckmaster' in charge[b]	y	y	y	y	y	y	y	y
	sorting facility - **b**ench or **c**onveyor	c	c	c	c	b	c	b	b
	complete sort upto no. bstkts	30	20	40	40	10	3	40	50
	small fish mixture sub sorting	y	y	y	y	y	y	y	y
	part of the catch discarded unprocessed[c]	n	n	n	n	n	n	n	n
Categories	by sex (1)[d]	n	y	y	y	n	n	y	y
	by size large or small[e]	y	y	y	y	y	y	y	y
	by size multi modal[f]	y	n	n	y	y	y	y	n
Sub sample	re-mix before selection	y	y	y	y	y	n	y	n
	selection random	y	y	y	y	y	y	y	y
Weighing	all catch components	y	y	y	n	y	y	y	y
	all sub samples	y	y	y	n	y	y	y	y
Measuring	all fish species (2)	y	y	y	y	n	y	y	y
	minimum sample size	75	100	100	50	50	50	75	150
	commercial benthos	n	c	n	c	n	y	y	n
	cephalopods	n	c	n	c	y	y	n	n
	other benthos - **w**eigh, **c**ount, **o**bserve	n	c	o	c	n	o	o	n
Biological sampling	prescribed species (3)	y	y	y	y	y	y	y	y
	other species (4)	n	n	n	y	n	y	y	y
	weight	y	n	y	y	y	y	y	y
	sex	y	y	y	y	y	y	y	y
	maturity	y	y	y	y	y	y	y	y
	age material	y	y	y	y	y	y	y	y
	ageing - at sea or ashore	a	s/a	a	a	a	a	a	s
Data capture	station detail - **e**lectronic or **p**aper/pencil	e/p	e	e	p	e/p	p	p	p
	catch detail - **e**lectronic or **p**aper/pencil	p	e	p	e	e	p	e	p
	length detail - **e**lectronic or **p**aper/pencil	p	p	p	e	e	p	e	p
	biological detail - **e**lectronic or **p**aper/pencil	p	p	p	p	e	p	e	p
	error checking	y	y	y	y	y	y	y	y
	back up	y	y	y	y	y	y	y	y
(1) Categories by sex	plaice	n	y	n	n	n	y	y	n
	dab	n	n	y	n	n	n	y	n
	elasmobranchs	n	y	y	y	n	n	y	y
(2) Measuring 0.5cm	herring	y	y	y	y	y	y	y	y
	sprat	y	y	y	y	y	y	y	y
	pilchard	y	y	y	n	n	n	y	n
	anchovie	y	y	y	n	n	n	y	n
(2) Measuring mm	commercial benthos	n	y	n	n	n	n	y	n
(3) Prescribed species	cod	y	y	y	y	y	y	y	y
	haddock	y	y	y	y	y	y	y	y
	whiting	y	y	y	y	y	y	y	y
	saithe	y	y	y	y	y	n	y	y
	Norway pout	y	y	y	y	y	y	y	y
	herring	y	y	y	y	y	y	y	y
	sprat	y	y	y	y	n	y	y	y
	mackerel	y	y	y	y	p	p	y	y
	plaice	n	y	n	n	n	y	y	n
(4) Other species	dab	n	n	n	n	n	n	y	n
	brill	n	n	n	n	n	n	y	n
	turbot	n	n	n	n	n	n	y	n
	lemon sole	n	n	n	n	n	n	y	n
	anglers	n	n	n	n	n	n	y	y
	elasmobranchs	n	n	n	y	n	n	y	n

Table 7.2
North Sea quarter 3

		Denmark	*Germany*	*Norway*	*Sweden*	*UK(Eng)*	*UK(Scot)*
Staffing	number available for catch processing	5	6/8	2/3	4/5	6/7	6
Hauls	Average number per day	3/4	4	7/8	5	3/4	4/5
Catch	retention in hopper or bin	y	y	y	y	y	y
	codend cleaned	y	y	y	y	y	y
	net cleaned	y	n	y	n	y	y
	cleanings added to catch	y	p	y	y	y	y
	total weight[a]	y	n	y	y	n	y
Sorting	'deckmaster' in charge[b]	y	y	y	y	y	y
	sorting facility - **b**ench or **c**onveyor	c	c	b	c	b	b
	complete sort upto no. bstkts	30	40	10	3	40	50
	small fish mixture sub sorting	y	y	y	y	y	y
	part of the catch discarded unprocessed[c]	n	n	n	n	n	n
Categories	by sex (1)[d]	n	y	n	n	y	y
	by size large or small[e]	y	y	y	y	y	y
	by size multi modal[f]	y	n	y	y	y	n
Sub sample	re-mix before selection	y	y	n	y	y	n
	selection random	y	y	y	y	y	y
Weighing	all catch components	y	y	y	y	y	y
	all sub samples	y	y	y	y	y	y
Measuring	all fish species (2)	y	y	y	y	y	y
	minimum sample size	75	100	50	50	75	150
	commercial benthos	n	n	n	y	y	n
	cephalopods	n	n	y	y	n	y
	other benthos - **w**eigh, **c**ount, **o**bserve	n	o	n	o	o	n
Biological	prescribed species (3)	y	y	y	y	y	y
sampling	other species (4)	n	n	n	y	y	y
	weight	y	y	y	y	y	y
	sex	y	y	y	y	y	y
	maturity	y	y	y	y	y	y
	age material	y	y	y	y	y	y
	ageing - at sea or ashore	a	a	a	a	a	s
Data	station detail - **e**lectronic or **p**aper/pencil	e/p	e	e/p	p	p	p
capture	catch detail - **e**lectronic or **p**aper/pencil	p	p	e	p	e	p
	length detail - **e**lectronic or **p**aper/pencil	p	p	e	p	e	p
	biological detail - **e**lectronic or **p**aper/pencil	p	p	e	p	e	p
	error checking	y	y	y	y	y	y
	back up	y	y	y	y	y	y
(1) Categories	plaice	n	n	n	y	y	n
by sex	dab	n	y	n	n	y	n
	elasmobranchs	n	y	n	n	y	y
(2) Measuring	herring	y	y	y	y	y	y
0.5cm	sprat	y	y	y	y	y	y
	pilchard	y	y	n	n	y	n
	anchovie	y	y	n	n	y	n
(2) Measuring mm	commercial benthos	n	n	n	n	y	n
(3) Prescribed	cod	y	y	y	y	y	y
species	haddock	y	y	y	y	y	y
	whiting	y	y	y	y	y	y
	saithe	y	y	y	n	y	y
	Norway pout	y	y	y	y	y	y
	herring	y	y	y	y	y	y
	sprat	y	y	n	y	y	y
	mackerel	y	y	y	p	y	y
	plaice	n	n	n	y	y	n
(4) Other	dab	n	n	n	n	y	n
species	brill	n	n	n	n	y	n
	turbot	n	n	n	n	y	n
	lemon sole	n	n	n	n	y	n
	anglers	n	n	n	n	y	y
	elasmobranchs	n	n	n	n	y	n

Staffing	number available for catch processing	8/10	5	4	6	6	7/8	6/7
Hauls	Average number per day	4/5	4/6	6	4/5	4/5	3/4	3/4
Catch	retention in hopper or bin	y	y	y	y	y	y	y
	codend cleaned	y	y	y	y	y	y	y
	net cleaned	y	y	y	y	y	y	y
	cleanings added to catch	y	y	y	y	y	y	y
	total weight[a]	y	n	n	y	y	n	n
Sorting	'deckmaster' in charge[b]	y	y	y	y	y	y	y
	sorting facility - **b**ench or **c**onveyor	c	b/x	b	b	b	c	b
	complete sort upto no. bstkts	60	50	sel	15	50	40	40
	small fish mixture sub sorting	y	y	y	y	y	y	y
	part of the catch discarded unprocessed[c]	n	n	n	y	n	n	n
Categories	by sex (1)[d]	y	y	y	n	y	y	y
	by size large or small[e]	y	y	y	y	n	y	y
	by size multi modal[f]	y	y	y	y	n	y	y
Sub sample	re-mix before selection	y	y	y	y	n	y	y
	selection random	y	y	y	y	y	y	y
Weighing	all catch components	y	y	y	y	y	y	y
	all sub samples	y	y	y	y	y	y	y
Measuring	all fish species (2)	y	y	n	n	y	y	y
	minimum sample size	100	75	75	50	150	75	75
	commercial benthos	n	y	y	w	n	y	y
	cephalopods	c/m	y	n	w/c	n	n	n
	other benthos - **w**eigh, **c**ount, **o**bserve	n	n	n	w	n	w/c	o
Biological sampling	prescribed species (3)	y	y	y	y	y	y	y
	other species (4)	n	y	y	n	y	n	y
	weight	n	y	y	y	y	n	y
	sex	y	y	y	y	y	y	y
	maturity	y	y	y	y	y	y	y
	age material	y	y	y	y	y	y	y
	ageing - at sea or ashore	a	a	a	a	s	a	a
Data capture	station detail - **e**lectronic or **p**aper/pencil	e	e/p	p	p	p	e/p	p
	catch detail - **e**lectronic or **p**aper/pencil	e	e	e	p	p	p	e
	length detail - **e**lectronic or **p**aper/pencil	p	e	e	p	p	p	e
	biological detail - **e**lectronic or **p**aper/pencil	p	e	e	p	p	p	e
	error checking	n	y	y	y	y	y	y
	back up	y	y	y	y	y	y	y
(1) Categories by sex	anglers	y	n	n	n	n	n	n
	cod	y	n	n	n	n	n	n
	dab	n	n	n	n	n	n	y
	elasmobranchs	y	y	y	n	y	n	y
	haddock	y	n	n	n	n	n	n
	hake	y	n	n	n	n	n	n
	lemon sole	n	y	y	n	n	n	n
	megrim	n	y	y	n	n	n	y
	nephrops	y	n	n	n	n	n	n
	plaice	y	n	n	n	n	n	y
	sole	y	n	n	n	n	n	n
	whiting	y	n	n	n	n	n	n
(2) Measuring 0.5cm	anchovie	y	y	y	n	n	y	y
	herring	y	y	y	n	y	n	y
	pilchard	y	y	y	n	n	y	y
	sprat	y	y	y	n	y	n	y
(2) Measuring mm	commercial benthos	n	n	n	n	n	n	y
	nephrops	y	n	n	n	n	y	n
(3) Prescribed species	anglers	y	y	y	n	y	y	y
	blue whiting	n	y	n	n	y	y	n
	cod	y	y	y	y	y	n	y
	haddock	y	y	y	y	y	n	y
	hake	y	y	y	y	y	y	y
	herring	n	y	y	n	y	n	y
	horse mackerel	n	y	n	n	y	y	n
	lemon sole	n	y	y	n	y	n	y
	mackerel	n	y	y	n	y	y	y
	megrim	y	y	y	n	y	y	y
	nephrops	n	y	n	n	y	y	n
	plaice	n	y	y	n	y	n	y
	saithe	n	y	y	n	y	n	y
	sole	y	y	y	n	y	n	y
	spur dog	n	y	y	n	y	n	y
	whiting	y	y	y	y	y	n	y
(4) Other species	brill	n	y	n	n	y	n	y
	elasmobranchs	n	y	y	n	y	y	y
	sprat	n	y	n	n	y	n	y
	turbot	n	y	n	n	y	n	y

Table 7.4

Southerly		**q4**			**q3,4**	**q2**
		France	*Spain N*	*Spain S*	*Portugal*	*Spain S*
Staffing	number available for catch processing	8/10	8/10	6/8	8	6/8
Hauls	Average number per day	5/6	5	5	4/5	5
Catch	retention in hopper or bin	y	n	n	y	n
	codend cleaned	y	y	y	y	y
	net cleaned	y	y	y	y	y
	cleanings added to catch	y	y	y	y	y
	total weight"	y	n	n	p	n
Sorting	"deckmaster" in charge"	y	y	y	y	y
	sorting facility - **b**ench or **c**onveyor	c	b	b	b	b
	complete sort upto no. bstkts	60	40	40	10	40
	small fish mixture sub sorting	y	y	y	y	y
	part of the catch discarded unprocessed"	n	n	n	y	n
Categories	by sex (1)"	y	n	n	y	n
	by size large or small"	y	y	y	n	y
	by size multi modal'	y	y	y	n	y
Sub sample	re-mix before selection	y	y	y	y	y
	selection random	y	y	y	y	y
Weighing	all catch components	y	y	y	y	y
	all sub samples	y	y	y	y	y
Measuring	all fish species (2)	y	y	y	n	y
	minimum sample size	100	75	75	200	75
	commercial benthos	n	y	y	y	y
	cephalopods	c/m	y	y	y	y
	other benthos - **w**eigh, **c**ount, **o**bserve	n	w/c	w/c	w/c	w/c
Biological sampling	prescribed species (3)	y	y	y	y	y
	other species (4)	n	y	y	n	y
	weight	n	n	n	y	n
	sex	y	y	y	y	y
	maturity	y	y	y	y	y
	age material	y	y	y	y	y
	ageing - at sea or ashore	a	a	a	a	a
Data capture	station detail - **e**lectronic or **p**aper/pencil	e	e/p	e/p	e/p	e/p
	catch detail - **e**lectronic or **p**aper/pencil	e	p	p	e/p	p
	length detail - **e**lectronic or **p**aper/pencil	p	p	p	e/p	p
	biological detail - **e**lectronic or **p**aper/pencil	p	p	p	p	p
	error checking	n	y	y	y	y
	back up	y	y	y	y	y
(1) Categories by sex	anglers	y	n	n	n	n
	elasmobranchs	y	n	n	n	n
	hake	y	n	n	n	n
	megrims	y	n	n	n	n
	nephrops	n	n	n	y	n
	red shrimp	-	-	n	y	n
	rose shrimp	-	-	n	y	n
	sole	y	n	n	n	n
	whiting	y	-	-	n	-
(2) Measuring 0.5cm	anchovie	y	y	y	y	y
	pilchard	y	y	y	y	y
	sprat	y	-	-	-	-
(2) Measuring mm	commercial benthos	n	y	y	n	y
	nephrops	y	y	y	y	y
	octopus/cuttlefish	n	n	n	y	n
	red shrimp	-	-	y	y	y
	rose shrimp	-	-	y	y	y
(3) Prescribed species	anglers	y	y	y	y	y
	blue whiting	n	y	y	y	y
	hake	y	y	y	y	y
	horse mackerel	n	y	y	y	y
	mackerel	n	y	y	y	y
	megrims	y	y	-	y	-
	nephrops	y	y	y	y	y
	octopus & cuttlefish	n	n	y	y	y
	red shrimp	-	-	y	y	y
	rose shrimp	-	-	y	y	y
	sole	y	n	n	n	n
	Spanish mackerel	n	n	y	y	y
	wedge sole	-	-	y	n	y
	whiting	y	-	-	n	-
(4) Other species	elasmobranchs	n	y	y	n	y

8 REVIEW OF RELEVANT PAPERS PRESENTED AT THEME SESSIONS P, Q AND T AT THE 2001 ASC WHICH MAY HAVE IMPLICATIONS FOR IBTS SURVEYS

Only the results of four papers presented at **theme session P** (Quality and Precision of Basic Data Underlying Fish Stock Assessment and Implications for Fisheries Management Advice) are of relevance for the IBTS surveys. These are the papers 06, 10, 16 and 17. Relevant for IBTS of **theme session Q** (Catchability and Abundance Indicators – the Influence of Environment and Fish Behaviour) are 7 papers (02, 07, 08, 10, 11, 20, 24) and only 1 of **theme session T** (Use and Information Content of Ecosystem Metrics and reference Points; No. 3) – the last paper had been reviewed at the last IBTS Working Group and thus was excluded this time.

Comments and recommendations from the Working Group for the relevant papers are given for each paper.

8.1 P-06

The measurement error of marine surveys catches: the bottom trawl case.

Objectives

To analyse the measurement error of marine surveys abundance estimates.

Methods

Use of 10 parallel trawl surveys for cod in the Barents Sea with a total of 130 paired hauls to compute and make statistical comparison of errors. Acoustic measurements were mentioned but not used.

Results

The measurement error is fairly constant on the logarithmic scale and is independent of location, time and fish density on that scale. The measurement error represents a 2-5% of the variability of the winter- and autumn surveys in the Barents Sea.

Implications

For this specific survey cod catch rates are precise measures of fish density at a given site at a given time. For IBTS there are no fine scale data to perform similar analysis.

No comments and no recommendations from the Working Group

8.2 P-10

Estimation of abundance Indices at Age in Research surveys – A comparison of sampling strategies

Before the ASC in 2001 this paper was also presented by the author at last year meeting of the IBTS Working Group in Copenhagen in April as a working document. It was comprehensively discussed and reviewed by the group. The results and proposals for the improvement of the method of catch processing is summarised in chapter 6.2. (Comparison of ageing sampling strategies) of the Working Group report.

The recommendation in last year report was as followed:

- Sampling of megrim (*Lepidorhombus whiffiagonis*) for abundance indices at age should be carried out by sex.

Comments and recommendations from the Working Group

This problem of sampling intensity, precision and previous stratification by sex should also be studied for other species, especially for those flatfish species that have strong sexual differences in growth.

The WG also recommends that the WGBEAM should pay attention to this problem.

8.3 P-16

An Evaluation of the IMR Summer Bottom Trawl Survey in the Barents Sea

Objectives

Both ground fish surveys (the winter and the summer Bottom Trawl Survey in the Barents Sea) have nearly the same tasks. Comparing the outcome of both surveys it should be decided which survey is more precise and if it is useful to continue both surveys.

Methods

Comparing spatial distribution, precision of density estimates and survey indices for age-groups of cod and haddock and the estimates of length-frequencies distributions.

Results

Survey indices are consistent in indicating similar trends in cod and haddock abundance. Cod abundance estimates from winter survey are twice as precise than those from the summer survey. Summer survey does not provide significantly more information for the assessment of cod than the winter survey.

Implications

This evaluation of the necessity of seasonal surveys is presented here to focus on the IBTS Q1 and Q3 surveys in the North Sea. The Q3 survey has been conducted since 1990 and the series of more than 10 years should be sufficient to compare both surveys due to their importance for the stock assessment work and for other possible applications like migration, ecosystem aspects and others. The cost effect should also be considered.

Comments and recommendations from the Working Group

The WG pointed out that the IMR in Norway has decided to continue the summer survey, for this survey also has further applications. Strong arguments to continue IBTS Q3 survey are the national and standing alone characteristic especially for stock assessment purposes of the different multi-functional components, like the English and Scottish surveys. The Q3 IBTS survey also provides data that are relevant for ecosystem purposes (e.g. benthos, nutrients) and for improving the survey strategy.

8.4 P-17

Allocation of survey effort between small scale and large scale and precision of fisheries survey-based abundance estimates

Objectives

Analyse the coherence in the level of variances between IBTS survey and part of the German Small Scale Bottom Trawl Survey (GSBTS) to understand how small scale variability influences the large scale survey data and to analyse if IBTS survey strategy is adequate.

Methods

Geostatic techniques applied to cod age 2 data from 1991 second quarter IBTS and GSBTS to estimate model-based variances. Then, simulations and re-sampling to calculate mean and variance estimates for different allocations of sampling effort between large and small scale were performed.

Results

No effect of the allocation of sampling effort is found for the estimates of the mean and coefficient of variation of the catch rates. For the estimation of the process variance allocation of the more sampling effort to fine sampling leads to a lower bias and better precision. The residual variance is always over-estimated when the sampling effort is allocated

predominantly at small scale. The variance of the estimate of the residual variance is also always higher for the sampling in designs in which the number of haul per box is higher than the number of rectangles sampled.

Implications

No implications can be derived from this analysis before it has been repeated with all 8 boxes in the German survey and with the spatial resolution reviewed (i.e. there is a problem in the size of the statistical rectangles in relation to the box area).

No comments and no recommendations from the Working Group

8.5 Q-02

Variability of diel variation of bottom trawl catch rates of North Sea cod

Objectives

This paper investigates the variation of cod catch rates in North Sea bottom trawl surveys within daytime and consistency of variation patterns.

Methods

Uses fine scale information from the 1999 German Small Scale Bottom Trawl Survey on catch rates of cod ages 0 to 4. Analysis consists on generalised linear models were rates are modelled as a function of time of day and environmental co-variates.

Results

Rates 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).

Implications

Diel patterns in cod catch rates 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. Sampling should be randomised by time of day.

Comments and recommendations from the Working Group

National representatives responsible for conducting IBTS expressed the difficulty of adjusting their current summer schedules to attempt randomising the haul timing as this might lose fishing time. 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 when IBTS abundance indices are calculated.

8.6 Q-07

***In situ* determination of bottom trawl ground gear contact**

Objectives

This paper describes how to get the exact timing of ground gear bottom contact. The effective tow duration is one of the main sources of uncertainty in estimating the swept area and to improve the accuracy of fish abundance indices.

Methods

A stretch cell sensor with a steel ground weight was mounted to the centre of the fishing line and to the bottom panel of the standard Campelen 1800 bottom trawl (Norwegian Barents Sea Survey). A coded signal was transmitted simultaneously back to the vessel. A series of 23 hauls with different tow duration were conducted.

Results

-The new sensor has detected the non-normal behaviour of the trawl immediately, e.g. the jumps of the rockhopper gear.

-The standard procedure of shooting and hauling the gear generally underestimates the effective sampling time at bottom. Effective tow duration was in average nearly 7min longer.

Implications

Minimising one of the sources of uncertainty in abundance indices it is necessary to keep the shooting and hauling methodology as constant as possible from year to year. The starting and ending points of the tow duration have to be exactly defined.

No implications at the moment. Before standardising the catch of the target species with the registered time of bottom contact, further studies have to be carried out, e.g. several sensors have to be mounted simultaneously in different positions along the ground gear and it has to be investigated to what degree the target species do react to these undesirable behaviour of the ground gear (e.g. species or age-group specific escapement (young cod) under the footrope).

Comments and recommendations from the Working Group

Different sensors to measure bottom contact are available. Some national representatives express their interest in using these devices during the surveys.

8.7 Q-08

Changes in the availability of herring to the North Sea acoustic survey: the impact of diurnal migration

Objectives

This paper investigates the exact timing and nature of diurnal vertical migration behaviour of Atlantic herring according to location and year: break-up and settlement periods of the schools. This is to evaluate possible bias of abundance indices based on acoustics using the existing time restrictions for the survey.

Methods

Analysis of six years of acoustic surveys (1991, 1993-1997) collected between 0200 and 2200 GMT. Examinations of data derived from image analysis techniques applied to echo traces to study parameters numbers of schools, depth of schools and school descriptors such length and height. A model was developed to pinpoint times at which key points in the pattern occurred. Based on results, data were selected and abundance indices were recalculated.

Results

Mean settlement time of the schools occurred between 0417 and 0457 for all years except 1995. The mean break-up time was more variable, occurring between 1816 and 2056. Differences were obtained in the indices using selected data for all years. In five of the six years estimates were higher and in one year lower.

Implications

Although the study is oriented towards evaluating acoustic surveys the results are also useful for bottom trawl surveys as they support the IBTS protocols establishing no fishing at night. For acoustic surveys the recommendation is to shorten the period during which the survey is carried out by one hour in starting and finishing times.

Comments and recommendations from the Working Group

The WG interpreted the results as further information reinforcing the IBTS regulation of restricting hauls to daytime period. No recommendation towards modifying the current schedule was made.

8.8 Q-10

Modelling fish reaction to vessel noise, the significance of the reaction thresholds

Objectives

Vessel avoidance of fish has been reported by different authors. If the fish react to the vessel before it is measured or caught, the estimate of abundance or the catch may be biased. A model was presented which could explain the large variability in fish behaviour seen in vessel avoidance experiments.

Methods

A simple model is made to predict the avoidance reaction and to quantify the importance of the parameters. The model is very sensitive to vessel noise and to the fish reaction threshold.

Results

Small changes in reaction thresholds may lead to significant changes in the resulting fish behaviour. To model fish reaction to vessels, emphasis should be put on the reaction threshold and noise field around the vessel, rather than swimming speed and endurance of fish.

Implications

No improvement in standardising the vessel specific catch rates related to different noise levels can be derived from this model at the actual stage.

Comments and recommendations from the Working Group

The WG should consider possible effect on catches when new vessels with low noise level join the IBTS research vessel fleet.

8.9 Q-11

Diurnal variation in bottom trawl survey catches: does it pay to adjust

Objectives

Investigate the bias due to in catch rates from bottom trawl catches to adjust and improve the accuracy of abundance distribution.

Methods

Stochastic model describing diurnal fluctuations to examine the annual variation of the diurnal amplitude as function of species and length.

Results

The correction for large fish leads to a moderate increase in variance while for small fish it results in a large increase in variance.

Implications

Correcting for bias due to diurnal variation can cause more problems leaving the data alone. Adjustment removes diurnal bias but at the cost of increasing uncertainty of the adjusted estimates. Adjusting would have some benefits when estimating absolute numbers rather than temporal trends.

No comments and no recommendations from the Working Group

8.10 Q-20

Vertical reality: utilizing knowledge of cod behaviour to interpret survey results

Objectives

This paper investigates natural behaviour of cod in the North Sea and Irish Sea.

Methods

Use of electronic data storage tags from April 1999 to June 2000 set to record depth at 10-minute intervals. 68 tagged North Sea cod were released near Lowestoft in May 1999 and 20 Irish Sea cod off the coast of Ireland. Returns, 31 and 4 respectively, were made through the commercial fishery.

Results

Vertical movements of cod change through the year and differed between regions. During early and late time of the year North Sea cod demonstrated more vertical movement than during the middle months. Irish Sea cod did not spend sustained periods of time close to the seabed. Further, cod rates of ascent and descent cannot be explained by the maintenance of negative buoyancy at residence depth and thus it is concluded that fish in shallow waters of the North Sea and Irish Sea are negatively buoyant at their mean residence depth.

Implications

Results are meant for hydro acoustics application to estimate the effect of variations in vertical movements on target strength. Nevertheless, the results also relate to estimating the proportion of time that fish area accessible to sampling gears and to bring the attention to the potential bias in trawl surveys for cod abundance indices due to vertical migration.

Comments and recommendations from the Working Group

The WG will like to see further results based on more observations.

8.11 Q-24

Spatial density distributions of fish, a balance between environmental and physiological limitations

Objectives

This paper looks at the implications of physiological characteristics of fish on large-scale vertical distribution. Species are: blue whiting, cod, haddock, redfish, saithe (physoclists), and capelin, and herring (physostomes).

Methods

The study uses trawl, acoustic and CTD data collected along the Norwegian coast and in the Barents Sea in summer and winter to investigate spatial distribution of the seven species in relationship with environmental conditions. Temperature, salinity, depth, acoustic Sa-values and density of the species in unsampled locations estimated by geostatistical methods.

Results

Results show that blue whiting, haddock, saithe, cod and redfish are distributed within the bottom half of the water column but that they adapt to pelagic living. Haddock and blue whiting are more often distributed higher into the water column than saithe and cod. Pelagic living more frequent in waters deeper than 200m. Evidence of diurnal vertical migration was found for all species when day and night were distinguishable. Relationship with environmental were not clearly established.

Implications

Fish vertical migration behaviour has an effect on the accuracy of acoustic stock estimates of demersal physoclists due to the buoyancy status and the loss of acoustic fish information in the dead zone, which could be corrected when interpreting vertical profiles according to environmental conditions. Thus, implications are mostly for acoustics applications, although the effects of vertical migration are also important for trawl surveys. Variability in the patterns observed implies difficulties in trying to correct data for calculating abundance indices.

No comments and no recommendations from the Working Group

9 NEW STANDARD INDICES

A Working Document on observations on the revised IBTS indices (P. Kunzlik) was presented. As the IBTS indices have been changed to the so-called standard areas there was a need to evaluate them, both in terms of internal consistency (old versus new) and their performance in stock assessment.

Analysis using a Shepherd-Nicholson model, which models survey indices over the life of multiple cohorts was carried out.

The model assumes that:

i. The survey catch-at-age data are separable into age, year and year-class effects (with log-normally distributed errors). The (age*year) interaction term can be considered a correction to the age-dependent selection factor (*i.e.*, fishing mortality is broadly constant over the period of the data)

ii. Survey catchabilities are constant over time.

iii. Survey CPUE is proportional to abundance.

In addition catch-at-age analysis was carried out for haddock and cod using the standard WGNSSK method which calibrates an extended survivors analysis (XSA) using survey CPUE series and/or commercial CPUE series. In order to examine the correspondence of the old and new survey indices, only those survey series and the same setting as used in assessments by WGNSSK.

The old and new indices are shown in the text table 1 and 2. Figure 9.1 to 9.4 shows the standard areas for cod, haddock, whiting and Norway pout respectively.

Results

Shepherd-Nicholson model

To summarise the results, an attempt was made to tabulate the performance of the model fit using the following criteria:

- Do old or new indices give a lower residual sum-of-squares for the model fit?
- Do old or new indices vary in the number of outlying points identified by the Systat model fit (remembering that identification of outliers may be affected by the inclusion of "perfect fit" data to force the constraint on the slope of year effects)?

These results are presented below. A tick indicates better performance, *ie*., a lower residual sum-of-squares or fewer identified outliers:

		New Indices		Old Indices	
Species	Survey	Residual SS	Outliers	Residual SS	Outliers
Cod	Q1			✓	✓
	Q2	✓			
	Q3	✓			
	Q4			✓	✓
	All Quarters	✓			
Haddock	Q1	✓			
	Q2	✓			
	Q3	✓			
	Q4			✓	
	All Quarters			✓	
Whiting	Q1		✓	✓	
	Q2	✓			
	Q3			✓	
	Q4	✓			
	All Quarters	✓	✓		
Norway pout	Q1	✓			
	Q2	✓			
	Q3			✓	
	Q4	✓			✓
	All Quarters	✓			
Sprat	Q1	✓			✓
	Q2	✓			
	Q3			✓	✓
	Q4			✓	✓
	All Quarters	✓			

From this, it can be seen that for 16 out of 25 cases, the new indices generated a lower residual sum-of-squares compared to 9 cases where the old indices perform better. Fewer outliers are identified for model fits to the old indices (on 6 occasions) compared to the new indices (on 2 occasions). It should be noted that in most cases the differences in residual sums-of-squares is very small. Notwithstanding this, based on these criteria in the single-survey models for cod, the old indices perform better for quarters 1 and 4, for haddock they perform better in quarter 4 only, for whiting they perform better in quarter 1 and quarter 3. For Norway pout they perform better in quarter 3 and for sprat they perform better in quarters 3 and 4. For all species except haddock, the new indices perform better in the multiple-survey model fits.

The result shows that in general, the parameter estimates are similar irrespective of whether the new or old indices are used. Visual inspection of the plots of parameter estimates indicates that where differences occur, they are more common in the year effects rather than the age-dependent selectivities or the year-class effects.

Catch-at-age analysis

For cod, in 3 out of the 5 single-fleet XSA regressions of Ln(IBTS index) on Ln(XSA abundance) a higher R^2 is apparent for the old index according to the predictive regressions made. Similarly, 3 out of the 5 calibration regressions in the single-fleet XSA also produce higher R^2 for the old index. Residual plots from the old and new indices would be qualitatively similar.

For haddock, the results are similar for the predictive regressions. 3 out of the 5 regressions demonstrate a higher R^2 for the old index. For the XSA calibration regressions the R^2 values are the same except for one age in which the old index perform better.

For the multi-fleet XSA runs that seek to emulate the WGNSSK final run analyses, both the old and new indices present similar results in terms of weightings to the estimates of survivors and the internal standard errors of the survivors' estimates. For both species the summary of XSA stock trends are virtually identical.

General conclusion

The most obvious conclusion from all of these analyses is that there are rather few differences in the results between the old and new indices. In general, the new indices perform marginally better in terms of reduced residual sums-of-squares when a Shepherd-Nicholson type model is fitted to them, although more outliers are apparent for them compared to the old indices. Conversely, the old indices perform marginally better in XSA for the two examined cases, based both on the single-fleet lightly-shrunk runs, and the multi-fleet analyses with heavier shrinkage. However, these differences really are all fairly marginal.

For the "working group" XSA runs, the inclusion of heavier shrinkage to both fishing mortality and population means, and the addition of other tuning series, means that the any differences between the old and new IBTS index series will be less apparent in the final results.

The results seem to indicate that the differences between the old and new indices are marginal and although the effects of the old and new indices on the retrospective performance of XSA, or in the predictive performance of RCT3 have not been studied, the results that are presented suggest that relatively little differences may be found. However, the whole exercise should be treated as a preliminary investigation; it is recommended that more a detailed analysis be undertaken by interested parties.

There is one final additional point. For the XSA runs, the WGNSSK input files were used, **not** the "old" indices as supplied by ICES. From a quick inspection of the values, there appears to be some minor discrepancies between them. It is recommended that assessment working groups check the index values that they use against the standard values produced by ICES.

Text table 1. North Sea/Skagerrak/Eastern Channel Haddock, IBTS Tuning Data

IBTS Quarter 1 Survey Indices

OLD IBTS Tuning Data

Year	0-wr	1-wr	2-wr	3-wr	4-wr	5-wr
1973	1092.0	110.0	-1.0	-1.0	-1.0	-1.0
1974	1168.0	385.0	-1.0	-1.0	-1.0	-1.0
1975	177.0	670.0	-1.0	-1.0	-1.0	-1.0
1976	162.0	84.0	-1.0	-1.0	-1.0	-1.0
1977	385.0	108.0	-1.0	-1.0	-1.0	-1.0
1978	480.0	240.0	-1.0	-1.0	-1.0	-1.0
1979	896.0	402.0	-1.0	-1.0	-1.0	-1.0
1980	268.0	675.0	-1.0	-1.0	-1.0	-1.0
1981	526.0	252.0	-1.0	-1.0	-1.0	-1.0
1982	307.0	400.0	89.0	114.0	13.0	2.0
1983	1057.0	219.0	134.0	22.0	22.0	5.0
1984	229.0	828.0	105.0	34.0	4.0	7.0
1985	579.0	244.0	294.0	18.0	6.0	2.0
1986	885.0	326.0	48.0	61.0	5.0	3.0
1987	92.0	688.0	98.0	13.0	14.0	2.0
1988	210.0	97.0	281.0	17.0	2.0	5.0
1989	220.0	110.0	31.0	51.0	3.0	2.0
1990	679.0	131.0	24.0	4.0	9.0	2.0
1991	1115.0	371.0	19.0	3.0	1.0	2.0
1992	1242.0	543.0	155.0	9.0	1.0	1.0
1993	229.0	504.0	98.0	23.0	2.0	1.0
1994	1375.0	205.0	181.0	25.0	5.0	1.0
1995	267.0	813.0	66.0	47.0	7.7	3.1
1996	860.0	366.0	471.0	25.0	15.1	3.4
1997	374.0	423.0	106.0	114.0	8.7	5.4
1998	212.0	233.0	130.0	48.0	36.6	4.3
1999	3702.0	108.0	50.0	25.0	15.6	10.3
2000	867.0	2295.0	50.0	11.0	7.0	5.7

NEW IBTS Tuning Data

Year	0-wr	1-wr	2-wr	3-wr	4-wr	5-wr
1973	842.8	99.4	146.0	14.1	0.6	5.5
1974	813.3	265.6	14.1	26.1	4.7	0.7
1975	75.3	369.9	124.6	11.1	9.5	2.3
1976	99.4	46.5	94.9	11.8	0.9	1.4
1977	270.1	84.0	23.2	50.7	8.0	2.2
1978	345.2	149.8	37.5	5.0	11.4	2.0
1979	607.5	262.8	65.2	8.9	2.0	5.4
1980	178.0	475.9	121.6	18.8	3.3	2.3
1981	357.4	176.2	303.4	45.3	6.2	1.7
1982	210.2	287.2	67.3	88.9	10.3	1.7
1983	732.1	155.7	92.1	14.9	15.1	3.3
1984	157.1	591.6	77.0	25.5	3.3	5.6
1985	398.4	171.4	203.8	13.3	4.9	1.9
1986	643.4	221.7	32.3	43.0	3.6	2.0
1987	73.4	473.6	70.8	9.7	10.8	1.7
1988	150.3	69.7	188.6	12.0	1.6	3.4
1989	163.9	100.8	24.6	37.3	2.6	1.4
1990	469.8	88.9	18.3	3.2	6.1	1.8
1991	832.4	250.6	13.7	2.2	0.5	1.6
1992	851.8	381.9	105.9	6.3	0.8	0.7
1993	163.8	332.9	69.7	15.7	1.1	0.5
1994	954.1	133.6	110.0	15.4	3.5	0.5
1995	226.9	570.1	48.1	32.2	5.5	2.1
1996	600.0	258.2	325.4	17.1	10.5	2.4
1997	260.0	306.7	76.2	81.0	6.2	3.8
1998	143.5	156.7	90.0	33.9	25.7	3.0
1999	2608.5	77.2	34.9	18.0	11.1	7.3
2000	637.5	1554.2	33.5	7.5	5.1	4.1

Difference in % between **OLD** and **NEW** IBTS Tuning Data

Year	0-wr	1-wr	2-wr	3-wr	4-wr	5-wr
1973	-22.8	-9.6	-	-	-	-
1974	-30.4	-31.0	-	-	-	-
1975	-57.5	-44.8	-	-	-	-
1976	-38.6	-44.6	-	-	-	-
1977	-29.8	-22.2	-	-	-	-
1978	-28.1	-37.6	-	-	-	-
1979	-32.2	-34.6	-	-	-	-
1980	-33.6	-29.5	-	-	-	-
1981	-32.1	-30.1	-	-	-	-
1982	-31.5	-28.2	-24.4	-22.0	-20.8	-15.0
1983	-30.7	-28.9	-31.3	-32.3	-31.4	-34.0
1984	-31.4	-28.6	-26.7	-25.0	-17.5	-20.0
1985	-31.2	-29.8	-30.7	-26.1	-18.3	-5.0
1986	-27.3	-32.0	-32.7	-29.5	-28.0	-33.3
1987	-20.2	-31.2	-27.8	-25.4	-22.9	-15.0
1988	-28.4	-28.1	-32.9	-29.4	-20.0	-32.0
1989	-25.5	-8.4	-20.6	-26.9	-13.3	-30.0
1990	-30.8	-32.1	-23.8	-20.0	-32.2	-10.0
1991	-25.3	-32.5	-27.9	-26.7	-50.0	-20.0
1992	-31.4	-29.7	-31.7	-30.0	-20.0	-30.0
1993	-28.5	-33.9	-28.9	-31.7	-45.0	-50.0
1994	-30.6	-34.8	-39.2	-38.4	-30.0	-50.0
1995	-15.0	-29.9	-27.1	-31.5	-28.6	-32.3
1996	-30.2	-29.5	-30.9	-31.6	-30.5	-29.4
1997	-30.5	-27.5	-28.1	-28.9	-28.7	-29.6
1998	-32.3	-32.7	-30.8	-29.4	-29.8	-30.2
1999	-29.5	-28.5	-30.2	-28.0	-28.8	-29.1
2000	-26.5	-32.3	-33.0	-31.8	-27.1	-28.1

Text table 2. North Sea/Skagerrak/Eastern Channel Cod, IBTS Tuning Data

IBTS Quarter 1 Survey Indices Backwarded to December in Previous Year

OLD IBTS Tuning Data

Year	0-wr	1-wr	2-wr	3-wr	4-wr	5-wr
1976	7.9	19.9	-1.0	-1.0	-1.0	-1.0
1977	36.7	3.2	-1.0	-1.0	-1.0	-1.0
1978	12.9	29.3	-1.0	-1.0	-1.0	-1.0
1979	9.9	9.3	-1.0	-1.0	-1.0	-1.0
1980	16.9	14.8	-1.0	-1.0	-1.0	-1.0
1981	2.9	25.5	-1.0	-1.0	-1.0	-1.0
1982	9.2	6.7	-1.0	-1.0	-1.0	-1.0
1983	3.9	16.6	2.7	1.8	0.8	1.5
1984	15.2	8.0	3.9	0.9	1.0	0.9
1985	0.9	17.6	3.5	1.7	0.5	1.0
1986	17.0	3.6	6.8	2.3	1.3	1.1
1987	8.8	28.8	1.4	1.7	0.6	0.9
1988	3.6	6.1	5.8	0.6	0.9	1.1
1989	13.1	6.3	5.0	2.3	0.4	1.0
1990	3.4	15.2	2.0	1.0	1.0	0.8
1991	2.4	4.1	3.4	0.8	0.4	0.8
1992	13.0	4.5	1.2	1.0	0.3	0.5
1993	12.7	19.9	2.0	0.7	0.6	0.4
1994	14.8	4.4	3.0	0.8	0.5	0.5
1995	9.7	22.1	2.8	1.1	0.3	0.3
1996	3.5	8.0	6.0	0.7	0.6	0.4
1997	40.0	6.9	2.3	1.1	0.4	0.4
1998	2.7	26.4	2.0	0.9	0.5	0.4
1999	2.1	1.6	8.1	0.8	0.5	0.5
2000	6.6	3.8	0.7	2.0	0.4	0.5

NEW IBTS Tuning Data

Year	0-wr	1-wr	2-wr	3-wr	4-wr	5-wr
1976	9.0	19.2	3.0	1.7	0.4	0.9
1977	36.2	2.7	3.1	0.8	0.5	0.3
1978	13.9	35.0	1.7	1.7	0.6	0.6
1979	9.5	8.6	4.9	0.6	0.9	0.4
1980	20.4	16.4	6.5	3.0	0.7	0.8
1981	10.2	26.5	5.1	2.4	1.8	1.1
1982	11.5	7.1	7.5	1.6	0.8	1.0
1983	6.7	17.0	3.0	2.1	0.8	1.3
1984	29.4	9.3	4.3	0.9	1.0	0.8
1985	1.2	19.7	4.6	3.6	0.9	1.1
1986	19.5	3.5	7.7	2.8	1.3	1.0
1987	10.0	34.0	1.7	2.0	0.6	0.8
1988	6.8	8.0	7.7	0.7	1.0	1.0
1989	14.5	6.1	5.6	2.6	0.4	0.9
1990	4.2	15.1	2.3	1.0	1.0	0.6
1991	6.2	4.9	4.7	1.0	0.5	0.8
1992	16.2	5.4	1.3	1.0	0.3	0.4
1993	12.6	20.0	2.2	0.7	0.7	0.4
1994	14.9	4.5	2.8	0.8	0.5	0.5
1995	11.5	24.1	3.2	1.2	0.3	0.3
1996	4.0	9.8	6.2	0.7	0.6	0.4
1997	40.6	6.1	2.3	1.0	0.4	0.4
1998	2.8	27.5	2.1	0.9	0.5	0.4
1999	3.8	2.0	8.0	0.8	0.4	0.5
2000	6.3	4.9	0.8	1.9	0.4	0.5

Difference in % between **OLD** and **NEW** IBTS Tuning Data

Year	0-wr	1-wr	2-wr	3-wr	4-wr	5-wr
1976	13.9	-3.5	-	-	-	-
1977	-1.4	-15.6	-	-	-	-
1978	7.8	19.5	-	-	-	-
1979	-4.0	-7.5	-	-	-	-
1980	20.7	10.8	-	-	-	-
1981	251.7	3.9	-	-	-	-
1982	25.0	6.0	-	-	-	-
1983	71.8	2.4	11.1	16.7	0.0	-13.3
1984	93.4	16.3	10.3	0.0	0.0	-11.1
1985	33.3	11.9	31.4	111.8	80.0	10.0
1986	14.7	-2.8	13.2	21.7	0.0	-9.1
1987	13.6	18.1	21.4	17.6	0.0	-11.1
1988	88.9	31.1	32.8	16.7	11.1	-9.1
1989	10.7	-3.2	12.0	13.0	0.0	-10.0
1990	23.5	-0.7	15.0	0.0	0.0	-25.0
1991	158.3	19.5	38.2	25.0	25.0	0.0
1992	24.6	20.0	8.3	0.0	0.0	-20.0
1993	-0.8	0.5	10.0	0.0	16.7	0.0
1994	0.7	2.3	-6.7	0.0	0.0	0.0
1995	18.6	9.0	14.3	9.1	0.0	0.0
1996	14.3	22.5	3.3	0.0	0.0	0.0
1997	1.5	-11.6	0.0	-9.1	0.0	0.0
1998	3.7	4.2	5.0	0.0	0.0	0.0
1999	81.0	25.0	-1.2	0.0	-20.0	0.0
2000	-4.5	28.9	14.3	-5.0	0.0	0.0

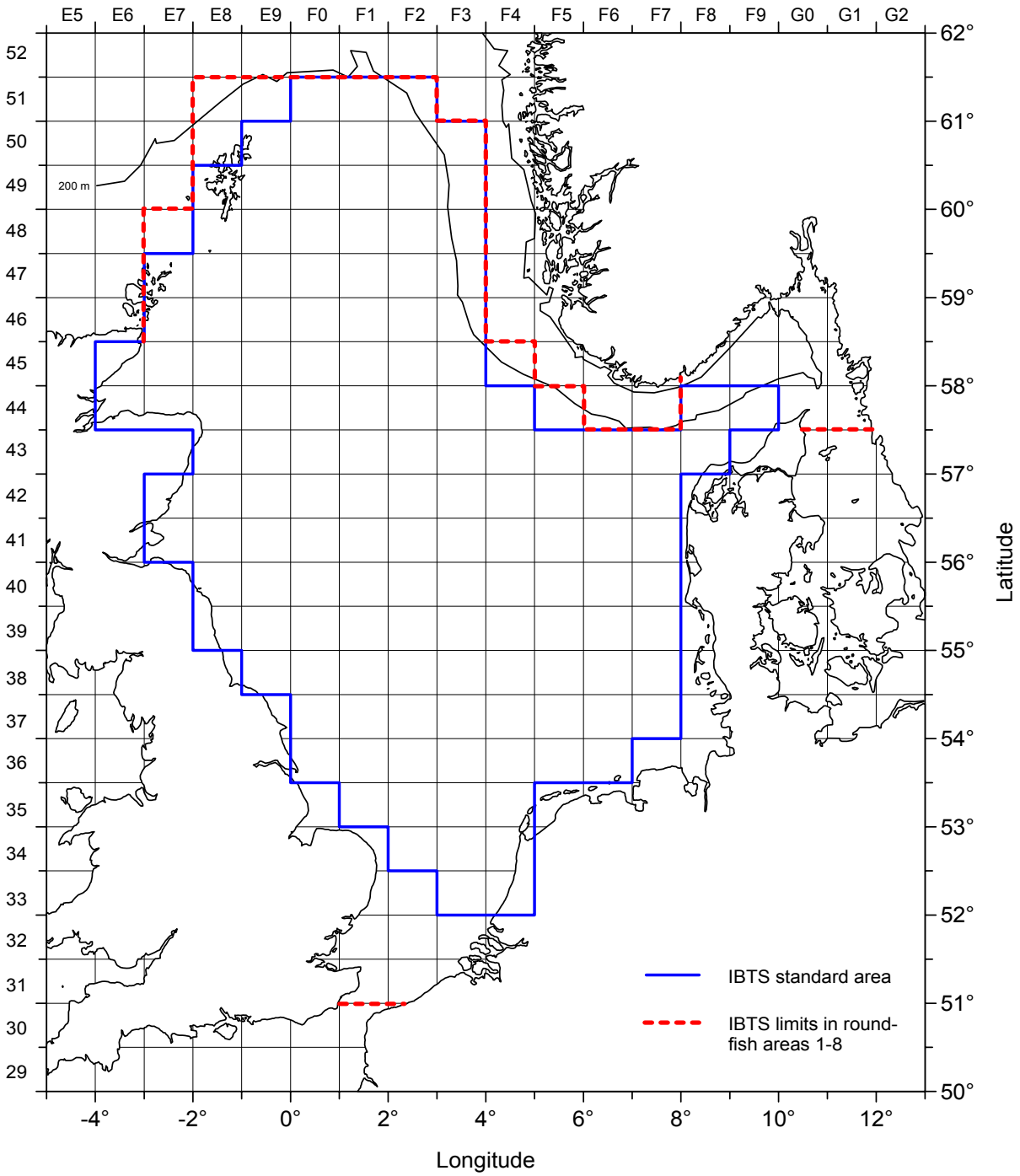


Figure 9.1: IBTS area for cod.

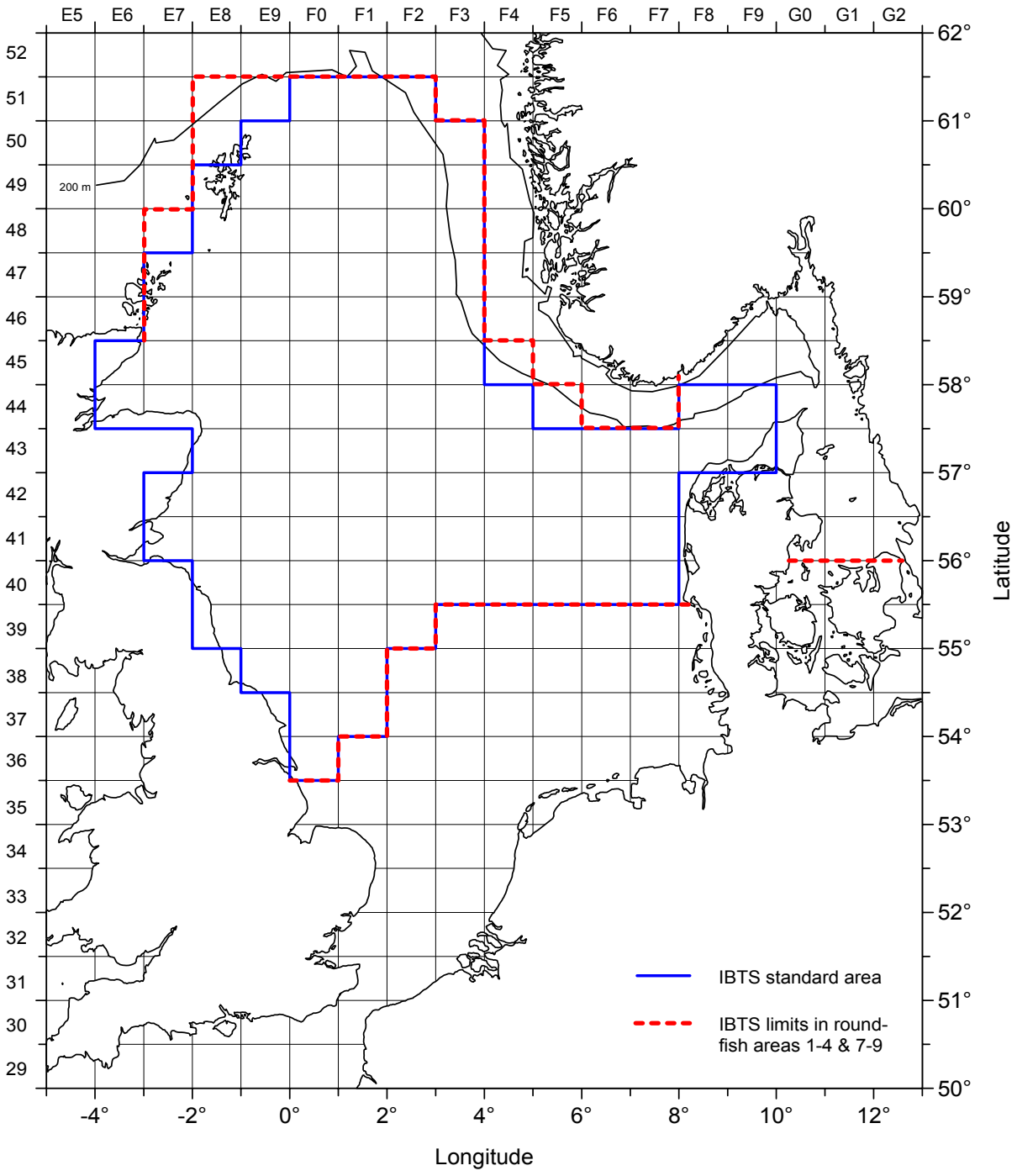


Figure 9.2: IBTS area for haddock.

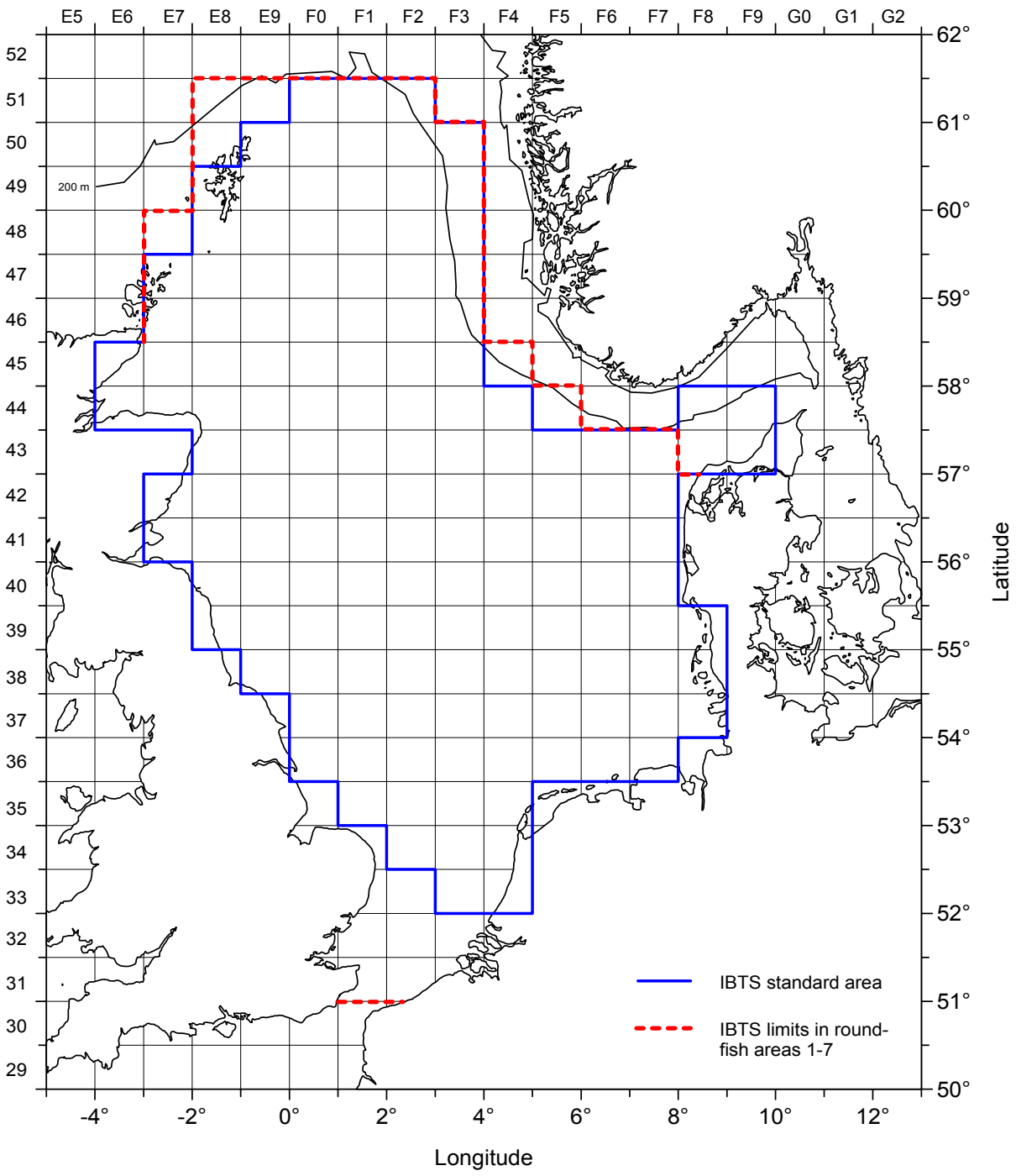


Figure 9.3: IBTS area for whiting.

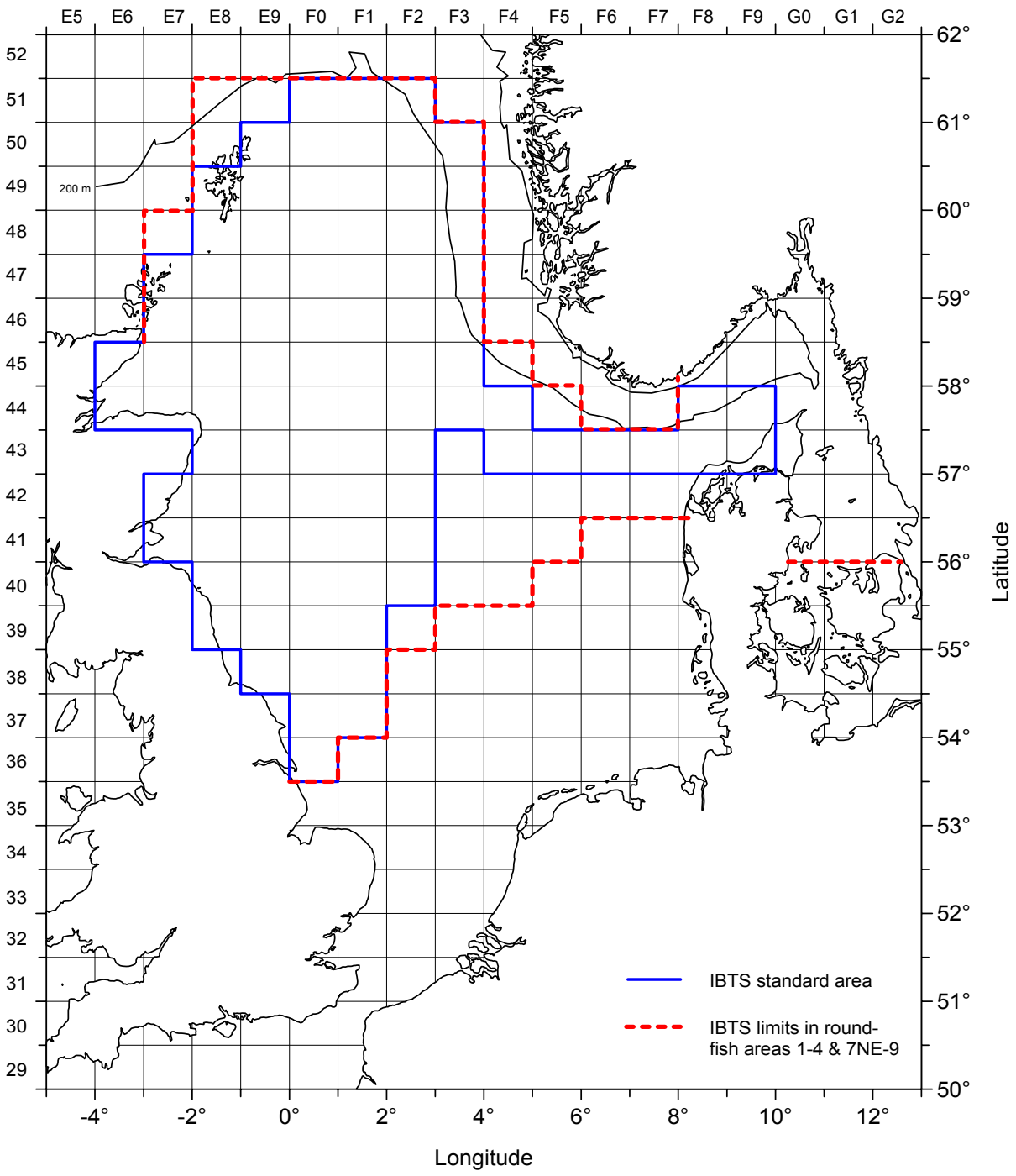


Figure 9.4: IBTS area for Norway pout.

10 COLLECTIONS OF SPECIES IDENTIFICATION AND MATURITY STAGE PHOTOGRAPHS

ToR h) asked the WG to review the extent of institute's collections of identification and maturity stage photographs. Prior to the meeting all WG members were asked to submit copies of all such material to the IJmuiden institute.

Some of the material made available was in the form of printed copies, but most were presented in a digital form. The digital photographs were either scanned in from traditional photographs, or photographs that were made using a digital camera. The text table below presents an overview of the material that was available at the meeting. Still more digital photographs could be made available from the Danish institute (maturity stages of cod), the Irish institute (maturity stages of deepwater sharks) and CEFAS (fish, benthos and maturity stages). In addition to the digital photographs only, the French and the Irish institute presented some extra identification keys prepared for certain species groups.

A wealth of digitized or digital photographs exists, and part of it is of high quality. Unfortunately not all photographs were made with the intention to help with identification. Ideally (a selection of) photographs from the different sources should be combined on one CD-Rom which could then be used by the different institutes to help with species identification and proper staging of different maturities. The lay-out of a CD-rom should be hierarchical and easily accessible.

Since there is a large amount of material that is already available, it will be a major task to prepare such a CD. It may be possible to fund (part of) this work as part of the EU data-collection programme. Work on the CD should be included in the national programmes that must be submitted by May this year. The IJmuiden institute will take the lead to edit such a CD in the course of the coming year. The available material will be reviewed and species specific sets of photographs selected, particularly to facilitate correct species identification and maturity staging. Gaps in the available material will be identified and indicated to survey co-ordinators, allowing the further short term collection of missing material. At the next meeting of this working group a list of any outstanding material requirements will be presented for longer term collection.

The contributions from different institutes and different photographers should be explicitly acknowledged. The CD should preferably be made available as a publication by the ICES IBTSWG. However, possible copyright problems should be resolved in discussions with the ICES Publication Committee.

		Fish	Benthos	Maturity stages
Digitized photographs	RIVO IJmuiden (H. Heessen & N. Daan)	X		
	MARLAB Aberdeen (F. Burns)	X		
Digital photographs	RIVO IJmuiden (H. Heessen & N. Daan)	X	X	X
	IFREMER Nantes (P. Porché)	X		
	MARLAB Aberdeen (F. Burns & K. Coull)	X	X	X
	Hamburg (S. Ehrich)	X		
	IMR Bergen (T. de Lange)	X	X	

11 REVIEW OF CO-ORDINATION

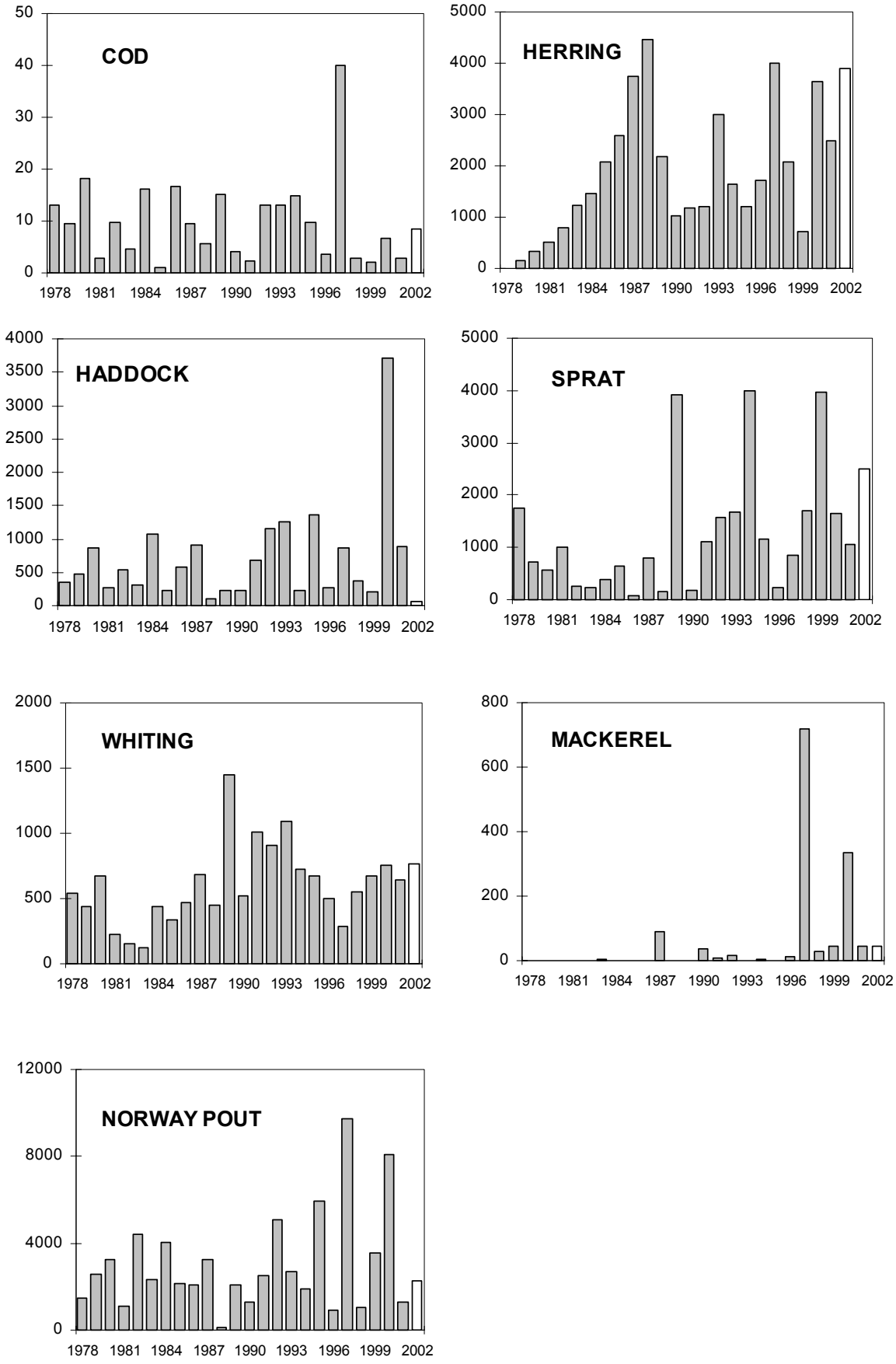
11.1 Quarter 1 in the North Sea

During the quarter 1 IBTS survey in 2002 in the North Sea, 359 valid GOV-tows were made by the countries usually participating in the survey (Denmark, France, Germany, Netherlands, Norway, Scotland and Sweden). In addition 36 GOV-hauls were made by R.V. Cirolana (England) in the southwestern North Sea. Despite the rather poor weather conditions throughout the survey period, the whole area (North Sea, Skagerrak and Kattegat) was sampled with 1 to 5 half hour tows per rectangle.

The preliminary indices of year class strengths for the target species (see also figure 11.1) were as follows: cod, Norway pout and mackerel were all below the 25 year average, the 2001 haddock year class is very poor, that of whiting is above average. The youngest year classes of herring (2000) and sprat (2001) are both strong and about twice the average value.

In addition to the GOV-hauls, also 489 MIK tows were made to sample herring larvae. Unfortunately, 75 hauls made by R. V. Tridens (Netherlands) were not used in the analysis by the Herring Assessment WG, due to apparent problems with the nets used. This means that there is a gap in MIK coverage in the Southern North Sea. As last years, the results of MIK sampling indicate another above average herring year class.

Figure 11.1 Indices of year class strength of different target species in the quarter 1 IBTS in the North Sea. Values for the most recent years are preliminary (Based on old standard areas for gadoids).



11.2 Q3 in North Sea

The North Sea, Skagerrak and Kattegat quarter 3 survey has now completed 11 years in its co-ordinated form. Table 11.2.1 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. Data from this survey have been used each year in the North Sea Demersal Working Group. In recent years efforts have been made to provide age based indices for the entire survey to that working group and the preliminary reports for the survey have not been produced. Although it was recommended in the previous report of this working group that the preliminary reports should be brought up to date, this requirement is still outstanding.

Table 11.2.1 Number of valid hauls and days at sea per country for quarter 3 surveys 1991-2001 and number of days proposed for 2002.

Year		Denmark	France	Germany	Netherlands	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	54		31		77	48	74	79	363
2000	Days	15		7		21		28	18	89
	Hauls	62		26		71		75	80	314
2001	Days	16		8		20	15	28	22	109
	Hauls	57		29		49	46	74	87	342
2002	Days	18		13		28	15	32	23	129

11.3 Review of co-ordination in the Western Division

Updates to the descriptions of Western Division survey spatial coverage, temporal coverage, sampling designs, vessels and gears, and survey histories have been made in the revised Western and Southern Division Manual. The manual also contains an updated description of the data management procedures undertaken in each country. The revised Western and Southern Division Manual is attached to this report as a Addendum

There has been a great deal of change within the Western Division in the last year and this change is expected to continue:

- In 2001 Spain commenced a survey of the Porcupine in late quarter 3, (ICES Divisions VIIb,k). (See also section 11.3.3)
- Under EU regulation 1639/2001 in 2002 CEFAS will extend the coverage of the quarter 4 ground-fish surveys in the Western Division (ICES Divisions VIIa, e, f, g, h and j).

The CEFAS survey will be included in the co-ordinated surveys in this area, carried out by Ireland, Scotland, France and Spain. In order to do this CEFAS will liase with the quarter 4 westerly survey co-ordinator. The CEFAS survey will adopt the developing co-ordinated quarter 4 westerly protocols, within practical operational limits. Some overlap in

station coverage will occur in order to compare and eventually calibrate the survey with the other participants. Station positions and standard gear for the survey will be decided in consultation with the co-ordinator of the quarter 4 westerly surveys. The approximate area to be covered is ICES Divisions VIIa, e, f, g, h and j.

- In 2003 Ireland's new 65 m research vessel will be available for groundfish surveys. Existing Irish surveys will then be transferred to the new vessel.
- UK (Northern Ireland) joined IBTS in 2002 offering the opportunity to co-ordinate UK (NI) groundfish surveys with other Western Division surveys.

11.3.1 Review of the classification of Southern and Western Division surveys

IBTSWG considered that the current quarterly classification of Southern and Western Division surveys creates temporal distinctions between surveys that are artificial. In addition, surveys conducted in the fourth quarter do not cover the entire fourth quarter and some occur within days of surveys classified as third quarter. IBTSWG concludes that it is more appropriate to classify these surveys as 'Autumn' surveys.

11.3.2 Review of the separate co-ordination of Southern and Western Divisions

IBTSWG considered the current situation of the separate co-ordination of surveys in the Southern and Western Divisions. IBTSWG concluded that the only reason for separate co-ordination was to limit the workload on Divisional co-ordinators and that the issues facing both Divisions are quite similar. It was concluded that the co-ordination in the Western and Southern Divisions should be combined. There will be a practical need to spread the workload of co-ordination amongst participants and to ensure that as much co-ordination as possible is achieved at future IBTSWGs.

11.3.3 Spanish survey of Porcupine

In 2001 Spain proposed to the IBTS WG a new survey to help overcome the current lack of sampling in some areas of the IBTS Western Division. The new survey covered Porcupine bank area extending from longitude 12° W to 15° W and from latitude 51° N to 54° N, and depths between 190 and 800 m. The cruise was carried out between August 31st and October 2nd on board R/V "Vizconde de Eza" following a random stratified sampling proportional to strata area, and designed using previous information on commercial hauls. A total of 78 valid hauls were performed (Figure 11.3.3.1).

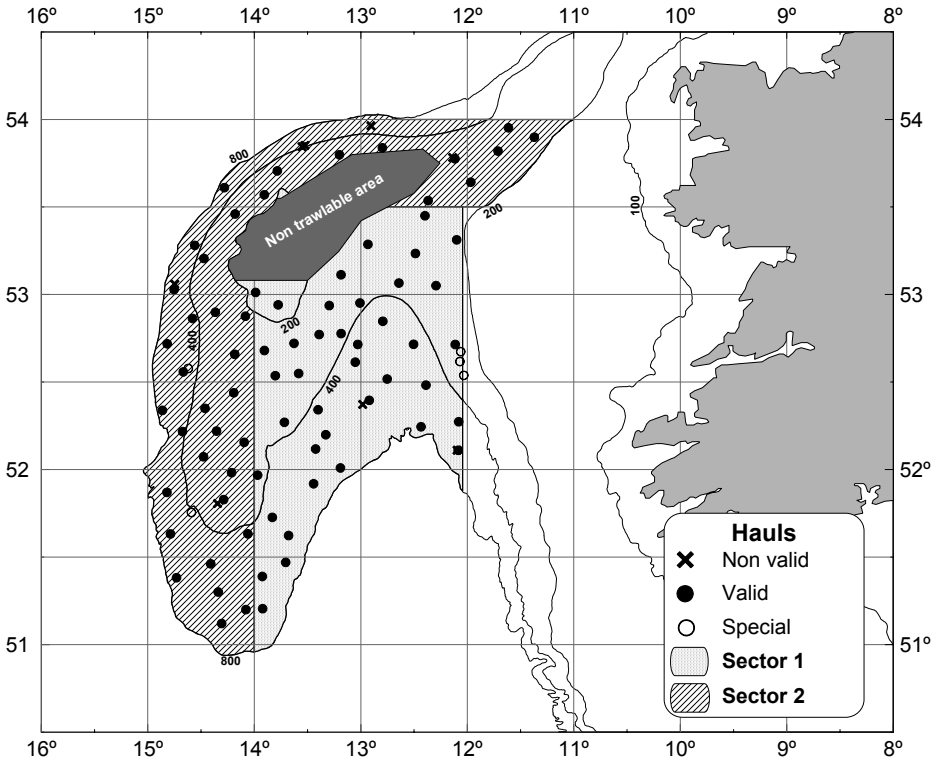


Figure 11.3.3.1. Stratification used in Porcupine 0901 survey and final distribution of the hauls carried out in Porcupine 0901 survey. Depth strata were a) shallower than 200 m, b) 200 – 400 m and c) 400 – 800 m. (Special hauls were not used to estimate stratified abundance indices)

A new sampling gear, "Porcupine baca 59/72", was designed taking into account the gears used by the fishing fleet in the area and prepared to work on rough Porcupine grounds. It was also adapted with reference to the survey's target species in order to maximise the representativeness of the catches for as many species as possible. Results have demonstrated that this gear is a robust and efficient sampler for semipelagic, demersal and benthic species. This robustness and versatility makes it a suitable candidate for IBTS Western Division standard gear.

Abundance indices per depth strata of all the species fished during the survey were presented in a working document (F. Velasco & F. Sanchez. Report on the Results of Porcupine Bank Bottom Trawl Survey 2001). Main commercial species in the area (hake, Nephrops, megrim, four spotted megrim, anglerfish, blue whiting and horse mackerel) were studied in more detail including information on their abundance indices, length distribution, juvenile abundance, and geographical and bathymetric distribution (see Figure 11.3.3.2 for example of hake). Results of this survey are considered valuable from IBTS WG point of view and it is recommended to continue with this survey and to develop a new time series, covering a previously not sampled area in the IBTS Western Division, that will provide abundance indices for the assessment of commercial species.

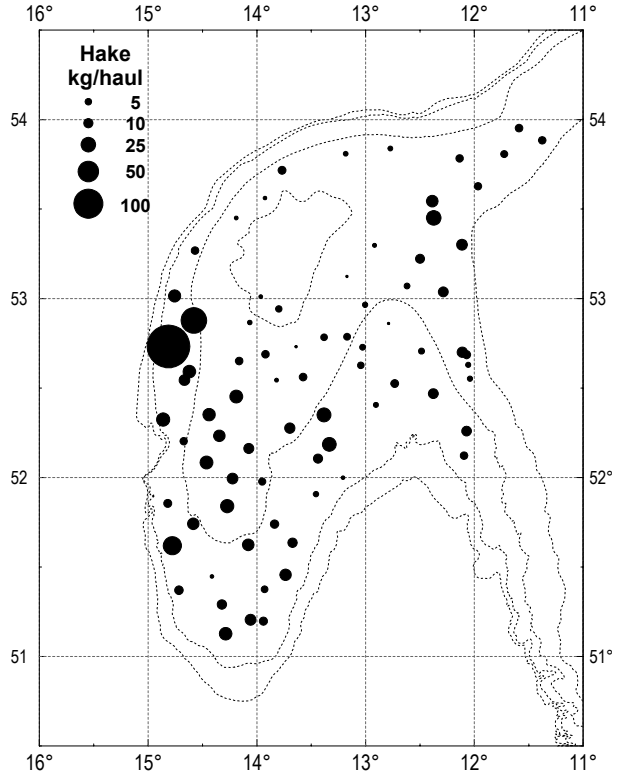


Figure 11.3.3.2. Hake catch distribution in biomass (kg/30 min haul) during survey Porcupine 0901

11.3.4 Incorporation of UK(NI) within Western Division IBTS

Data from the quarter 1 (March) and quarter 4 (October) trawl surveys of the Irish Sea, carried out by the Department of Agriculture and Rural Development (Northern Ireland), are to be included in the IBTS database. The surveys series commenced in the present form in 1992 and comprises 45 1hr tows in the northern Irish Sea with an additional 12 0.5hr tows in the St George's channel from October 2001. The surveys are carried out using a rock-hopper otter trawl deployed from the RV *Lough Foyle*. The survey design is stratified by depth and substratum with fixed station positions. Abundance indices for cod, whiting and haddock from these surveys have been used in ICES WGNSDS assessments of the stocks since about 1997.

11.3.5 Development of a standard gear for the Western Division

The WG has been discussing the need for a new standard gear in the western and southern areas for some years. This need is based on a number of factors;

- There is no widely used common gear outside the North Sea. Gear used includes; GOV (in various configurations), mini GOV, Baca, Porcupine Baca and Norwegian Campelin.
- The standard (North Sea) GOV is expensive and is not very robust. It is also know to be poor at catching some species, particularly flat fish.
- The GOV has been definitively rejected as suitable for the north Spanish coast, and also is known to have limited value in many rough areas of the western shelf.

The WG believes that any standard gear should ideally be robust, cheap, capable of deployment in rougher sea beds 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 benthos species. A proposal was made for a project to the EC to develop such a gear *de novo*. The project would have included all development and production aspects and also field trials and intercalibrations with existing gear. This proposal was rejected. Some aspects of the project were brought forward as an "Accompanying Measure" project, but this only covers theoretical aspects and some modelling work. The WG recognizes that this project and any subsequent practical development project would be unlikely to produce a usable standard gear in less than five years. Given the introduction of at least two new research vessels (Ireland and UK-England &Wales) in the western area in the near future, this time scale is not acceptable. 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.

11.3.6 Evaluation work on the Porcupine Baca trawl as a candidate NE Atlantic standard gear

A feasible alternative to developing an entirely new gear is to adopt a suitable existing commercial or survey gear. Commercial gears tend to be selective, and are probably not suitable. IEO in Spain have recently developed a new high headline modification of the Baca trawl routinely used in bottom trawl surveys in the Cantabrian Sea. On first evidence, this trawl would appear to satisfy many of the requirements for a standard gear, however, further evaluation would be required. To this end the WG requests that all countries involved in surveys of the western European shelf attempt to carry out comparative trials with the Porcupine Baca and their existing gear. Specific suggestions for this work are that;

- CEFAS should deploy both GOV and Porcupine Baca during their new western area survey in 2002. Ideally this should involve repeat tows on the same location with both gears. This suggestion is predicated on the observation that this is a new survey and that the vessel will be changed after this survey.
- If possible IEO should carry out Porcupine Baca tows on known clear tows carried out by France in the region of Grand Sole Bank. It would also be useful if IEO could deploy a GOV on a small number of duplicate stations on the Porcupine survey.
- MI should carry out tows on known clear tows carried out by IEO in the region of Porcupine.
- FRS and IFREMER should explore the possibility of obtaining access to a Porcupine Baca and also carrying out comparative tows in the area NW of Northern Ireland and in Biscay respectively.

These trials are not seen as being a complete calibration of the Porcupine Baca with respect to the other gears, but as a qualitative comparison of the relative performances of the gears. It is proposed that the results of this exercise be reported to the IBTSWG at it's 2003 meeting and the results reviewed.

11.3.7 Intercalibration

IBTSWG concludes that, in the absence of a standard gear, comparison of trawl performance between surveys is essential. Such studies may offer the opportunity to intercalibrate survey data collected on each survey. IBTSWG has identified several surveys in the Western Division that require inter-comparison:

- New CEFAS vessel with other vessels
- *Vizconde de Eza* with other vessels/gears
- *Celtic Explorer* with other vessels and *Celtic Voyager*
- UK (NI) with other vessels (in the first case with *Scotia*)
- *Cornide de Saavedra* with other vessels/gears
- *Noruega* with other vessels/gears

IBTS recommends that the countries concerned proceed with the organisation of intercalibration of their 2003 surveys. IBTSWG recommends the use of the intercalibration methodologies developed during the IPROSTS study contract. These methodologies have the advantages of:

- requiring a relatively low number of comparative tows,
- allowing these tows to be conducted over consecutive years and added to a combined data set, and,
- allowing tows to be conducted on stations required on existing survey designs.

These advantages overcome the need to commit excessive amounts of ship time to comparative trawling in any one year.

11.3.8 Data exchange and collation

IBTSWG discussed the collation of data collected on surveys in the Southern and Western Divisions. It was considered that the diversity of survey designs and lack of extensive overlap of surveys currently prevents the combination of data for the purpose of calculating abundance indices. It was concluded that the combination of data for the purpose of mapping the distribution and relative abundance of species would be worthwhile.

It was agreed that data would be collated by haul for all species and mapped for cod, haddock, hake, anglerfish sp., megrim sp., herring, mackerel, horse mackerel, Norway pout, whiting, plaice, sole and saithe. Numbers per haul will be submitted by species and by haul (with co-ordinates) and split into adult and juvenile components where possible. The length split for identification of juvenile and adult components will be circulated by the Divisional co-ordinator for agreement by the other participants. Other outputs will include maps showing survey coverage by country. It was decided to collate these data from the 1999 surveys on.

The data collation will be undertaken using simple exchange formats in Excel spreadsheets outputs that will be prepared by the Divisional co-ordinator.

11.4 Overview of Southern Division Surveys 2001

The series of 4th quarter bottom trawl surveys were accomplished. The surveys were performed from 25 September until 20 November 2001. The Iberian Atlantic shelf from Cap Breton (French-Spanish border) to the Strait of Gibraltar was sampled (ICES Divisions VIIIc and IXa). All of the area was stratified according to 9 main geographical sectors (figure 11.4.1) and depth strata (figure 11.4.2). A total of 210 valid hauls were realised.

11.4.1 Spanish Surveys

Two surveys were conducted in the 4th quarter of 2001, one on the northern Spanish shelf (ICES Division VIIIc and IXa) and other in the Gulf of Cadiz (ICES Division IXa); in the 1st quarter one survey was performed in the Gulf of Cadiz. All surveys were accomplished following stratified random sampling protocols with the R/V *Cornide de Saavedra*, using the Baca 44/60 trawl gear with a 20mm codend mesh size. The mean headline height was 2.0 m, the mean wing spread and door spread were 21.2 m and 125.2 m, respectively. The duration of each haul was 30 minutes in the northern survey and 1 hour in the southern one, carried out during daylight at a mean towing speed of 3.0 knots.

In the North of Spain a total of 113 valid half-hour tows were conducted (table 11.4.1 and figure 11.4.3). In addition 9 extra hauls were carried out outside the standard sampling area, in shallow and deeper depths (less than 70 m and more than 500 m depth). Gear performance was monitored by Scanmar equipment. Also, 151 CTDs sampling stations were carried out.

Abundance and biomass indices were computed for hake, blue whiting, four-spot megrim, megrim, anglerfishes (black and white), horse mackerel, and mackerel. All other species of fish and invertebrates (only commercial species) were measured. One of the main objectives of this survey is to provide indices of abundance for the relevant ICES working groups (Southern Shelf Demersal Assessment WG, Assessment of Mackerel, Horse Mackerel, Anchovy and Sardine WG and Blue Whiting Fisheries WG). At present abundance indices by age are being processed. The biomass and abundance indices resulting from this survey for the major commercial species are in table 11.4.2.

During the Northern Spanish survey and to study the benthic communities of fishing grounds, a short number of hauls (17) in three depth strata and four transects, using a small beam trawl (3.45 x 0.6 m) were accomplished. A total of 43 species of fish, 55 of crustaceans, 55 of molluscs, 17 of echinoderms and 57 of others invertebrates were caught. This information, in combination with the one provided by the standard bottom trawl survey, assessment working groups and feeding studies, is used in the construction of the trophodynamic mass-balance model (ECOPATH) of the Cantabrian sea shelf ecosystem (ICES Division VIIIc).

During 2001 two groundfish surveys were conducted in the Gulf of Cadiz, one in Spring and one in Autumn. In the Spring survey a total of 40 valid one-hour tows were achieved, including 23 CTDs sampling stations. The surveyed area was of 7224 km2, covering depths ranging from 15 to 700 m (figure 11.4.2). The main objectives of the Autumn survey were focused on the calibration of the Baca 44/60 and GOC 73 (MEDITS-E surveys) trawl gears. Nevertheless, the sampling scheme followed in this calibration experience was similar to the standard surveys. In this survey, 39 1-hour valid hauls were carried out with the Baca 44/60 gear, covering depths ranging from 15 to 700 m (table 11.4.1 and figure 11.4.3).

Abundance and biomass indices for the whole area were computed for the main commercial species: hake, horse mackerel, blue whiting, mackerel and Spanish mackerel, octopus (*Octopus vulgaris*), cuttlefish (*Sepia officinalis*), rose shrimp (*Parapenaeus longirostris*) and Norway lobster. Results are shown in table 11.4.2.

11.4.2 Portuguese surveys

During 2001 two Portuguese groundfish surveys were conducted, in summer and autumn, covering Division IXa in Portuguese waters. The area surveyed extends from latitude 41°20' N to 36°30' N, and from 20 to 750 meters depth. In summer (July) and autumn (October-November) 2001 surveys a total of 83 and 58 valid hauls were carried out, and 92 and 110 CTDs sampling stations took place, respectively. The reduced number of hauls performed during the autumn survey (table 11.4.1 and figure 11.4.3) was due to the bad weather conditions and shorter ship time. Under this constraint the priority of sampling was given to the hake nursery areas.

The sampling strategy was unchanged from the previous surveys and consists in a fixed station sampling scheme. A total of 97 fixed stations were planned, spread over 12 sectors. Each sector is subdivided into 4 depth ranges: 20-100, 101-200, 201-500 and 501-750 m with a total of 48 strata (figure 11.4.2). The duration of each tow was 60 minutes, carried out during daylight at a towing mean speed of 3.5 knots.

The Portuguese surveys were carried out with the R/V *Noruega*. The fishing gear used was a bottom trawl (type Norwegian Campell Trawl 1800/96 NCT) with a 20mm codend mesh size. The mean vertical opening was 4,6 m and the mean horizontal openings between wings and doors were 15,1 m and 45,7 m, respectively. CTD sampling stations were homogeneously distributed all over the sampling area, avoiding large extensions uncovered. CTD casts sampled at stations over the shelf area covered the whole water column, from surface to bottom. When CTD casts were made off the shelf, sampling was conducted to at least 400 metres.

The catch was sorted by species, counted and weighted. In the case of a huge catch of one dominant species, only a fraction of the catch was sorted. All fish and commercial cephalopods and crustaceans species were measured. Biological parameters (length, weight, status of maturity among others) and hard structures (otoliths and *illicia*) were collected.

Abundance indices (number per hour) and biomass indices (kg per hour) for the whole area were computed for the main commercial species: hake, horse mackerel, blue whiting, mackerel and Spanish mackerel, megrims, anglerfish, rose (*Parapenaeus longirostris*) and red (*Aristeus antennatus*) shrimps and Norway lobster. Results are shown in table 11.4.2.

11.4.3 Main results

The distribution and abundance of hake, hake recruits, blue whiting and horse mackerel in the whole Southern area are shown in figures 11.4.4, 11.4.5, 11.4.7 and 11.4.8, respectively.

Biomass and abundance indices of hake were higher in Portuguese shelf particularly at south of Lisbon where abundance of recruits was also high. The 2001 concentration of recruits in Spanish waters was located eastward and in Portuguese waters northern of the trawl close areas (Figure 11.4.6) as it is referred in the current legislation.

Blue whiting indices of abundance and biomass show a continuous distribution in North and South of the Spanish waters. In Portuguese waters a discontinuous area is detected, approximately between latitude 40 and 41, because no hauls in depth waters took place.

The distribution and abundance of horse mackerel show high levels of biomass in the Cantabrian sea (North of Spain). In Portuguese shelf high values of abundance indices was observed in the North and at latitude 40 corresponding to high values of recruits. In the South of Portugal this species was scarce.

Table 11.4.1. Sampling areas, valid hauls and coverage per sector in 4th quarter of 2001 in IBTS Southern Division surveys.

Zone	Geographic sector		Survey 2001	
	Name	km²	Valid hauls	Hauls/1000 km²
Cantabrian Sea	AB	2460	14	5.69
	PA	4614	24	5.20
	EP	5352	21	3.92
Galicia	FE	7774	34	4.37
	MF	4139	20	4.83
Portugal	NO	11245	20	1.80
	SW	5837	23	3.90
	SO	7296	15	2.10
Gulf of Cádiz	CA	7224	39	5.40
Whole area		**55941**	**210**	**3.75**

Table 11.4.2. Standardised indices of abundance in the 4th quarter of 2001 from Southern Division. Portuguese indices were transformed using the conversion coefficients obtained during the SESITS project.

Species	Spain N		Portugal		Spain S	
	Kg/hour	N/hour	Kg/hour	N/hour	Kg/hour	N/hour
Hake	3.45	84.0	16.15	166.3	2.53	30.0
Four-spot megrim	5.30	86.0	0.10	1.4	-	-
Megrim	2.90	26.0	0.00	0.0	-	-
Black anglerfish	0.38	1.0	0.00	0.0	0.28	0.4
White anglerfish	2.18	5.8	0.00	0.0	0.33	0.4
Blue whiting	84.04	2095.6	245.05	6060.9	45.50	1165.0
Horse mackerel	29.66	223.6	48.78	1856.9	2.61	68.0
Mackerel	1.32	6.2	23.23	317.0	0.12	1.0
Spanish mackerel	-	-	0.03	0.3	0.03	0.2
Norway lobster	0.22	5.4	0.09	1.2	0.45	14.0
Rose shrimp	-	-	1.68	173.7	1.72	584.0
Red shrimp	-	-	0.01	0.3	-	-

It was not possible to estimate conversion coefficients for megrims, anglerfish and Spanish mackerel; the conversion coefficient estimated for rose shrimp was 3.12 and 1 for the other species.

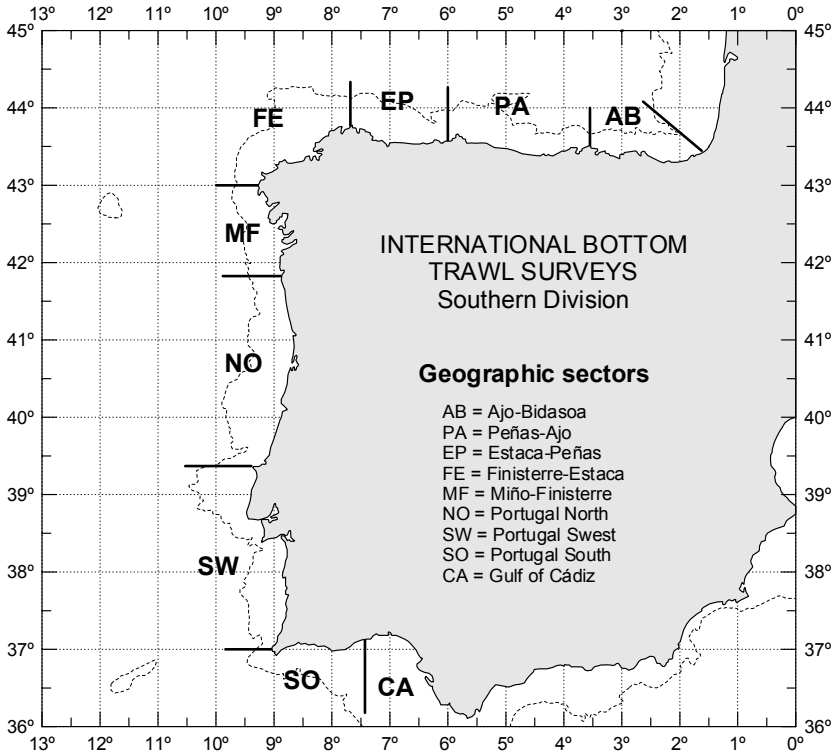


Figure 11.4.1. General geographic stratification of the bottom trawl surveys Included in the Southern Division.

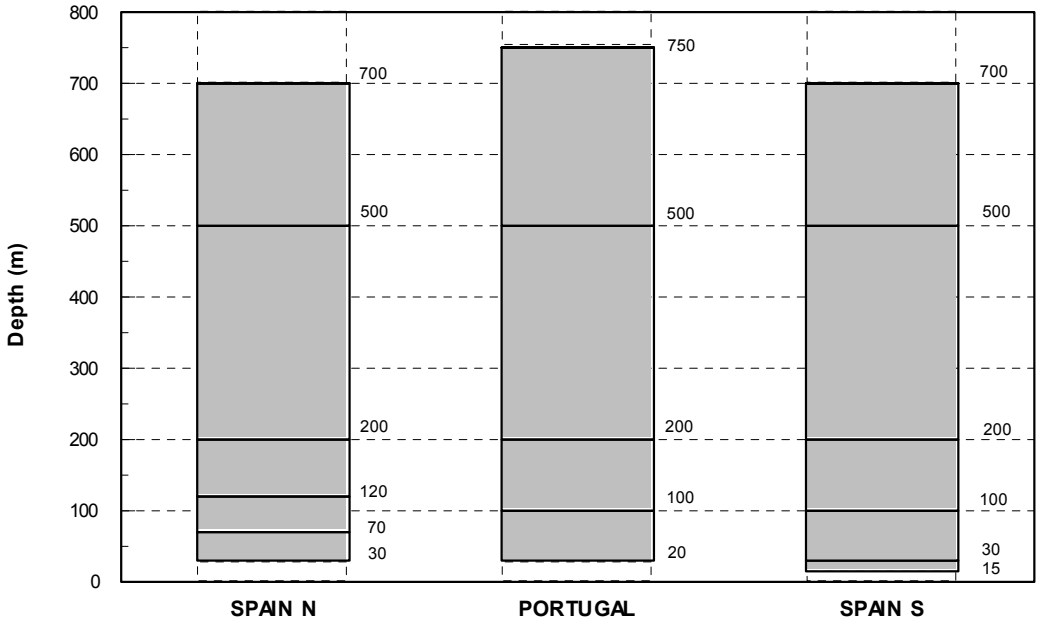


Figure 11.4.2. Depth strata in the Southern Division surveys.

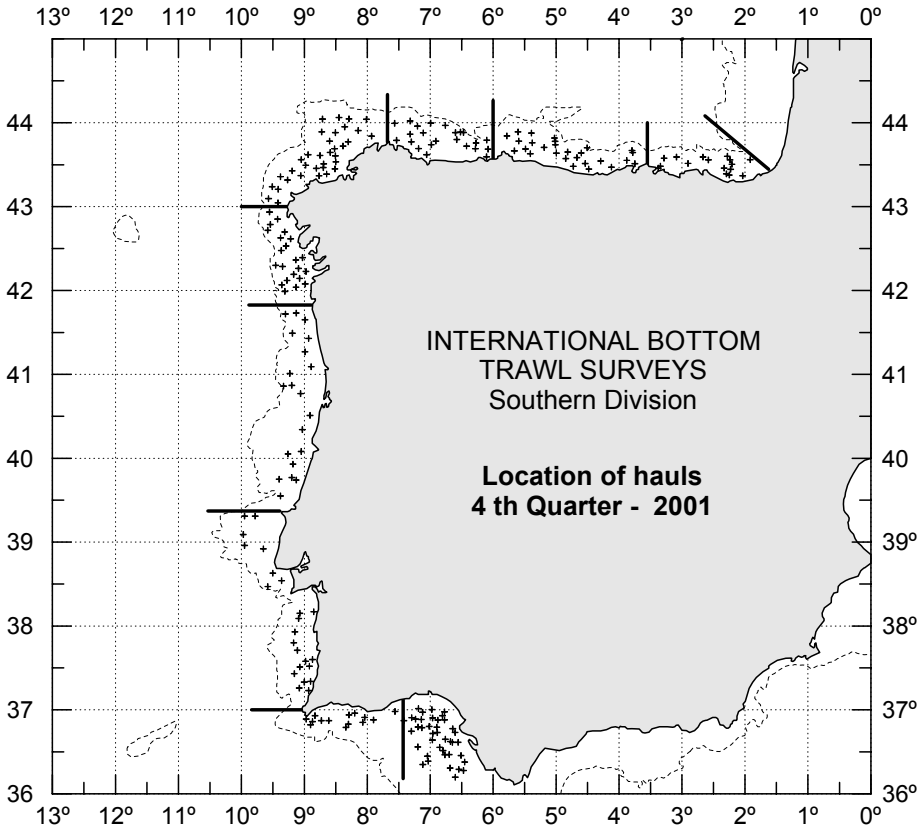


Figure 11.4.3. Location of hauls in 4th quarter bottom trawl surveys in Southern Division.

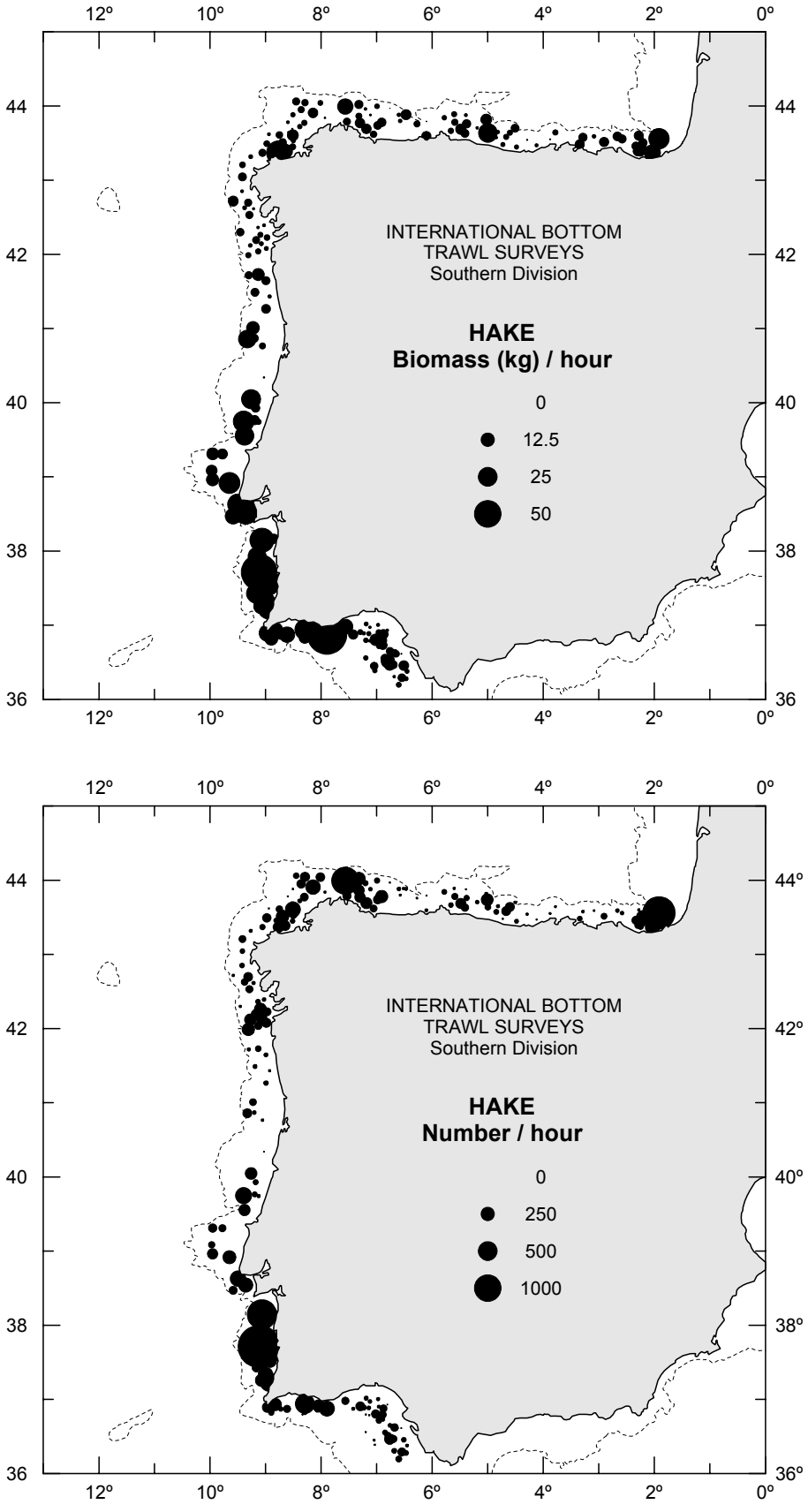


Figure 11.4.4. Standardised biomass (kg/h) and abundance indices (n/hour) of hake.

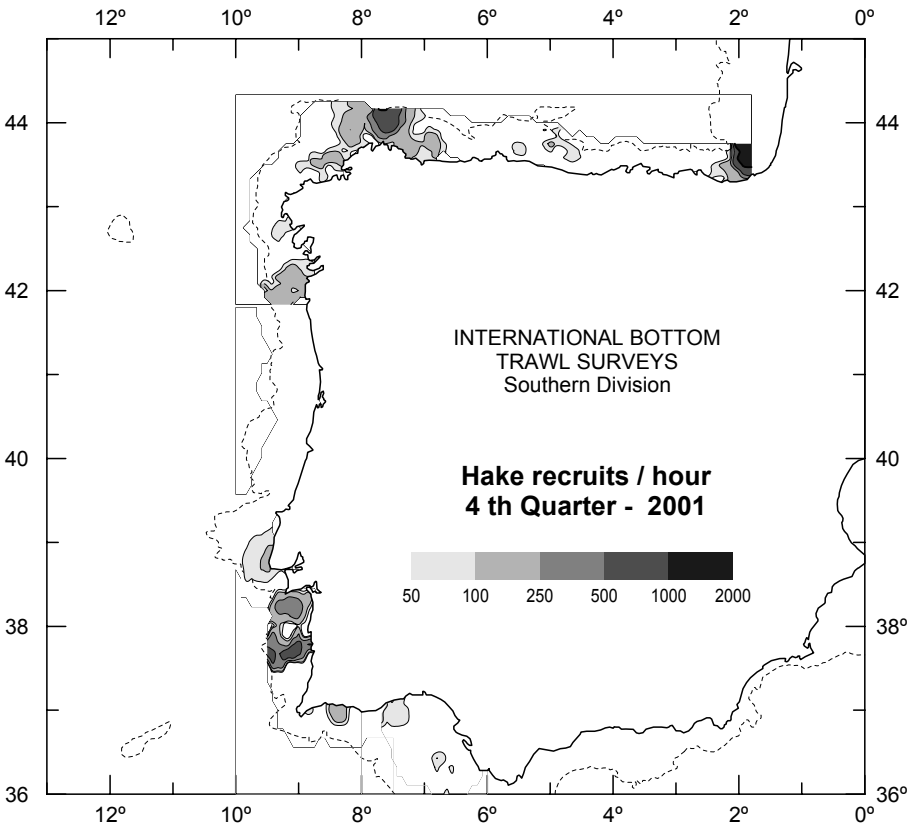


Figure 11.4.5. Hake recruitment (standardised age 0 number/hour) in 2001.

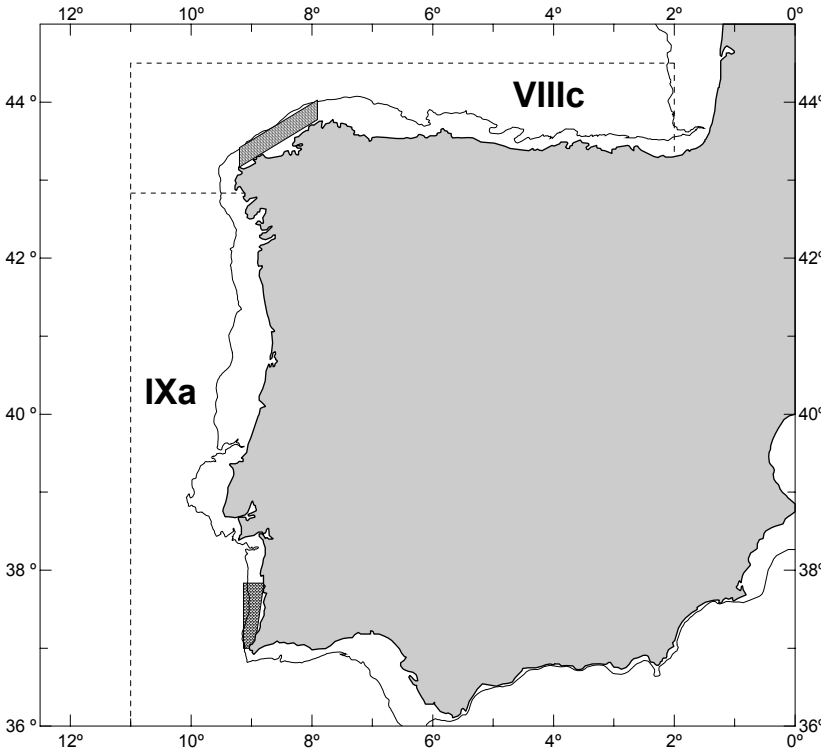


Figure 11.4.6 Hake-closed areas in current legislation to protect juveniles- in Spanish waters from 1 October to 31 January (Reg. 724/01) and in Portuguese waters (Reg. 850/98). from 1 December to last day of February

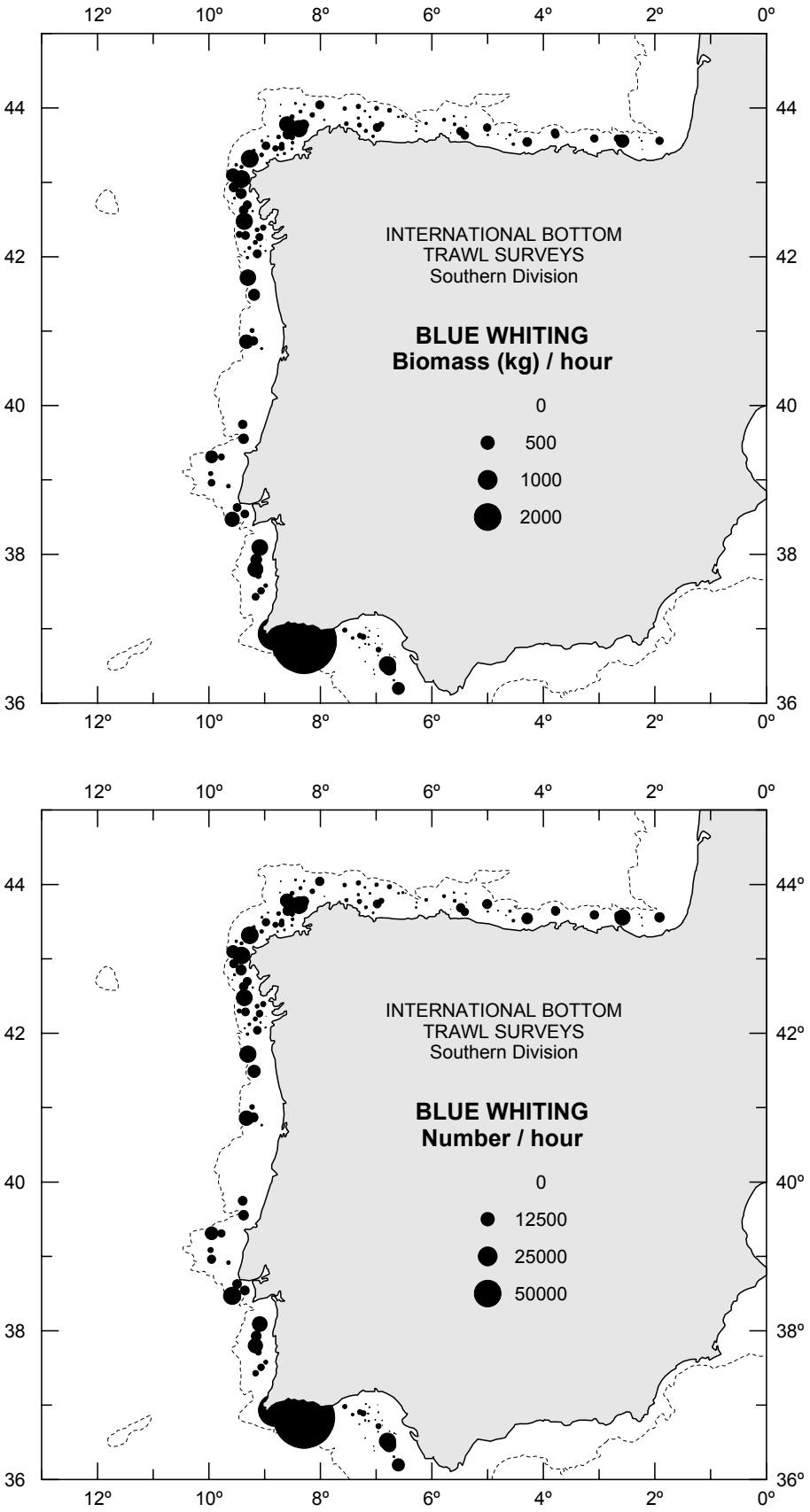


Figure 11.4.7. Standardised biomass (kg/h) and abundance indices (n/hour) of blue whiting.

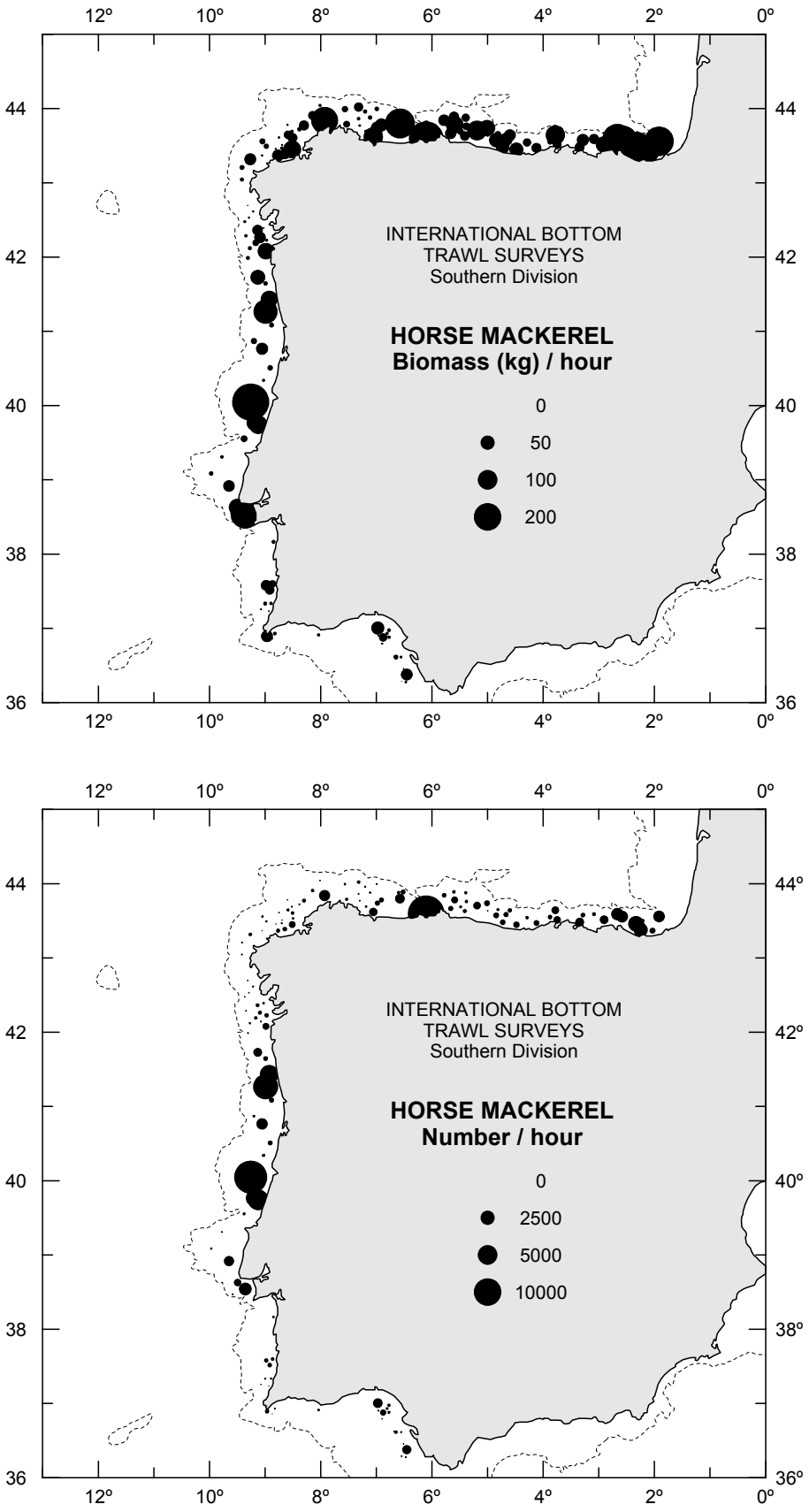


Figure 11.4.8. Standardised biomass (kg/h) and abundance indices (n/hour) of horse mackerel.

12 ADDITIONAL BIOLOGICAL DATA FOR COD

TOR j) asked the WG to consider the collection of additional data on the condition of cod caught during the 1st quarter in the North Sea. This request was reinforced by a similar communication from the Chair of SGPRISM. All participants were willing to provide the additional data and the co-ordinator for these surveys (Dr. H Heessen) offered to contact appropriate colleagues to ascertain the precise additional data required. The additional sampling will commence in 2003.

13 GENERAL

13.1 Design Changes in GOV trawl

The GOV 36/47 is actually the standard gear used for the French EVHOE surveys in the Bay of Biscay and Celtic Sea. However, this gear is facing numerous tears when used on the rougher grounds in the Celtic Sea, especially in the trawl belly.

A first attempt was made to modify the actual GOV to make it more resistant and use it on a heavier ground rope (type C as described in the IBTS manual v.5). In order to maintain coherence in the time series of abundance indices, the performance of the new trawl should be the closest possible to the actual GOV and therefore the basic plan of the actual trawl was used as the basis for transformation. The changes were almost entirely focused on the net material (twine material and diameter) and change in the ground rope in order to be able to tow on rougher grounds.

After discussions with the THALASSA crew, it was concluded that the use of polyethylene weaved twine should replace the actual polyamide twine.

A program developed by IFREMER (DynamiT) permitted dynamic video simulation of the trawl geometry after entering the trawl characteristics (mesh sizes, twine diameter and density and all relevant information on the gear) depth and towing speed. It also computes the main geometry measurements.

The software was used in a first step to compare the actual gear parameter from the Scanmar measurement made during the EVHOE 2001 survey and the parameters computed by simulation. Then the computed parameters were compared with the transformed gear computed parameters on same depth and towing speed.

The DynamiT simulations showed that the hydrodynamic characteristics of the modified trawl were different from the standard GOV equipped with PA twine.

From the results of the study and the discussions that followed several points were raised concerning:

- Effect of changing twine material on gear performance:
  - It has been observed in the past that changes in the net material modified the gear performance as measured by the Scanmar equipment.
- The use of the kite can have a stabilising effect and should be tested on the numerical simulator.
- In order to monitor more precisely standardisation of the gear, all countries involved in IBTS and using GOV should provide detailed information on the material used in the construction of their trawl.
- Standard gear for western division: conclusions of the discussion are given under section 11.3.5.

At the same time the WG received a request to allow the construction of belly lines (catch-alls), especially on GOV trawls deployed in the western division. The matter was discussed and the general view was that this alteration to the net would have no significant impact on the behaviour of the gear and may well limit damage. The alterations were accepted.

13.2 Design of MIK trawl

The Working Group received a communication from Peter Munk concerning the design of the MIK trawl:

"There is still the 'deviation' from the full standardisation, that the Scottish cruises use a gear of own design (rectangular, larger opening). We assume that the gear have the same characteristics and I check regularly whether there are obvious differences between Scotland and other countries when they "meet" in the same rectangles.

However, in the long term it would be nice if the same gear was used all around, and I will ask you to consider this matter at the next meeting in the IBTS working group."

Prior to the meeting Scotland had an internal debate concerning the issue and the initial response was that no change was contemplated. However, the Working Group felt that Scotland should re-consider this decision and the Scottish participants agreed to have further discussions within their institute.

13.3 Sampling of Horse Mackerel in the North Sea

The last Mackerel, Horse Mackerel, Sardine and Anchovy WG report contained the following recommendation:

"The Working Group recommends that the IBTS collect age composition samples from Horse Mackerel in the third quarter in the area of the North Sea (IVbc, VIId and IIIa), to improve fishery independent abundance indices."

Subsequent contact with a member of the Mackerel WG has established that the request only pertains to the third quarter surveys in the North Sea and the requirement is:

5 pair of otoliths per centimetre length from Roundfish areas 5, 6 and 7. Each pair of otoliths should be thoroughly cleaned and then placed in a paper packet and the latter marked with the appropriate length, sex and, if possible, maturity. All otoliths should be sent to RIVO for ageing.

This request has now been passed to the Q3 co-ordinator for action by the appropriate participating institutes.

13.4 Access to IBTS Data

This subject was re-visited again during the meeting and the agreed policy of the Working Group is outlined in section 6.3.

13.5 Calculation of Standard Deviations for the IBTS indices

The Working Group received the following communication from the ICES Secretariat:

"…the Method WG or some members of the WG and other people have asked whether SDs for the IBTS indices could be given in addition to the indices themselves. I think that most people are thinking about the internal SD i.e. the one calculated on the basis of the IBTS dara themselves, and not from kind of relationship to VPA and the like."

The Working Group concluded that this is an item that could be included in the re-write of the IBTS database (DATRAS) but were unclear on the exact information required. Accordingly the Chair of the Group agreed to write to the Method WG seeking clarification.

13.6 Software for monitoring gear parameters

During the meeting "Pescawin" software, used to monitor navigation and towing operations during surveys, was presented. This software is utilised in the Spanish Surveys (Mediterranean, Gulf of Cádiz, Galicia, Cantabrian Sea and Porcupine) to monitor in real time all the information derived from GPS, echosounders and gear parameters (from Simrad ITI and Scanmar equipment). Its main advantage over commercial classic navigation programs is that it allows the user to generate and to optimise his own charts with all the information available, using most common graphic formats for scientists (WMF, BNA, DXF and CSV formats). At the same time it makes it easier to control sampling unit characteristics (mean towing speed, haul duration and tracking, depth, etc.) and gear performance (vertical and horizontal spreads, ground contact, etc.) in real time. Furthermore, the program generates data files that can be used as electronic input of all haul station information needed as input for survey databases. These files are stored in CSV format and can be absorbed by a database straightforward.

13.7 Discussion on the future of the IBTS WG

The WG had a short discussion on the items that could be dealt with during future meetings. The following is a brief summary of the highlights.

The aims of the IBTS survey have gradually changed over the years. From a recruitment survey for herring, it developed into a recruitment survey for a limited number of species, and then gradually evolved to a survey that is now also being used to describe changes in the ecosystem, biodiversity, and community structure. The standard gear that is being used, the GOV, only catches a certain selection of the fish community, whereas a beam trawl catches another selection. It should be discussed whether the GOV is ideally suited for the tasks of the WG or if another gear would be more appropriate.

The GOV-trawl and the degree of standardisation of the IBTS, have often been criticised. For the western and southern areas work is on-going to develop a more robust gear, better suited for rough grounds found in these area. It is suggested that the gear used and the sampling strategy in the North Sea surveys should be critically evaluated. The evaluation should also take the survey design itself into consideration. Such evaluation could either be carried out by a new Study Group or via EU funded projects.

It was generally agreed that the wealth of data that are collected during the IBTS surveys are, in general, poorly used. Much more attention should be given to preparing publications, e.g. on species distribution, biodiversity etc. Such publications would be of interest to the general public, but also to the scientific community and fishers. Although an earlier EU proposal to prepare an Atlas for North Sea fishes was not accepted by the Commission, it should be considered to prepare and submit a new proposal covering the whole area covered by the survey.

The decision to split the coordination of the surveys in western and southern waters in two different areas was criticised. It was felt that this caused an unnecessary gap between co-ordination in these areas. It was decided that, for the time being, the co-ordination of the input of the different vessels, should still be done for the two areas separately. The analyses of the preliminary data for the two areas, however, should be combined into one, general, analysis. Mapping the species distribution over the whole East Atlantic will also be done in the DATRAS project.
A considerable part of the actual work on the co-ordination of the surveys is now being done outside the WG meeting. It was felt that part of the coordination could be done more efficiently during the actual meeting of the WG. For this purpose the WG should be split in two area sub-groups during part of the meeting.

It was suggested to prepare a bibliography of the documents concerning the IBTS, or using information derived from the IBTS. A first bibliography on the predecessors of the IBTS was prepared by Daan in 1981, but should be updated and extended. Also, in future WG reports, an overview should be presented of the work that was recently carried out using IBTS data. Some former reports of the IBTS WG did contain such an overview (e.g. ICES C.M. 1989/H:2) but this practice has ceased in recent years.

13.8 Staff exchange

The WG felt that further improvement could be made to standardisation of protocols etc by the exchange of key staff during co-ordinated surveys. J¢rgen Dalskov (DIFRES) offered to circulate all participants in late 2002 seeking survey dates for the next 12 months in order that staff exchanges can be planned.

13.9 Nominations for Chair

The present Chair (Andrew Newton) has completed his allowed length of tenure and fresh nominations were sought for a new Chair. No nominations were received from the floor although one institute revealed that they were prepared to allow one of their participants to be nominated in a year's time. Accordingly it was decided to nominate Andrew Newton for a further year in the Chair with another election to be held in 2003.

14 RECOMMENDATIONS

The Working Group had a wide range of topics to discuss and recommendations are listed under the appropriate headings within the body of the report but for ease of reading the main recommendations are collated and listed in this section.

- It was concluded that a bottom contact system for the demersal trawl may be useful, and that members were encouraged to use such systems if they felt it would enhance their ability to carry out the surveys (section 4).
- The IPROSTS project was an extremely valuable project and, if resources permit, areas of investigation for future years should include (section 5) :
    - Depth stratification of the surveys
    - An analysis of the need for a standardised gear for the western division

- An agreement on standardised protocols for sampling
- An extension of the inter-calibration exercise for different areas, vessels and species.

- The DATRAS section holds a lot of recommendations which are aimed at project programmers (see section 6) but two items are highlighted here:
  - The WG recommended the incorporation of fishery gathered environmental data (temperature and salinity) into the new Fisheries data base
  - The co-ordinator to liase with ICES over the level of access by various interested bodies
- The problem of sampling intensity, precision and previous stratification by sex should be studied for those species, especially flatfish, which have strong sexual differences in growth. The WG also recommends that the WGBEAM should pay attention to this problem (section 8).
- The WG should consider possible effect on catches when new vessels with low noise level join the IBTS research vessel fleet (section 8).
- The co-ordinator of the North Sea Q3 surveys should look at the frequency distribution of haul timing performed by each country to ascertain whether a more balanced diurnal survey could be achieved (section 8).
- Examination of the old and new IBTS indices revealed only marginal differences between the two sets but the WG recommends that further investigations should be made (section 9).
- The WG noted some discrepancies between 'old' indices held in WG files and those supplied by ICES. Assessment WGs are advised to check the index values that they use against the standard values produced by ICES (section 9).
- Costs of work on constructing a CD-rom on species identification etc. should be included in the national programme for those institutes involved in submitting a plan to Brussels by 31st May 2002 (section 10).
- Co-ordination of the western and southern division surveys should be amalgamated (section 11.3.2)
- The new Spanish survey on Porcupine Bank is regarded as a valuable addition to the western area and should continue with the aim of creating a new time series (section 11.3.3)
- The UK(NI) survey should be co-ordinated with the other western division surveys (section 11.3.4)
- Work should be commissioned on the development of a new trawl which is more suited to the rougher ground found in the NE Atlantic; the Porcupine Baca should be investigated as a potential contender (sections 11.3.5 &11.3.6)
- In the next year institutes should attempt comparative fishing trials with the Porcupine Baca trawl and existing trawls (section 11.3.6)
- Institutes are encouraged to proceed with intercalibration experiments using the techniques developed under IPROSTS (section 11.3.7)
- The WG recommended a programme of staff exchange between participating institutes (section 13.8)
- The IBTSWG should convene at IFREMER, Lorient on 25th-28th March 2003 with the suggested Terms of Reference as outlined in the following section.

15 SUGGESTED TERMS OF REFERENCE

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

b) To review and comment on progress in DATRAS.

c) To review and prepare responses to the outcome of the EVARES, MIQES, FINE and other relevant projects.

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

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

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

g) To 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.

16 WORKING DOCUMENTS

Sara Adlerstein & Siegfried Ehrich. Review of relevant papers presented at theme sessions P, Q and T at the 2001 ASC which may have implications for IBTS surveys.

Philip Kunzlik. Some Observations on the Revised IBTS Indices.

Lena Larsen. Report On the Data Base Trawl Surveys Project.

F. Morandeau. B Vincent & JC Mahe. A tentative modified GOV 36/47 for working on rougher grounds.

F. Sánchez, F. Cardador & I. Sobrino. Southern Division Groundfish Surveys 2001 Report

F. Velasco & F. Sanchez. Report on the Results of Porcupine Bank Bottom Trawl Survey 2001

Manual For the International Bottom Trawl Surveys In The Western And Southern Areas (Revision I)

APPENDIX 1 DATRAS EXCHANGE FORMAT

RECORD TYPE 1 (Haul information - HH)

POSITION	NAME	TYPE *	M/O**			RANGE				COMMENTS			
			BITS	IBTS	EVHOE BTS	BITS	IBTS	EVHOE	BTS	BITS	IBTS	EVHOE	BTS
1-2	Record type	2A	M	M		HH				Fixed value: HH	Fixed value: HH		
3	Quarter	1N	M	M		1 to 4	1 to 4						
4-6	Country	3A	M	M		See Appendix III	See Appendix III			ICES alpha codes for countries	ICES alpha codes for countries		
7-10	Ship	4AN	M	M		See Appendix III	See Appendix III						
11-20	Gear	10AN	M	M		See Appendix IV	See Appendix IV			Preliminary code 1)	Preliminary code 1)		
21-26	**Standard** station number	6AN	**M**	**M**						National coding system	National coding system		
27-29	Haul no	3N	M	M		1 to 999	1 to 999			Sequential numbering by cruise	Sequential numbering by cruise		
30-33	Year	4N	M	M		1900-2099	1900-2099						
34-35	Month	2N	M	M		1 to 12	1 to 12						
36-37	Day	2N	M	M		1 to 28/29/30/31	1 to 28/29/30/31						
38-41	Time shot	4N	M	M		1 to 2400	1 to 2400			In UTC	In UTC		
42-44	Haul duration	3N	M	M		5 to 150	5 to 90			In minutes 2)	In minutes 2)		
45	Day/night	1A	M	M		D, N, space	D, N			Not known = space filled			
46-52	**Shooting latitude decimal**	**2N.4D**	**M**	**M**		**53.0000 to 66.0000**	**50.0000 to 64.0000**			**Shooting position: latitude decimals**	**Shooting position: latitude decimals**		
53-60	**Shooting longitude decimal**	**+/-3N.4D**	**M**	**M**		**-20.0000 to 59.0000**	**-20.0000 to 59.0000**			**Shooting position: longitude decimals**	**Shooting position: longitude decimals**		

61-67	**Hauling latitude decimal**	**2N.4D**	**M**	**M**	**53.0000 to 66.0000**	**50.0000 to 64.0000**	**Hauling position: latitude decimals**	**Hauling position: latitude decimals**
68-75	**Hauling longitude decimal**	**+/-3N.4D**	**M**	**M**	**-20.0000 to 59.0000**	**-20.0000 to 59.0000**	**Hauling position: longitude decimals**	**Hauling position: longitude decimals**
76-79	Depth	**4N**	M	M	10 to 150, space 5 to 150 in Sub-div. 22 + 24	**10 to 300**	Depth from surface in metres	Depth from surface in metres
80	Haul validity	1A	M	M	I, V, N	I, P, V	Invalid =I, Valid =V or no oxygen = N, C = calibrated	Invalid=I. Partly valid=P **(only historical data)**.
81-88	Hydrographic station number	8AN	**M**	**M**			Station no as reported to the ICES hydrographer	Station no as reported to the ICES hydrographer
89-90	Species Recording Code	2N	M	M	See Appendix V	See Appendix V	Use position 65 for standard and 66 for bycatch codes	Use position 65 for standard and 66 for bycatch codes
91-94	**Netopening**	**2N.1D**	**O**	**O**	**1.5 to 10.0**	**2.5 to 10.0**	**In metres**	**In metres**
95-99	Distance	4N	O	O	1850 to 9999	1850 to 9999	Distance towed over ground (m)	Distance towed over ground (m)
100-103	Warp lenght	**4N**	O	O	100 to 999	100 to 999	in metres	in metres
104-105	Warp diameter	2N	O	O	10 to 60	10 to 60	In millimetres	In millimetres
106-109	**Door surface**	**2N.1D**	**O**	**O**	**1.0 to 10.0**	**3.0 to 10.0**	**In square metres**	**In square metres**
110-113	Door weight	4N	O	O	50 to 2000	500 to 2000	In kilogrammes	In kilogrammes
114-117	Buoyancy	4N	O	O	50 to 200	50 to 200	In kilogrammes	In kilogrammes
118-120	**Kite dimensions**	**1N.1D**	**O**	**O**	**0.5 to 2.0**	**0.5 to 2.0**	**In square metres**	**In square metres**
121-124	Weight ground rope	4N	O	O	0 to 800	0 to 300	In kilogrammes	In kilogrammes
125-127	Door	3N	O	O	25 to 200	48 to 180	In metres	In metres

127	spread							
128	**Data type**	**1A**	**M**	**M**	**R, C, S**	**R, C, S**	**S = Subsample** **R = Raised,** **C = calculated no/hour**	**S = Subsample** **R = Raised,** **C = calculated no/hour**
129-131	Towing direction	3N	O	O	1 to 360	1 to 360		
132-134	**Ground speed**	**1N.1D**	**O**	**O**	**2.0 to 6.0**	**2.0 to 6.0**	**Ground speed of trawl. Knots**	**Ground speed of trawl. Knots**
135-137	**Speed through water**	**1N.1D**	**O**	**O**	**1.0 to 9.9**	**1.0 to 9.9**	**Trawl speed through. Knots**	**Trawl speed through. Knots**
138-139	Wing spread	2N	O	O	12 to 30	12 to 30	Metres	In metres
140-142	Surface current direction	3N	O	O	0 to 360	0 to 360	Slack water =0	Slack water =0
143-146	**Surface current speed**	**2N.1D**	**O**	**O**	**0 to 10.0**	**0 to 10.0**	**Metres per sec**	**Metres per sec**
147-149	Bottom current direction	3N	O	O	0 to 360	0 to 360	Slack water =0	0 slack water
150-153	**Bottom current speed**	**2N.1D**	**O**	**O**	**0 to 10.0**	**0 to 10.0**	**Metres per sec**	**Metres per sec**
154-156	Wind direction	3N	O	O	0 to 360	0 to 360	0 = calm	360=north, 0=variable
157-159	Wind speed	3N	O	O	0 to 100	0 to 100	Metres per sec	Metres per sec
160-162	Swell direction	3N	O	O	0 to 360	0 to 360		360=north, 0=variable
163-166	**Swell height**	**2N.1D**	**O**	**O**	**0 to 25.0**	**0 to 25.0**	**Metres**	**Metres**
167-170	**Surface temperature**	**2N.1D**	**O**	**O**	**-1.0 to 30.0**	**-1.0 to 30.0**	**Degree Celsius**	**Degree Celsius**
167-170	**Bottom temperature**	**2N.1D**	**O**	**O**	**1.0 to 20.0**	**1.0 to 20.0**	**Degree Celsius**	**Degree Celsius**

171-175	**Surface salinity**	**2N.2D**	**O**	**O**		**10.00-38.00**	**10.00-38.00**							
176-180	**Bottom salinity**	**2N.2D**	**O**	**O**		**20.00-38.00**	**20.00-38.00**							
181	**Thermo cline**	**1A**	**O**	**O**		**y=yes, n=no**	**y=yes, n=no**							
182-185	**Depth of thermo**	**4N**	**O**	**O**		**5 to 100**	**5 to 100**			**Depth from surface in metres**			**Depth from surface in metres**	

RECORD TYPE 2 (Length frequency distribution)

POSITION	NAME	TYPE*	M/O**			RANGE				COMMENTS			
			BITS	IBTS	EVHOE BTS	BITS	IBTS	EVHOE	BTS	BITS	IBTS	EVHOE	BTS
1-2	Record type	2A	M	M		HL	HL			Fixed value: HL	Fixed value: HL		
3	Quarter	1N	M	M		1 to 4	1 to 4			See Record Type 1	See Record Type 1		
4-6	Country	3A	M	M		See Appendix III	See Appendix III			See Record Type 1	See Record Type 1		
7-10	Ship	4AN	M	M		See Appendix III	See Appendix III			See Record Type 1	See Record Type 1		
11-20	Gear	10AN	M	M		See Appendix IV	See Appendix IV			See Record Type 1	See Record Type 1		
21-26	Standard station number	6AN	**M**	**M**						See Record Type 1	See Record Type 1		
27-29	Haul no	3N	M	M		1 to 999	1 to 999			See Record Type 1	See Record Type 1		
30-33	Year	**4N**	M	M		1900 to 2099	1900 to 2099			See Record Type 1	See Record Type 1		
34	**Species code type**	**1A**	**M**	**M**		**N, T**	**N, T**			**N = NODC or T = TSN**	**N = NODC or T = TSN**		
35-44	Species code	10A	M	M		See Appendix VII	See Appendix VII			Official NODC code or TSN code	Official NODC code or TSN code		
45-46	Validity code	2N	M	M		See Appendix VIII	See Appendix VIII						
47	**Category number**	**1N**	**M**	**M**		**1 to 5**	**1 to 5**			**If DataType = C then category number = 1, else 1 to 5**	**If DataType = C then category number = 1, else 1 to 5**		
48-54	**Category number**	**7N**	**M**	**M**		**0 to 9999999**	**0 to 9999999**			**Number specimen of the category that was**	**Number specimen of the category that was**		

	measured					**measured**	**measured**
55-57	**Subsampling factor**	**3N**	**M**	**M**	**1-999**	**1-999**	**If data type=R or C then 1** **If data type=R or C then 1**
58-65	**Category catch weight**	**8N**	**O**	**O**	**0 to 10000000, -9**	**0 to 10000000, -9**	**Catch weight per category In g.** **Catch weight per category In g.** **Not known = -9** **Not known = -9**
66-70	**Sample catch weight**	**5N**	**O**	**O**	**0 to 40000**	**0 to 40000**	**Total catch weight (kg.)** **Total cach weight (kg.)** **Not known = -9** **Not known = -9**
71	Length class code	1AN	M	M	., 0, 1, 2, 5, 9	., 0, 1, 5, 9	0.1 cm length class=., 0.5 cm length class = 0, 1 cm length class = 1, 2 cm length class = 2, 5 cm length class = 5, +group =9 0.1 cm length class=., 0.5 cm length class = 0, 1 cm length class = 1, 2 cm length class = 2, 5 cm length class = 5, +group =9
72-74	Min. length class	3N	M	M	1 to 999, -9	1 to 999, -9	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 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
75-80	No at length	6N	M	M	1 to 999999, -9	1 to 999999, -9	No at length is either by category or by haul and hour. 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). Length classes with zero catch should be excluded from the record (Category catch number equals the sum of no at length).
81	Sex	1A	O	O	**M, F, U**	**M, F, U**	Male = M, Female =F, **U = Unknown** Male = M, Female =F, **U = Unknown**

RECORD TYPE 4 (SMALK's)

POSITION	NAME	TYPE*	M/O**				RANGE				COMMENTS			
			BITS	IBTS	EVHOE	BTS	BITS	IBTS	EVHOE	BTS	BITS	IBTS	EVHOE	BTS
1-2	Record type	2A	M	M			CA	CA			Fixed value: CA	Fixed value CA		
3	Quarter	1N	M	M			1 to 4	1 to 4			See Record Type 1	Identical to Record Type 1		
4-6	Country	3A	M	M			See Appendix III	See Appendix III			See Record Type 1	Idem		
7-10	Ship	4AN	M	M			See Appendix III	See Appendix III			See Record Type 1	Idem 1)		
11-20	Gear	10AN	M	M			See Appendix IV	See Appendix IV			See Record Type 1	Idem 1)		
21-26	Station number	6AN	**M**	**M**							See Record Type 1	Idem 1)		
27-29	Haul no	3N	M	M			1 to 999	1 to 999			See Record Type 1	Idem 1)		
30-33	Year	4N	M	M			1900 to 2099	1900 to 2099			See Record Type 1	Idem		
34	**Species code type**	**1A**	**M**	**M**			**N, T**	**N, T**			**N = NODC or T = TSN**	**N = NODC or T = TSN**		
35-44	Species code	10A	M	M			See Appendix VII	See Appendix VII			**Official NODC code or TSN code**	**Official NODC code or TSN code**		
45-46	Sub-Area Division area type	2N	M	M			22 to 32, see Appendix IX	0 to 3			ICES Baltic Sub-Division code 7)	ICES Statistical rectangles=0, Four Statistical rectangles=1, Standard NS Roundfish areas=2, Herring Sampling areas=3		
47-50	Rectangle Area area code	4 AN	M	M			See Appendix IX	See Appendix IX			ICES Statistical Rectangles			

51	Length class code	1AN	M	M	., 0, 1, 2, 5, 9	., 0, 1, 5, 9	0.1 cm length class=., 0.5 cm length class = 0, 1 cm length class = 1, 2 cm length class = 2, 5 cm length class = 5, +group =9	Identical to Record Type 2 (+group not allowed).
52-54	Min. length class	3N	M	M	1 to 999, -9	1 to 999, -9	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	Idem
55	Sex	1A	M	M	**M, F, U**	**M, F, U**	Male = M, Female = F, **Unknown = U**	Male=M, Female=F, **Unknown=U**
56	Maturity	1AN	M	M	1 to 5, space	1 to 4, space	See Appendix I 3)	See Appendix II 3)
57	+group identifier	1A	M	M	+, space	+, space	Plus group = +, else space 4)	Plus group=+ else space 4)
58-59	Age	2N	M	M	0 to 99, spaces	0 to 99, -9	Unknown age = -9 5)	Unknown age/rings= -9 5)
60-62	Number	3N	M	M	1 to 999	1 to 999	6)	6)
63-67	Individual weight (g)	**Individual weight (g)**	5N	O	**O**	0 to 99999, spaces	**0 to 99999, -9**	**The individual weight of the fish in the record (in gram).**	**The individual weight of the fish in the record (in gram).**
68-?	**Liver weight?**	**Liver weight?**						

APPENDIX 2 LIST OF CONTACT ADDRESSES

INTERNATIONAL BOTTOM TRAWL SURVEY WORKING GROUP

Dublin, 8-11 April 2002

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