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COVER NOTE

From:	Secretary-General of the European Commission, signed by Ms Patricia BUGNOT, Director
date of receipt:	20 October 2004
to:	Mr Javier SOLANA, Secretary-General/High Representative
Subject:	Commission staff working paper Scientific, Technical and Economic Committee for Fisheries (STECF); Evaluation of 2003 data collection national projects undertaken under the Commission Regulation (EC) No 1639/2001 (October 2004)

Delegations will find attached Commission document SEC(2004) 1312.

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COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 19.10.2004
SEC(2004) 1312

COMMISSION STAFF WORKING PAPER

SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (STECF)

Evaluation of 2003 data collection national projects undertaken under the Commission Regulation (EC) No 1639/2001.

October 2004

This report has been adopted by the Scientific, Technical and Economic Committee for Fisheries (STECF) through a fast track procedure by correspondence.

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1. Introduction

STECF was requested to evaluate the 2003 national reports delivered by each EU Member State within the framework of the data collection programme under the Council Regulation (EC) No1543/2000 and the Commission Regulation (EC) No 1639/2001.

Accordingly, STECF convened a meeting of its subgroup on research need (SGRN) from 21-25 June 2004. The SGRN was invited to evaluate how well Member States (MS) had performed with respect to the requirements of the agreed National programmes for 2003. The SGRN was invited also to underline whether the achievements are in line with the international obligations of the EU in regards to the Regional Fisheries Organizations.

In particular the SGRN was requested to:

- Evaluate National technical Reports and provide an advice on the measures taken by each MS, the appropriateness of the methods used and the results achieved as regards the data collection and management.

This report presents the response of the STECF to the findings in the SGRN report on Evaluation of 2003 data collection national projects undertaken under Commission Regulation (EC) No 1639/2001. The STECF review was undertaken by correspondence.

The SGRN report is attached at Appendix 1.

2. STECF Comments

STECF welcomed the SGRN Report on the Evaluation of 2003 data collection national projects undertaken under Commission Regulation (EC) No 1639/2001, noting the difficulties involved in producing it. STECF agrees with, and endorses the findings of the SGRN Report and draws particular attention to the following points.

1. STECF strongly supports the process for the evaluation of member States' National Programmes which described in the SGRN Report on the Evaluation of the National Technical Reports in 2003 (Appendix 1).
2. STECF also strongly supports the recommendation of the SGRN that MS submit their Technical reports by the agreed deadline of 31 May, to give sufficient time for proper evaluation. STECF notes that since several of Technical Reports for 2003 were submitted in languages other than English, such reports had to be translated prior to the SGRN meeting and this caused a delay in the evaluation process. In addition, some of the translated versions contained translation errors.
3. STECF notes that the quality of the Technical Reports improved compared to the submissions for 2002. However, many reports still failed to give sufficient information to evaluate the overall achievement levels. In some instances where member States fell short of their required targets (in terms of precision levels, sampling levels, number of survey stations to be covered, etc.), the reasons for underachievement were not documented.
4. STECF shares the concern of SGRN that further standardisation of the format of the Technical Reports is needed in order to ensure that they contain all the essential

elements required for a comprehensive evaluation. Accordingly, SGRN has suggested a number of guidelines that will not only assist the evaluation process but will help Member States to compile their annual reports. These guidelines are published in a separate document "***Guidelines for the submission of Technical Reports, Version 2004***", which replaces the guidelines that were issued as part of the July 2003 Report of SGRN. STECF endorses the guidelines and recommends that Member States adhere to the 2004 guidelines in compiling their National reports for 2004.

5. On the evaluation of the reported activities under Module J (Economic data on fishing fleets) STECF agrees that the report should contain a clear statement indicating whether or not the Minimum and Extended Programme are being undertaken. This is the information SGRN needs in order to assess progress whether the agreed targets given in the regulation are achieved. All Reports submitted for 2003 suffered from an inadequate amount of information, which made the assessment procedure difficult.
6. STECF is in agreement with the results of the evaluation process on the precision levels required under the National programmes. STECF recognises that according to the SGRN report, MS are making considerable efforts to meet the Regulation requirements with regards to precision levels. In this connection, the SGRN Report draws to the attention of MS's the outcome of the Workshop on Precision Levels (Nantes, January 2004) and the Workshop on Discard Sampling Methodology and Raising Procedures (Charlottenlund, September 2003). In keeping with the recommendations of the SGRN Report STECF recommends that, wherever possible and appropriate, Member States follow the recommendations from these Workshops.
7. STECF further notes that SGRN decided to group the remarks and/or suggestion made by individual MS on presion level in a single physical document (see Annex I of the RGRN Report on the Evaluation of the National Technical Reports in 2003) and agrees that these should be tabled for consideration at the next Workshop on Precision Levels, which is scheduled for January 2005.
8. STECF generally agrees with SGRN's comments and suggestions on the MS proposals for amendments to the Data Collection Regulation (Council Regulation (EC) No1543/2000 and the Commission Regulation (EC) No 1639/2001 and recommends that they be discussed as part of the considerations in 2005-2006 with a view to the upcoming major revision of the Regulation.
9. STECF shares the concern of SGRN with respect to its inability to correctly evaluate the targets and achievements of tuna tagging experiments for stock assessment purposes and urges that all relevant Member States (France, Greece, Italy, Portugal, Spain and possibly Ireland), take part in such tagging studies to provide a joint and concise technical memorandum.
10. Taking into account the above comments, STECF endorses the SGRN report.

APPENDIX 1

COMMISSION STAFF WORKING PAPER

SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (STECF)

SUBGROUP ON RESEARCH NEED AND DATA COLLECTION (SGRN)

Evaluation of 2003 data collection national projects undertaken under the Commission Regulation (EC) No 1639/2001

Brussels, 21 – 25 June 2004

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1 Introduction

1.1 List of Participants

STECF Members

Cardinale Massimiliano

Di Natale Antonio

Ernst Peter

Invited experts

Arneri Enrico

Borges Lisa

Chicharo Luis

Eltink Guus

Folmer Ole

Hatcher Aaron

Klepper Rainer

Koutrakis Manos

Martin Paloma

Millner Richard

Myllylä Timo

Newton Andrew

Quincoces Iñaki

Redant Franck (chairperson)

Rodgers Philip

Sabatella Evelina

Vigneau Joël

STECF SECRETARIAT (European Commission)

Biagi Franco (DG Fishery)

Moguedet Philippe (DG Fishery)

Pertierra Juan Pablo (DG Fishery)

Philippe Carreau (JRC)

1.2 Terms of Reference

The Sub-Group on Research Needs (STECF-SGRN) met in the premises of DG Fish, from 21-25 June 2004, with the following Terms of Reference:

The Subgroup shall evaluate how Member States (MS) get to implement Council Regulation n° 1543 / 2000. The analysis shall be done on the basis of Technical Reports submitted by MS. The main aim is to deliver a critique review of the situation by evaluating what MS had proposed in their National Programmes for 2003 and what they have finally achieved.
The Subgroup shall also underline whether the achievements are in line with the international obligations of the EU in regards to the Regional Fisheries Organizations.
The Subgroup shall feel free to make any comment, suggestion or critique, but also to be pragmatic in this approach.
In particular SGRN is requested to:

a. Evaluate National Technical Reports and provide an advice on the measures taken by each MS, the appropriateness of the methods used and the results achieved as regards data collection and management.

2 General comments

2.1 On deadlines and translation problems

SGRN notes that several Technical Reports (France, Portugal and UK) were submitted to the Commission after the deadline of May 31st. SGRN insists that, in the future, MS scrupulously respect the deadline. As already hinted on previous occasions, in the next evaluation round of Technical Reports, SGRN may consider the possibility of not evaluating reports that were not received in time.

SGRN also notes that several Reports (France, Portugal and Spain) were submitted in languages other than English and had to be translated prior to the meeting. This caused delays in the evaluation process. Moreover, some of the translated versions contained translation errors. SGRN realises that it cannot request MS to submit their Technical Reports in English, but it likes to stress that doing so is in the MS's own interest: (i) it helps to speed up the evaluation, and (ii) it prevents translation errors (and hence mis-interpretations by the evaluators).

2.2 On the quality of the Technical Reports

In general, SGRN was pleased by the improved quality of the Technical Reports compared to last year's submissions. Many reports however, still failed to give all the necessary evidence of what was achieved, or the reasons why the achievements fell short of the Regulation requirements in those cases where a MS did not manage to meet the Regulation targets (in terms of precision levels, sampling levels, number of survey stations to be covered, etc.).

So far, SGRN has been relatively mild in what it expected to be included in the Technical Reports. It has, for example, not asked for landings or effort tables, or for tables with CPUE values as "physical proof" of the type of data that was collected. To further standardise the format of the Technical Reports and to ensure that they contain all the essential elements required for their evaluation, SGRN has laid down a number of guidelines on the presentation and contents of the next set of Technical Reports (i.e. the ones covering the activities performed in 2004, and to be submitted at the latest by May 31st, 2005). These guidelines are given in a separate document (to be distributed later on this year), called "***Guidelines for the submission of Technical Reports, Version 2004***", which replaces the guidelines that were issued last year (as part of the July 2003 Report of SGRN). The idea is to keep these "Guidelines" as a separate document and to further elaborate them as the evaluation process moves on in the years to come. The "Guidelines" will include a set of template tables (an extended and improved version of the template tables that were issued last year). Here too, it is the intention to further elaborate the set of templates as the evaluation process moves on.

2.3 On the evaluation process in general

At the SGRN meeting, the Technical Reports (sections on Modules C to I + Databases + Co-ordination) were first reviewed in area-based sub-groups, which were composed in such a way that none of the experts were involved in the evaluation of his / her own country's report. The sections of the Reports dealing with Module J (Economic data on fishing fleets) were evaluated by a sub-group of economists, without however being divided into area-based sub-groups. All sub-groups had common guidelines on which aspects of the Technical Reports they had to address in particular. The findings of the different sub-groups were then discussed in plenary.

In the evaluation process, SGRN particularly focused on the extent to which MS did meet / have tried to meet the Regulation requirements. As a general guide, MS were considered to have complied with the Regulation if they had achieved more than 90 % of the Regulation requirements. Between 90 % and 20 %, MS were considered to have partially complied with the Regulation, and in these cases some explanation would be required for the under-achievement. Below 20 %, the MS were regarded as having not complied with the Regulation. However, the fact that SGRN has introduced this 90 % threshold to evaluate the levels of achievement does not mean that from now on, MS should only try to achieve 90 % of the Regulation requirements. Ultimately, MS should keep trying to achieve the full 100 % of the requirements!

Generally speaking, when a MS failed to meet the requirements of the Regulation, this may be due to two major reasons: (i) anything that could be classified as "*force majeure*" (e.g. bad weather conditions or damage to sampling gear during a survey, fishers refusing to have their landings sampled or to take sea-going observers, temporal closures of fishing areas, etc.), and (ii) anything that could be classified as "lack of initiative" or "poor organisation". In SGRN's opinion, "*force majeure*" is an acceptable reason for non-compliance with the Regulation requirements, but lack of initiative and poor organisation are not.

2.4 On the evaluation of reported activities under Module J

These comments address the quality of the Technical Reports and in particular their sections on Module J (Economic data on fishing fleets), in terms of the evidence that national intentions, as set out in the NP proposals, were followed through.

To begin with, it should be clearly indicated whether or not both the Minimum and Extended Programme are being undertaken.

The Technical Reports should convey clearly certain basic information about data collection programmes as set out below. This is the information SGRN needs in order to be able to assess progress towards meeting the requirements of the Regulations and compliance with the NP. All Reports submitted for 2003 suffered from an inadequate amount of information which made the assessment procedure difficult.

The Technical Reports should include the following information about economic data collection:

1. *What data is being collected.* Referring to the relevant appendices in the Regulation as a guide and checklist, the Report should set out precisely and in some detail what economic parameters are being collected and how these are defined. For example, under the heading "Other operational costs" in Appendix XVII, the data collected in this category should (ideally) be fully listed, e.g., lubricating oil, ice, food, fish boxes, etc. It is then possible to assess whether a meaningful and comprehensive dataset is being compiled within the terms of the Regulation.

2. *Who the data is being collected from.* Information is required on the number of vessels in the target population (sample frame) and the sample size, broken down by relevant fleet segments. It should be clearly indicated how the population is defined, i.e. the fleet register, and subsequent criteria for inclusion in the sampling frame (such as vessel length, activity or gross revenue thresholds). Exclusion of any group of vessels should be justified in economic terms.

3. *How the data are being collected.* Further information on the definition of economic parameters for practical data collection purposes is required. Data sources should be clearly stated for each segment and data category (e.g. company accounts, face-to-face interviews, questionnaires, logbooks, sales notes and settlement sheets, etc.). Where survey work is being undertaken, details should be given about methodology, including sampling procedures. Note that stratified random sampling should be the standard approach unless there are strong reasons why this is not possible or appropriate.

Wherever possible, this information should be presented in tabular form, following the format of the tables in the Regulation where appropriate.

2.5 On precision levels

Several MS extensively commented on the problems they experienced in calculating the precision levels for the different Modules of the Regulation, or included working papers on the issue as an annex to their Technical Report.

SGRN notes that many MS are making considerable efforts to meet the Regulation requirements with regards to precision levels. SGRN also recognises however, that the issue of precision levels is a difficult one and that there remains much heterogeneity in the methods used to calculate precision levels. SGRN draws the MS's attention to the outcome of the Workshop on Precision Levels (Nantes, January 2004 [1]) and the Workshop on Discard Sampling Methodology and Raising Procedures (Charlottenlund, September 2003 [2]), and recommends that, wherever possible and appropriate, they follow the recommendations of these Workshops.
One of the conclusions of the Workshop on Precision Levels refers to the possible confusion between CV and confidence interval. A CV is not calculated the same way as a confidence interval, and in the Workshop's report, mathematical proof is given to show that the confidence interval is around twice the range of the CV value. For example, precision level 1 in the Regulation, which states that a parameter has to be estimated with a precision of +/- 25 % for a 95 % confidence level, corresponds to a CV of around 12.5 %.

Instead of commenting on the remarks / suggestions made by individual MS on precision levels, SGRN decided to group these in a single physical document (see Annex I), for consideration at the next Workshop on Precision Levels, which is scheduled for January 2005.

2.6 On MS proposals for amendment of the Regulation

Several countries have included suggestions for amendments of the Regulation in their Technical Reports. SGRN takes note of these suggestions and recommends that they be discussed as part of the considerations in 2005-2006 with a view to the upcoming major revision of the Regulation.

2.7 On tuna tagging

In the absence of sufficient background information, SGRN keeps having problems to correctly evaluate the targets and achievements of tuna tagging experiments for stock assessment purposes. Therefore, SGRN expects all MS that take part in such tagging studies (France, Greece, Italy, Portugal, Spain and possibly Ireland) to provide a joint and concise technical memorandum, with:

([1]) Available on the ICES internet site (www.ices.dk/iceswork/wgdetailacfm.asp?wg=WKSCMFD)

([2]) Available on the ICES internet site as an annex to the report of the Planning Group on Commercial Catch, Discards and Biological Sampling (www.ices.dk/iceswork/wgdetailacfm.asp?wg=PGCCDBS)

(a) the goals of tuna tagging experiments (with either spaghetti or electronic tags);

(b) the methodology of tuna tagging experiments;

(c) the minimum set of parameters to be recorded as part of such tagging experiments, to be useful for stock assessment purposes;

(d) the minimum time pop-up electronic tags should remain on the tagged fish to produce useful data;

(e) an estimation of the minimum number of electronic tag recoveries that would be required to produce useful data for stock assessment purposes;

(f) indicators of how to evaluate the success of tuna tagging experiments;

(g) the use that can be made of the outcome of tuna tagging experiments for stock assessment purposes;

(h) how the information collected so far has been used in stock assessments.

Ideally, this memorandum should be transmitted to the Commission at the latest by October 31st 2004, to be considered by SGRN as part of its evaluation of the 2005 NP proposals in December 2004.

3 SGRN's evaluation of MS Technical Reports

3.1 Country: Belgium

3.1.1 a. General comments

Technical Report submitted to Commission before May 31st deadline ?	Yes
Did Technical Report comply with DG Fish / STECF-SGRN Guidelines ?	Yes
Did Technical Report have all the necessary information to allow DG Fish / STECF-SGRN to evaluate the achievements of the MS 2003 National Programme ?	Yes, for most (*)
Did Technical Report give precision levels for all parameters for which this is required by the Regulation ?	No
Did Technical Report contain sufficient information on the methods used to calculate precision levels ?	No
Did Technical Report include information on both national and international co-ordination ?	Yes

(*) A fairly well constructed Report that followed the SGRN guidelines. However, this Report would benefit from a summary table outlining discard targets and achievements.

3.1.2 b. Comments by Module of the Regulation – Minimum Programme

Summary table Minimum Programme			
Module	Subject	Were Regulation targets met ?	See comment
C	Fleet capacity	Yes	1
D	Fuel consumption	No	2
	Fishing effort	Yes	1
	Species-specific fishing effort	Yes	1 3
E	Landings: MP species	Yes	1
	Discards: MP species	Partial	4
	Recreational fisheries	Derogation	
F	Species-specific CPUE data series	Yes	1
G	Surveys Priority 1		
	Demersal Young Fish Survey	Yes	
	North Sea Beam Trawl Survey	Partial	5

H	Landings: Recovery stocks: Length	Yes	
	Landings: Recovery stocks: Age	Yes	
	Landings: Other MP stocks: Length	Yes	
	Landings: Other MP stocks: Age	Partial	6
	Discards: Recovery stocks: Length & age	Partial	7
	Discards: Other MP stocks: Length & age	Partial	7 8
I	Sex ratios	--	9
	Sexual maturity data	--	9
	Growth data	--	9
J	Economic data fishing fleets	Partial	10

General comment on Modules C, D, E and F

[1] In the future, evidence of the data collected should be provided (see Guidelines for the Submission of Technical Reports, Version 2004).

Module C - Fishing capacities

Module D - Fishing effort

[2] The collecting of fuel consumption data is running a year behind schedule but even then, only 57 % of the fleet has provided data for 2002. Future Technical Reports need a better description of "partial sampling".

[3] Independent external information informed SGRN that Belgium has not delivered data gathered under Module D to WGHMM as stated in the Technical Report. To be clarified by MS.

Module E - Catches and landings

[4] SGRN notes that the MS was unable to provide estimates of the quantities discarded by species, as it still needs to resolve the problem of raising the discard sampling data to fleet level.

Module F - CPUEs

Module G - Scientific surveys

[5] The number of stations achieved was less than planned, but this was due to technical problems with the research vessel, which resulted in a loss of 17 % of the survey time.

Module H - Age and length sampling of landings and discards

[6] Belgium should consider paying for damaged (flat)fish sampled whilst at sea. This would resolve the problem of inadequate sampling for age.

[7] No targets established in NP Proposal. Also see previous comment.

[8] Inadequate sampling for the flatfish directed beam trawl fishery in first quarter, due to poor administration.

Module I - Other biological parameters

[9] According to the provisions of the Regulation, no report on Other Biological Sampling is required until 2005 (covering the years 2002-2004). However, Belgium did present some results already on sampling for Other Biological Parameters, but SGRN notices that it failed to meet its own national targets for plaice in the North Sea (ICES Sub-area IV).

Module J - Economic data fishing fleets

[10] Insufficient information given as to what has actually been achieved. It is not clear what economic data have been collected. Lack of detail on methodological approach, including validation of data sources. No details of precision levels. The use of a voluntary (self-selected) sample may introduce statistical bias.

Databases

SGRN notes that a new database is being developed for all biological and survey data, but that its development was slower that anticipated.

Co-ordination

All commitments made in the NP proposal were fulfilled.

3.1.3 c. Comments by Module of the Regulation – Extended Programme

Belgium only requested work under Module F for the Extended Programme, but did not seek financial support for these activities.

Summary table Extended Programme			
Module	Subject	Were Regulation targets met ?	See comment
F	Species-specific CPUE data series	Yes	11

General comment on Modules C, D, E and F (insofar as they are part of the EP)

[11] In the future, evidence of the data collected should be provided (see Guidelines for the Submission of Technical Reports, Version 2004).

3.1.4 d. Request for information on action taken

SGRN recommends that all MS provide a brief report with an overview of the actions that were / will be taken to avoid future non-compliance with the provisions of the Regulation identified in the 2003 Technical Report.

3.2 Country: Denmark

3.2.1 a. General comments

Technical Report submitted to Commission before May 31st deadline ?	Yes
Did Technical Report comply with DG Fish / STECF-SGRN Guidelines ?	Mostly (*)
Did Technical Report have all the necessary information to allow DG Fish / STECF-SGRN to evaluate the achievements of the MS 2003 National Programme ?	Yes (*)
Did Technical Report give precision levels for all parameters for which this is required by the Regulation ?	No
Did Technical Report contain sufficient information on the methods used to calculate precision levels ?	No
Did Technical Report include information on both national and international co-ordination ?	Yes

(*) The Report has a clear structure and generally followed the SGRN guidelines. However, discard sampling precisions are not presented, there is no separate section on databases and there is no list of acronyms and abbreviations.

3.2.2 b. Comments by Module of the Regulation – Minimum Programme

Summary table Minimum Programme			
Module	Subject	Were Regulation targets met ?	See comment
C	Fleet capacity	Yes	1
D	Fuel consumption	See Module J	
	Fishing effort	Yes	1
	Species-specific fishing effort	Yes	1
E	Landings: MP species	Yes	1
	Discards: MP species	Partial	2
	Recreational fisheries	Pilot study	3
F	Species-specific CPUE data series	Yes	1
G	Surveys Priority 1		
	IBTS	Yes	
	BITS	Partial	4
	Herring acoustic survey	Unknown	5

H	Landings: Recovery stocks: Length	Partial	6
	Landings: Recovery stocks: Age	Yes	
	Landings: Other MP stocks: Length	Partial	7
	Landings: Other MP stocks: Age	Partial	7
	Discards: Recovery stocks: Length & age	Yes	
	Discards: Other MP stocks: Length & age	Yes	
I	Sex ratios	--	8
	Sexual maturity data	--	8
	Growth data	--	8
J	Economic data fishing fleets	Yes	9

General comment on Modules C, D, E and F

[1] In the future, evidence of the data collected should be provided (see Guidelines for the Submission of Technical Reports, Version 2004).

Module C - Fishing capacities

Module D - Fishing effort

Module E - Catches and landings

[2] No precision levels are presented on discard sampling, since according to the MS, there is no agreed standard procedure. SGRN notes that this is not really the case, since at its 2003 meeting, the Workshop on Discard Sampling Methodology and Raising Procedures (Charlottenlund, September 2003) did agree on a common methodology for several aspects of discard sampling, amongst which the calculation of precision levels.

[3] SGRN notes that a new pilot study on the recreational fishery for salmon is planned for 2004. The one done in 2003 was based on interviews, and the MS expressed doubts on the reliability of the methodology used in this survey. Also see SGRN Report on the Evaluation of Pilot Study Reports (May, 2004).

Module F - CPUEs

Module G - Scientific surveys

[4] The MS does not specify reasons for the non-achievement of the planned BITS (4^{th} quarter) survey in the main body of the text, only in a technical appendix. In this appendix the reason for the shortfall is stated as a personal accident and technical problems with the steering gear of the research vessel.

[5] No sampling levels achieved are given for the HERSUR survey. SGRN however notes that in the case of acoustic surveys, it might be difficult to properly define targets only in terms of hauls, and that targets including the overall length of the transects or an indication of area coverage might be a more appropriate measure of achievement.

Module H - Age and length sampling of landings and discards

[6] Length measurements for cod in ICES Sub-area IV only reached 81 % of the Regulation requirements, but no explanation is given for the shortfall. To be clarified by MS. On the other hand, age sampling exceeded the requirements of the Regulation.

[7] The Report gives a comprehensive list of species / stocks covered. For the majority of these, the MP levels were achieved. When the target sampling levels were not met, the reasons given are satisfactory (derogation, staff changes, sampling on-board, among others). With regards to ageing of turbot and brill, Denmark should consider the possibility of building up its own expertise or, as an alternative, to out-source the age readings. In the meantime, the MS should at least make sure it collects the necessary samples for age.

Module I - Other biological parameters

[8] According to the provisions of the Regulation, no report on Other Biological Sampling is required until 2005 (covering the years 2002-2004).

Module J - Economic data fishing fleets

[9] The clarity of this section is generally good, although some extraneous information could have been omitted. Detail should have been included, however, on sampling by fleet segment, by means of a summary table.

Databases

There is no separate section on databases. Information on this aspect of the Regulation should be included in all future Technical Reports (see Guidelines for the Submission of Technical Reports, Version 2004).

Co-ordination

List of international meetings with MS participation and surveys is given.

3.2.3 c. Comments by Module of the Regulation – Extended Programme

Denmark did not apply for an Extended Programme.

3.2.4 d. Request for information on action taken

SGRN recommends that all MS provide a brief report with an overview of the actions that were / will be taken to avoid future non-compliance with the provisions of the Regulation identified in the 2003 Technical Report.

3.3 Country: Finland

3.3.1 a. General comments

Technical Report submitted to Commission before May 31st deadline ?	Yes
Did Technical Report comply with DG Fish / STECF-SGRN Guidelines ?	Mostly (*)
Did Technical Report have all the necessary information to allow DG Fish / STECF-SGRN to evaluate the achievements of the MS 2003 National Programme ?	Yes, for most (*)
Did Technical Report give precision levels for all parameters for which this is required by the Regulation ?	No
Did Technical Report contain sufficient information on the methods used to calculate precision levels ?	No
Did Technical Report include information on both national and international co-ordination ?	Yes

(*) The Report is very well structured, with planned and accomplished sampling in each Module of the Regulation. However, there are no separate sections on databases and co-ordination, and there is no list of acronyms and abbreviations. Also, the summary table on precision levels presented does not include all Modules of the Regulation.

3.3.2 b. Comments by Module of the Regulation – Minimum Programme

Summary table Minimum Programme			
Module	Subject	Were Regulation targets met ?	See comment
C	Fleet capacity	Yes	1
D	Fuel consumption	See Module J	
	Fishing effort	Yes	1
	Species-specific fishing effort	Unknown	1 2
E	Landings: MP species	Yes	1
	Discards: MP species	Unknown	3
	Recreational fisheries	Pilot study	4
F	Species-specific CPUE data series	Yes	1
G	Surveys Priority 1		
	BITS	Yes	
	Herring acoustic survey	Derogation	

	Sprat acoustic survey	Derogation	
H	Landings: Recovery stocks: Length	Yes	
	Landings: Recovery stocks: Age	Yes	
	Landings: Other MP stocks: Length	Yes	5
	Landings: Other MP stocks: Age	Yes	5
	Discards: Recovery stocks: Length & age	Derogation	
	Discards: Other MP stocks: Length & age	Derogation	
I	Sex ratios	--	6
	Sexual maturity data	--	6
	Growth data	--	6
J	Economic data fishing fleets	Partial	7

General comment on Modules C, D, E and F

[1] In the future, evidence of the data collected should be provided (see Guidelines for the Submission of Technical Reports, Version 2004).

Module C - Fishing capacities

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Module D - Fishing effort

[2] Because there is no specific section on species specific effort, it is not clear whether these data are collected / available. To be clarified by MS.

Module E - Catches and landings

[3] No information is provided on discard sampling programmes in 2003. There is some uncertainty on what the MS planned / achieved with respect to the discards of cod. However, bearing in mind that the catches of cod in Finland are small compared with the international total (see SGRN Report on the Evaluation of Pilot Study Reports, May 2004), the absence of cod discard data was not considered to be a "non-compliance".

[4] See SGRN Report on the Evaluation of Pilot Studies (May 2004).

Module F - CPUEs

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Module G - Scientific surveys

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Module H - Age and length sampling of landings and discards

[5] For herring in ICES Sub-area IIId, the required sampling levels for length were achieved. For age, the levels required by the Regulation (viz. 8200 age readings) were

considered to be excessive by the MS and therefore, as allowed by the Regulation, they planned and performed 40 age readings per length class.

Module I - Other biological parameters

[6] According to the provisions of the Regulation, no report on Other Biological Sampling is required until 2005 (covering the years 2002-2004). However, Finland did present some results already on sampling for Other Biological Parameters.

Module J - Economic data fishing fleets

[7] Progress appears adequate, although there is a lack of detailed information on what is exactly being done. The methodology is unclear, for example as to data requirements (economic parameters), sources and sampling. The overall sample is small, and there is no sampling detail by segment.

Databases

There is no separate section on databases. Information on this aspect of the Regulation should be included in all future Technical Reports (see Guidelines for the Submission of Technical Reports, Version 2004).

Co-ordination

There is no information in the Report on national or international co-operation other than for surveys. Information on this aspect of the Regulation should be included in all future Technical Reports (see Guidelines for the Submission of Technical Reports, Version 2004).

3.3.3 c. Comments by Module of the Regulation – Extended Programme

Finland only requested work under Modules E and H for the Extended Programme.

Summary table Extended Programme			
Module	Subject	Were Regulation targets met ?	See comment
E	Landings: EP species	Yes	8
H	Landings: All EP stocks: Length	Yes	
	Landings: All EP stocks: Age	Yes	

General comment on Modules C, D, E and F (insofar as they are part of the EP)

[8] In the future, evidence of the data collected should be provided (see Guidelines for the Submission of Technical Reports, Version 2004).

3.3.4 d. Request for information on action taken

SGRN recommends that all MS provide a brief report with an overview of the actions that were / will be taken to avoid future non-compliance with the provisions of the Regulation identified in the 2003 Technical Report.

3.4 Country: France

3.4.1 a. General comments

The Technical Report had to be translated in English and only became available to SGRN during the meeting. The translated version contained some translation errors, and still had tables, figures and annexes in French, which made reviewing of the Report difficult.

Technical Report submitted to Commission before May 31st deadline ?	No
Did Technical Report comply with DG Fish / STECF-SGRN Guidelines ?	In part (*)
Did Technical Report have all the necessary information to allow DG Fish / STECF-SGRN to evaluate the achievements of the MS 2003 National Programme ?	Yes, for some (**)
Did Technical Report give precision levels for all parameters for which this is required by the Regulation ?	Yes, for most
Did Technical Report contain sufficient information on the methods used to calculate precision levels ?	Yes, for most
Did Technical Report include information on both national and international co-ordination ?	Yes

(*) The Technical Report does not comply with the SGRN Guidelines especially for Module H, which is too extensive and not well structured. There is no separate section on databases, and no list of acronyms and abbreviations.

(**) The Report is too extensive. It is often difficult to compare what was planned according to the NP proposal and what was achieved. Also, it is sometimes not clear what was part of the Minimum and what of the Extended Programme.

3.4.2 b. Comments by Module of the Regulation – Minimum Programme

Summary table Minimum Programme			
Module	Subject	Were Regulation targets met ?	See comment
C	Fleet capacity	Yes	1
D	Fuel consumption	Yes	2
	Fishing effort	Yes	1
	Species-specific fishing effort	Yes	1
E	Landings: MP species	Yes	1
	Discards: MP species		
	Mediterranean	Partial	3
	Channel & North Sea	Partial	4
	North-East Atlantic	Partial	4
	Tuna fisheries in Atlantic and Indian Oceans	No	5
	Recreational fisheries	Partial	6
F	Species-specific CPUE data series	Yes	1
G	Surveys Priority 1		
	IBTS	Yes	
	PELGAS	Yes	
	EVHOE	Yes	
	MEDITS	Yes	
	Tagging of highly migratory species	Partial	7
H	Landings: Recovery stocks: Length	Yes	8
	Landings: Recovery stocks: Age	Yes	8
	Landings: Other MP stocks: Length	Partial	9
	Landings: Other MP stocks: Age	Partial	9
	Discards: Recovery stocks: Length & age	Yes	
	Discards: Other MP stocks: Length & age	Yes	
I	Sex ratios	--	10
	Sexual maturity data	--	10
	Growth data	--	10
J	Economic data fishing fleets	Partial	11

General comment on Modules C, D, E and F

[1] In the future, evidence of the data collected should be provided (see Guidelines for the Submission of Technical Reports, Version 2004).

Module C - Fishing capacities

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Module D - Fishing effort

[2] SGRN appreciates that the precision levels are given by fleet segment, but would also like to know the level of precision for the fleet as a whole.

Module E - Catches and landings

[3] SGRN notes that not all fisheries were covered in the discard sampling programme. Also see SGRN Report on the Evaluation of Pilot Study Reports (May, 2004).

[4] SGRN notes that the MS is taking action to set up comprehensive discard sampling programmes in these areas, but that the programmes were delayed because of logistic problems. These could, however, at least in part have been avoided, if the process had be initiated earlier.

[5] According to Appendix XII of the Regulation, there is an obligation to sample discards of tuna. The NP proposal states that such a discard sampling programme would be carried out. As mentioned in the Technical Report however, the programme was not carried out, due to administrative problems. To be clarified by MS.

[6] The MS submitted a brief summary of a Pilot Study (carried out in 2003) on its recreational fisheries for bluefin tuna, as part of its Technical Report. This Pilot Study was evaluated by SGRN, following the approach it took at its May 2004 meeting to evaluate all other Pilot Study Reports. For details, see Section e underneath.

Module F - CPUEs

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Module G - Scientific surveys

[7] SGRN was not able to compare what was planned in the NP proposal to what was achieved according the Technical Report. The Technical Report states that one survey was not carried out, because the chartered vessel was "not available". It is however not clear from the Report why the vessel was not available. To be clarified by MS.

Module H - Age and length sampling of landings and discards

[8] SGRN notes that the stocks under a Recovery Plan are not identified in the summary table.

[9] For 7 stocks, there is no explanation why sampling for length fell short of the Regulation requirements (for 2 there is an explanation). Similarly, for 5 stocks there is

no explanation why sampling for age fell short of the requirements (for 3 there is an explanation). To be clarified by MS.

Module I - Other biological parameters

[10] According to the provisions of the Regulation, no report on Other Biological Sampling is required until 2005 (covering the years 2002-2004).

Module J - Economic data fishing fleets

[11] Lack of information on population and sampling by segment. More information is needed on methodology and in particular the role of the two surveys and how these interact.

Databases

The Report contains no information on databases, except for sea surveys.

Co-ordination

The Report gives detailed information on international co-operation, but there is no information on national co-ordination.

3.4.3 c. Comments by Module of the Regulation – Extended Programme

France only requested work under Module G and H for the Extended Programme.

Summary table Extended Programme			
Module	Subject	Were Regulation targets met ?	See comment
G	Surveys Priority 2		
	CGFS	Yes	
	PELMED	Yes	
H	Landings: All EP stocks: Length	Yes	

3.4.4 d. Request for information on action taken

SGRN recommends that all MS provide a brief report with an overview of the actions that were / will be taken to avoid future non-compliance with the provisions of the Regulation identified in the 2003 Technical Report.

3.4.5 e. Pilot Study: Recreational fisheries for bluefin tuna

This section replaces the comments on the French pilot study on recreational fisheries for bluefin tuna in SGRN's Report on the Evaluation of Pilot Study Reports (May 2004; Sec (2004)1066).

- **Overall quality of Pilot Study Report**

There has been no pilot study on the French recreational fisheries in 2002. A pilot study was performed in 2003, which was included in the 2003 Technical Report. SGRN notes that catch information was only collected from tournaments and did not cover possible other catches by recreational fishermen. No explanation is given why these possible other catches were not included in the Pilot Study.

- **Soundness of conclusions drawn from pilot study**

The possible other catches by recreational fishermen are unknown and not reported in the Pilot Study. SGRN therefore notes that the total catch from the recreational fishery on bluefin tuna is still unknown.

- **Follow-up suggested by MS**

France is suggesting not to continue the sampling programme for its recreational fishery for bluefin tuna.

- **Follow-up suggested by SGRN**

SGRN notes that all EU MS should collect catch data on bluefin tuna and provide them to ICCAT, according to the ICCAT rules, particularly Task 1 (category SPOR). At the same time, all MS concerned should collect size frequencies from all their bluefin tuna fisheries (including recreational fisheries) and report them to ICCAT in compliance with the Task 2 forms. It is quite clear that this mandatory system is not currently in place for France. Thus, the pilot studies on the recreational fisheries for bluefin tuna should be considered as a first step to obtain more reliable figures on the quantities of bluefin tuna taken by the recreational fisheries, and to help MS to better comply with the ICCAT rules.

- **Other comments / recommendations by SGRN**

None.

3.5 Country: Germany

3.5.1 a. General comments

Technical Report submitted to Commission before May 31st deadline ?	Yes
Did Technical Report comply with DG Fish / STECF-SGRN Guidelines ?	In part (*)
Did Technical Report have all the necessary information to allow DG Fish / STECF-SGRN to evaluate the achievements of the MS 2003 National Programme ?	No (**)
Did Technical Report give precision levels for all parameters for which this is required by the Regulation ?	Yes, for most
Did Technical Report contain sufficient information on the methods used to calculate precision levels ?	Yes, for most
Did Technical Report include information on both national and international co-ordination ?	Yes

(*) Report is too bulky, and some parts do not conform to the SGRN recommended Guidelines on text format. It lacked an index or any other form of cross-referencing to the annexes. This made the Report difficult to navigate. Also, there is no list of acronyms and abbreviations.

(**) There is insufficient explanation in the text on the reasons why certain targets were not met.

3.5.2 b. Comments by Module of the Regulation – Minimum Programme

Summary table Minimum Programme			
Module	Subject	Were Regulation targets met ?	See comment
C	Fleet capacity	Yes	1
D	Fuel consumption	No	2
	Fishing effort	Yes	1
	Species-specific fishing effort	Yes	1 3
E	Landings: MP species	Yes	1
	Discards: MP species	Partial	4
	Recreational fisheries	Yes	5
F	Species-specific CPUE data series	Yes	1
G	Surveys Priority 1		

	IBTS 1st Quarter	Yes	
	IBTS 3rd Quarter	Yes	
	Sprat Acoustic survey	Partial	6
	Redfish survey	Partial	7
	NS Herring Acoustic Survey	Yes	
	BITS 1st Quarter	Yes	
	BITS 4th Quarter	Yes	
	BTS	Yes	
	Herring Acoustic Survey	Yes	
	DYFS – Husum	Yes	8
	DYFS – Busum	Yes	8
	DYFS – Ostfriesland	Partial	8 9
	DYFS – Cuxhaven	Partial	8 10
H	Landings: Recovery stocks: Length	Yes	
	Landings: Recovery stocks: Age	Yes	
	Landings: Other MP stocks: Length	Partial	11
	Landings: Other MP stocks: Age	Partial	11
	Discards: Recovery stocks: Length & age	Yes	
	Discards: Other MP stocks: Length & age	Unknown	12
I	Sex ratios	--	13
	Sexual maturity data	--	13
	Growth data	--	13
J	Economic data fishing fleets	Partial	14

General comment on Modules C, D, E and F

[1] In the future, evidence of the data collected should be provided (see Guidelines for the Submission of Technical Reports, Version 2004).

Module C - Fishing capacities

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Module D - Fishing effort

[2] The collecting of fuel consumption data is running a year behind schedule.

[3] The MS suggests a review of the Regulation regarding specific effort for static gear and this has already been discussed in STECF.

Module E - Catches and landings

[4] SGRN notes that a large amount of work was done, but some stocks were missed due to (i) lack of co-operation from the fishermen, and (ii) administrative delays in recruiting suitable personnel.

[5] Germany is to be praised for undertaking a voluntary pilot study on recreational fisheries for cod. With regards to the recreational fisheries for salmon, see SGRN Report on the Evaluation of Pilot Study Reports (May, 2004).

Module F - CPUEs

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Module G - Scientific surveys

[6] Only 82 % of stations achieved, but no explanation given. To be clarified by MS.

[7] Only 54 % of stations achieved, but no explanation given. To be clarified by MS.

[8] The DYFS survey achievements are reported by four geographical areas. However, the Regulation lists them as two surveys (by quarter). Germany should follow the format of the Regulation.

[9] Only 72 % of stations achieved, but no explanation given. To be clarified by MS.

[10] Only 87 % of stations achieved, but no explanation given. To be clarified by MS.

Module H - Age and length sampling of landings and discards

[11] In general, sampling for length and age was satisfactory. Sampling for redfish and saithe however, fell short of the Regulation requirements. In Germany, nearly all sampling for both landings and discards takes place at sea. This in itself can cause problems, because of the need to find co-operative vessels. A general lack of co-operation from fishermen meant that some tasks could not fully be completed, but this was out of the control of the MS. However, Germany also failed to recruit sufficient personnel until December 2003.

[12] Except for the Baltic, the achievements for discard age reading are not listed in the Technical Report. This might be an omission. To be clarified by MS.

Module I - Other biological parameters

[13] According to the provisions of the Regulation, no report on Other Biological Sampling is required until 2005 (covering the years 2002-2004). However, Germany did present some results already on sampling for Other Biological Parameters.

Module J - Economic data fishing fleets

[14] Insufficient detailed information on data collection methodology and sampling. It is therefore difficult to assess progress, although it appears that a significant quantity of data has been collected.

Databases

The form of words used in the Technical Report was minimal but highlighted work on a new database, and it appears that the 2002 data have been loaded. There is however, no mention of the 2003 data. The impression is given that the database has been improved in 2002, especially with the incorporation of dynamic websites, but SGRN was unable to ascertain whether the project is finished.

Co-ordination

Germany participated in a number of international meetings. Also, there were informal contacts with Dutch and Danish colleagues over co-ordinated sampling. However, they did not attend PGRS, PGEGGS, PGHAC or PGSPFN as listed in the NP proposal. One meeting (SGSTG) is not eligible. Regional Planning Group for the Baltic Sea was only convened for the first time in 2004.

3.5.3 c. Comments by Module of the Regulation – Extended Programme

Germany did not apply for an Extended Programme.

3.5.4 d. Request for information on action taken

SGRN recommends that all MS provide a brief report with an overview of the actions that were / will be taken to avoid future non-compliance with the provisions of the Regulation identified in the 2003 Technical Report.

3.6 Country: Greece

3.6.1 a. General comments

From the NP, it seems that most parameters related to landings and effort are collected by survey rather than through census. In the introduction to the NP, it is noted that the implementation and co-ordination of such a programme faces many difficulties: large number of species, large range of fishing techniques, and large number of small vessels working in the coastal fisheries. Despite all this, all parts of the 2003 NP are claimed to have been fully achieved and no major problems have been encountered. However, no quantitative information is given to allow SGRN to confirm this general statement. In the future, SGRN requests that the Technical Report provides sufficient detailed information to allow a more precise evaluation of the information collected.

Technical Report submitted to Commission before May 31st deadline ?	Yes
Did Technical Report comply with DG Fish / STECF-SGRN Guidelines ?	In part (*)
Did Technical Report have all the necessary information to allow DG Fish / STECF-SGRN to evaluate the achievements of the MS 2003 National Programme ?	No (**)
Did Technical Report give precision levels for all parameters for which this is required by the Regulation ?	Yes
Did Technical Report contain sufficient information on the methods used to calculate precision levels ?	Yes
Did Technical Report include information on both national and international co-ordination ?	No

(*) The Technical Report is well structured. However, information on what was planned and sufficient information on what was achieved is not included. Also, there is no list of acronyms and abbreviations.

(**) For many Modules, insufficient information is provided to validate the statements that are made.

3.6.2 b. Comments by Module of the Regulation – Minimum Programme

Summary table Minimum Programme			
Module	Subject	Were Regulation targets met ?	See comment
C	Fleet capacity	Yes	1 2
D	Fuel consumption	Yes	
	Fishing effort	Yes	1 3
	Species-specific fishing effort	Yes	1
E	Landings: MP species		1 4
	Demersal and small pelagic	Yes	5
	Large pelagic	Yes	6
	Discards: MP species	Unknown	6
	Recreational fisheries	Pilot Study	7
F	Species-specific CPUE data series	Unknown	1 8
G	Surveys Priority 1		
	MEDITS	Yes	
	Tuna tagging	No	9
H	Landings: Recovery stocks: Length	Not applicable	
	Landings: Recovery stocks: Age	Not applicable	
	Landings: Other MP stocks: Length	Partial	10
	Landings: Other MP stocks: Age	Partial	10
	Discards: Recovery stocks: Length & age	Not applicable	
	Discards: Other MP stocks: Length & age		11
I	Sex ratios	--	12
	Sexual maturity data	--	12
	Growth data	--	12
J	Economic data fishing fleets	Unknown	13

General comment on Modules C, D, E and F

[1] In the future, evidence of the data collected should be provided (see Guidelines for the Submission of Technical Reports, Version 2004).

Module C - Fishing capacities

[2] Appropriate segmentation is required for assigning data on fishing capacity to the correct gear type. The Technical Report did not provide sufficient information to evaluate the validity of the segmentation. If the licensing system referred to in the NP is

comprehensive, then the method used to assign vessels to fleet segments would be acceptable.

Module D - Fishing effort

[3] The raising factors used to derive total estimates of effort and landings for the coastal fleet may have a big influence on the outcome. SGRN notes that these raising factors were based on a relatively imprecise methodology.

Module E - Catches and landings

[4] See previous comment.
[5] The Report concluded that the required precision was achieved but no proof was provided to validate this statement. Also see previous comment.

[6] No details given in the Technical Report. To be clarified by MS.

[7] Although initially, Greece requested derogation for its recreational fisheries on bluefin tuna, a pilot study on these fisheries was foreseen under Action 10 of the Greek NP proposal. SGRN notes, however, that the proposed pilot study has not been carried out. Also see SGRN Report on the Evaluation of Pilot Study Reports (May, 2004).

Module F - CPUEs

[8] MS should clarify whether the pilot study has been concluded.

Module G - Scientific surveys

[9] There are no results of the tuna tagging programme in the Technical Report. To be clarified by MS.

Module H - Age and length sampling of landings and discards

[10] The targets were mainly achieved. SGRN however considers that sampling during the last 7 months of the year only, may have led to some bias in the estimation of the length and age structure of the species / stocks sampled.

[11] A comprehensive discard sampling programme has been carried out, but there is no information in the Technical Report to confirm whether the threshold of 10 % by weight or 20 % by numbers of discard was exceeded.

Module I - Other biological parameters

[12] According to the provisions of the Regulation, no report on Other Biological Sampling is required until 2005 (covering the years 2002-2004).

Module J - Economic data fishing fleets

[13] No information given in either the NP proposal or the Technical Report. To be clarified by MS.

Databases

The Technical Report confirms that an integrated database has been developed.

Co-ordination

One international co-ordination meeting was attended. Despite the many problems in organising and co-ordinating the programme, no information is provided on national co-ordination.

3.6.3 c. Comments by Module of the Regulation – Extended Programme

Greece only requested work under Module G for the Extended Programme.

Summary table Extended Programme			
Module	Subject	Were Regulation targets met ?	See comment
G	Surveys Priority 2		
	Anchovy	Yes	

Module G - Scientific surveys

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3.6.4 d. Request for information on action taken

SGRN recommends that all MS provide a brief report with an overview of the actions that were / will be taken to avoid future non-compliance with the provisions of the Regulation identified in the 2003 Technical Report.

3.7 Country: Ireland

3.7.1 a. General comments

Technical Report submitted to Commission before May 31st deadline ?	Yes
Did Technical Report comply with DG Fish / STECF-SGRN Guidelines ?	Mostly (*)
Did Technical Report have all the necessary information to allow DG Fish / STECF-SGRN to evaluate the achievements of the MS 2003 National Programme ?	Yes
Did Technical Report give precision levels for all parameters for which this is required by the Regulation ?	Yes
Did Technical Report contain sufficient information on the methods used to calculate precision levels ?	Yes
Did Technical Report include information on both national and international co-ordination ?	Yes

(*) There is no list of acronyms and abbreviations.

3.7.2 b. Comments by Module of the Regulation – Minimum Programme

Summary table Minimum Programme			
Module	Subject	Were Regulation targets met ?	See comment
C	Fleet capacity	Yes	1
D	Fuel consumption	See Module J	
	Fishing effort	Partial	1 2
	Species-specific fishing effort	Yes	1
E	Landings: MP species	Yes	1
	Discards: MP species	Yes	
	Recreational fisheries	Pilot Study	3
F	Species-specific CPUE data series	Yes	1
G	Surveys Priority 1		
	North West Herring Acoustic Survey	Yes	
	Celtic Sea Herring Acoustic Survey	Yes	
	IBTS West	Yes	
H	Landings: Recovery stocks: Length	Yes	
	Landings: Recovery stocks: Age	Yes	

	Landings: Other MP stocks: Length	Yes	4
	Landings: Other MP stocks: Age	Yes	
	Discards: Recovery stocks: Length & age	Yes	
	Discards: Other MP stocks: Length & age	Partial	5
I	Sex ratios	--	6
	Sexual maturity data	--	6
	Growth data	--	6
J	Economic data fishing fleets	No	7

General comment on Modules C, D, E and F

[1] In the future, evidence of the data collected should be provided (see Guidelines for the Submission of Technical Reports, Version 2004).

Module C - Fishing capacities

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Module D - Fishing effort

[2] SGRN notes that poor return rates of questionnaires amongst the vessels < 10 m may have affected precision.

Module E - Catches and landings

[3] See SGRN Report on the Evaluation of Pilot Study Reports (May, 2004).

Module F - CPUEs

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Module G - Scientific surveys

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Module H - Age and length sampling of landings and discards

[4] Although Ireland met most of the requirements of the Regulation, a few MP stocks were either not sampled or sampled at a too low level for length and age. No explanation is given in the Technical Report why this was the case. To be clarified by MS.

[5] SGRN notes that not all fleets are covered by the discard sampling programme (e.g. gillnets). To be clarified by MS.

Module I - Other biological parameters

[6] According to the provisions of the Regulation, no report on Other Biological Sampling is required until 2005 (covering the years 2002-2004). However, Ireland did present some results already on sampling for Other Biological Parameters.

Module J - Economic data fishing fleets

[7] It appears that insufficient effort has been made to undertake this part of the NP. The failure of the pilot survey was not apparently followed by an alternative methodological approach.

Databases

SGRN notes that still different databases exist for different sets of data.

Co-ordination

In the Technical Report, it is mentioned that operational links have been established with other countries to ensure accurate reporting of Irish vessels landing their catches abroad. SGRN notes that this also should be arranged for foreign flag vessels landing into Ireland.

3.7.3 c. Comments by Module of the Regulation – Extended Programme

Ireland conducted two priority 2 surveys under Module G, but did not seek financial support for these activities.

3.7.4 d. Request for information on action taken

SGRN recommends that all MS provide a brief report with an overview of the actions that were / will be taken to avoid future non-compliance with the provisions of the Regulation identified in the 2003 Technical Report.

3.8 Country: Italy

3.8.1 a. General comments

Technical Report submitted to Commission before May 31st deadline ?	Yes
Did Technical Report comply with DG Fish / STECF-SGRN Guidelines ?	No (*)
Did Technical Report have all the necessary information to allow DG Fish / STECF-SGRN to evaluate the achievements of the MS 2003 National Programme ?	Yes
Did Technical Report give precision levels for all parameters for which this is required by the Regulation ?	Yes, for most
Did Technical Report contain sufficient information on the methods used to calculate precision levels ?	Yes
Did Technical Report include information on both national and international co-ordination ?	Yes

(*) Non compliance with SGRN guidelines:

- Modules incorrectly listed (Module A instead of C, etc.).
- Report poorly set out and difficult to follow. For instance, information on fishing effort is not given in the chapter on fishing effort but under the section on landings.
- No clear indications on compliance, and lack of information on deviation from aims.
- In a number of Modules, it was difficult to assess whether the protocol used and the results obtained fully complied to the Regulation.
- No list of acronyms and abbreviations.

3.8.2 b. Comments by Module of the Regulation – Minimum Programme

Summary table Minimum Programme			
Module	Subject	Were Regulation targets met ?	See comment
C	Fleet capacity	Partial	1 2
D	Fuel consumption	Yes	
	Fishing effort	Yes	1
	Species-specific fishing effort	Partial	1 3
E	Landings: MP species	Yes	1
	Discards: MP species	Pilot Study	4
	Recreational fisheries	Pilot Study	5

F	Species-specific CPUE data series		16
G	Surveys Priority 1		
	MEDITS	Yes	
	Tuna tagging	Unknown	7
H	Landings: Recovery stocks: Length	Not applicable	
	Landings: Recovery stocks: Age	Not applicable	
	Landings: Other MP stocks: Length	Yes	8
	Landings: Other MP stocks: Age	Unknown	9
	Discards: Recovery stocks: Length & age	Not applicable	
	Discards: Other MP stocks: Length & age	Unknown	10
I	Sex ratios	--	11
	Sexual maturity data	--	11
	Growth data	--	11
J	Economic data fishing fleets	Yes	12

General comment on Modules C, D, E and F

[1] In the future, evidence of the data collected should be provided (see Guidelines for the Submission of Technical Reports, Version 2004).

Module C - Fishing capacities

[2] Data appears to be collected exhaustively and survey carried out to identify poly-valent vessels is acceptable for the vessels > 12 m (30 % of population sampled). No information was reported on the segment < 12 m, which is considered to be the major part of the fleet. To be clarified by MS.

Module D - Fishing effort

[3] It is unclear from the Technical Report whether the methodology in the NP proposal has been followed. Only 119 vessels were included in the analysis, spread over a considerable number of geographical and gear strata. For the target species, precision levels did not reach the Regulation requirements.

Module E - Catches and landings

[4] See SGRN Report on the Evaluation of Pilot Study Reports (May, 2004).

[5] See SGRN Report on the Evaluation of Pilot Study Reports (May, 2004).

Module F - CPUEs

[6] SGRN notes that no action was planned in 2003. To be clarified by MS.

Module G - Scientific surveys

[7] SGRN wonders whether 23 tag recoveries are of any use for stock assessment purposes. Also see general comment on Tuna tagging.

Module H - Age and length sampling of landings and discards

[8] SGRN appreciates that the MS has sampled a considerable number of species in addition to the mandatory ones, in anticipation of the upcoming revision of the Regulation, which has much stricter exemption rules for the Mediterranean than the current version.

[9] In the summary table on page 35 of the Report, the columns with "Numbers planned" and "Numbers achieved" for age (and most of the columns with "Numbers required" too) have exactly the same figures. SGRN wonders whether this could be a mis-print. To be clarified by MS.

[10] The summary table on length and age sampling of catches and discards (page 36 of the Report) shows very high numbers. SGRN suspects that these may be numbers raised to trip level instead of numbers actually measured. To be clarified by MS.

Module I - Other biological parameters

[11] According to the provisions of the Regulation, no report on Other Biological Sampling is required until 2005 (covering the years 2002-2004).

Module J - Economic data fishing fleets

[12] It appears that a full programme is under way, but it would have been useful to have underlined this in the Technical Report with a table of population and sample sizes by segment.

Databases

The Report provides a description of the database, but gives no information on its state of development.

Co-ordination

One international meeting was held as specified in the NP proposal, and some information is given on national co-ordination.

3.8.3 c. Comments by Module of the Regulation – Extended Programme

Italy only requested work under Module G for the Extended Programme.

Summary table Extended Programme			
Module	Subject	Were Regulation targets met ?	See comment
G	Surveys Priority 2		
	GRUND	Yes	

Module G - Scientific surveys

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3.8.4 d. Request for information on action taken

SGRN recommends that all MS provide a brief report with an overview of the actions that were / will be taken to avoid future non-compliance with the provisions of the Regulation identified in the 2003 Technical Report.

3.9 Country: Netherlands

3.9.1 a. General comments

Technical Report submitted to Commission before May 31st deadline ?	Yes
Did Technical Report comply with DG Fish / STECF-SGRN Guidelines ?	Mostly (*)
Did Technical Report have all the necessary information to allow DG Fish / STECF-SGRN to evaluate the achievements of the MS 2003 National Programme ?	No (*)
Did Technical Report give precision levels for all parameters for which this is required by the Regulation ?	No
Did Technical Report contain sufficient information on the methods used to calculate precision levels ?	No
Did Technical Report include information on both national and international co-ordination ?	Yes

(*) From the Technical Report it is difficult to track some of the work done. There is no text on the Mauritanian stocks, and these should be clearly referenced. The section on discard analysis is confusing.

3.9.2 b. Comments by Module of the Regulation – Minimum Programme

Summary table Minimum Programme			
Module	Subject	Were Regulation targets met ?	See comment
C	Fleet capacity	Yes	1
D	Fuel consumption	Yes	
	Fishing effort	Yes	1
	Species-specific fishing effort	Yes	1
E	Landings: MP species	Yes	1
	Discards: MP species	Partial	2
	Recreational fisheries	Derogation	
F	Species-specific CPUE data series	Yes	1
G	Surveys Priority 1		
	DYFS (Isis)	Yes	
	DYFS (Stern)	Yes	
	DYFS (Schollevaar)	Yes	
	IBTS (Tridens)	Yes	
	IBTS (Tridens) - Night component of above	--	

	BTS (Tridens)	Yes	
	BTS (Isis)	Yes	
	SNS (Isis)	Yes	3
	ACOHER (Tridens)	Yes	
	Landings: Recovery stocks: Length	Yes	
	Landings: Recovery stocks: Age	Yes	
	Landings: Other MP stocks: Length	Partial	4 5
	Landings: Other MP stocks: Age	Yes	4 5
	Discards: Recovery stocks: Length & age	Partial	6
	Discards: Other MP stocks: Length & age	Partial	7
I	Sex Ratios	--	8
	Sexual Maturity data	--	8
	Growth data	--	8
J	Economic data fishing fleets		9

General comment on Modules C, D, E and F

[1] In the future, evidence of the data collected should be provided (see Guidelines for the Submission of Technical Reports, Version 2004).

Module C - Fishing capacities

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Module D - Fishing effort

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Module E - Catches and landings

[2] SGRN notes that the discard sampling programme for pelagic trawlers fell one trip short of the planned programme. SGRN also identified a complete lack of sampling for the North Sea *Nephrops* fishing fleet. Also see SGRN Report on the Evaluation of Pilot Study Reports (May, 2004).

Module F - CPUEs

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Module G - Scientific surveys

[3] In future Technical Reports, the planned numbers of tracks and hauls should also be given.

Module H - Age and length sampling of landings and discards

[4] Achieved sampling levels generally exceeded the levels required by the Regulation except for:

- Sole in ICES Sub-area VIIa, where the Netherlands had no catches in 2003 (they swapped their entire sole quota in VIIa).
- Herring in ICES Sub-area VIIb-c,e-k, where no vessels under a sampling contract had been fishing at the time most of the herring catches were made by the Dutch fleet.
- Horse mackerel in the Western Areas, where 2003 sampling levels were adjusted downwards to match the reduced 2003 TAC.

[5] SGRN identified a lack of sampling for some species in the CECAF area (Mauritania). To be clarified by MS.

[6] No ageing was done for cod in ICES Sub-area IV. To be clarified by MS.

[7] Compared to Annex 2 of the Dutch NP proposal, achieved sampling was well below the national targets. SGRN also notes that not all species in Appendix XII of the Regulation are included in the Dutch discard sampling programme for age. To be clarified by MS.

Module I - Other biological parameters

[8] According to the provisions of the Regulation, no report on Other Biological Sampling is required until 2005 (covering the years 2002-2004).

Module J - Economic data fishing fleets

[9] SGRN had some concerns over the sampling procedures (the sample appeared to be self-selected). More information is needed on which data (parameters) are actually being collected. It is also suggested that the capital value of inactive vessels on which ITQs are "parked" should at least be investigated.

Databases

SGRN notes that extensive work has been carried out on the databases.

Co-ordination

MS has created a national co-ordination group that seems to work well. Data gathering representatives attended all the international groups as foreseen in the NP proposal.

3.9.3 c. Comments by Module of the Regulation – Extended Programme

The Netherlands only requested work under Modules F, G and H for the Extended Programme.

Summary table Extended Programme			
Module	Subject	Were Regulation targets met ?	See comment
F	Species-specific CPUE data series	Unknown	10
G	Surveys Priority 2		
	HLS – Q1	Yes	
	HLS – Q3	Yes	11
	HLS – Q4	Yes	
H	Landings: All EP stocks: Length	Yes	
	Landings: All EP stocks: Age	Yes	

General comment on Modules C, D, E and F (insofar as they are part of the EP)

[10] In the future, evidence of the data collected should be provided (see Guidelines for the Submission of Technical Reports, Version 2004).

Module F - CPUEs

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Module G - Scientific surveys

[11] No reference could be found in the Regulation to a HLS-survey in quarter 3. Most likely, this is an omission in the Regulation.

Module H - Age and length sampling of landings and discards

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3.9.4 d. Request for information on action taken

SGRN recommends that all MS provide a brief report with an overview of the actions that were / will be taken to avoid future non-compliance with the provisions of the Regulation identified in the 2003 Technical Report.

3.10 Country: Portugal

3.10.1 a. General comments

Technical Report submitted to Commission before May 31st deadline ?	No
Did Technical Report comply with DG Fish / STECF-SGRN Guidelines ?	In part (*)
Did Technical Report have all the necessary information to allow DG Fish / STECF-SGRN to evaluate the achievements of the MS 2003 National Programme ?	No
Did Technical Report give precision levels for all parameters for which this is required by the Regulation ?	Yes, for most
Did Technical Report contain sufficient information on the methods used to calculate precision levels ?	Yes, for most
Did Technical Report include information on both national and international co-ordination ?	Yes (**)

(*) The Report generally follows the SGRN guidelines. Nevertheless, the structure is complicated, making assessment of the Report extremely difficult. Summary tables of length and age measurements are given in proportions of samples and numbers measured per sample (i.e. following the Regulation's approach to define sampling intensities) and not in total numbers. There is no list of acronyms and abbreviations.

(**) National co-operation needs to improve in order that the Portuguese National Report will have the same format in all geographical areas, particularly in the summary tables provided.

3.10.2 b. Comments by Module of the Regulation – Minimum Programme

Summary table Minimum Programme			
Module	Subject	Were Regulation targets met ?	comments
C	Fleet capacity	Yes	1
D	Fuel consumption	Partial	2
	Fishing effort	Partial	1 2
	Species-specific fishing effort	Partial	1 2
E	Landings: MP species	Partial	1 3
	Discards: MP species	Partial	4
	Recreational fisheries	Partial	5

F	Species-specific CPUE data series	Unknown	1 6
G	Surveys Priority 1		
	IBTS	Partial	7
	Sardine, anchovy, horse mackerel acoustic survey	Unknown	8
	Flemish Cap Survey	Unknown	9
H	Landings: Recovery stocks: Length	Yes	
	Landings: Recovery stocks: Age	Yes	
	Landings: Other MP stocks: Length	Partial	10
	Landings: Other MP stocks: Age	Partial	10
	Discards: Recovery stocks: Length & age	Unknown	11
	Discards: Other MP stocks: Length & age	Unknown	11
I	Sex ratios	--	12
	Sexual maturity data	--	12
	Growth data	--	12
J	Economic data fishing fleets	No	13

General comment on Modules C, D, E and F

[1] In the future, evidence of the data collected should be provided (see Guidelines for the Submission of Technical Reports, Version 2004).

Module C - Fishing capacities

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Module D - Fishing effort

[2] Regulation requirements were not achieved in ICES Sub-area IXa for vessels < 10 m due to administrative problems which hindered the sampling planned.

Module E - Catches and landings

[3] Regulation requirements were not achieved in ICES Sub-area IXa for vessels < 10 m due to administrative problems which hindered the sampling planned. In Sub-area X, it is mentioned that a fresh / chilled conversion factor is necessary to determine nominal catches. SGRN does not consider this a valid excuse for not providing landings data.

[4] Discards were sampled according to the Regulation requirements in ICES Sub-area IXa and in the NAFO area. In CECAF 34.1.2, a pilot study was carried out and reported to SGRN. A preliminary analysis was carried out in ICES Sub-area X, but only for one fleet (longline). Also see SGRN Report on the Evaluation of Pilot Study Reports (May, 2004).

[5] With regards to the Portuguese recreational fisheries in general, see SGRN Report on the Evaluation of Pilot Study Reports (May, 2004). SGRN notes that no sampling of the recreational fishery was carried out in ICES Sub-area IXa, and no explanation is given in the Report.

Module F - CPUEs

[6] A list of available CPUE series is not presented. To be clarified by MS.

Module G - Scientific surveys

[7] The number of hauls planned in IBTS was not achieved due to bad weather.

[8] No sampling levels achieved are given for the Sardine, anchovy, horse mackerel acoustic survey. SGRN however notes that in the case of acoustic surveys, it might be difficult to properly define targets only in terms of hauls, and that targets including the overall length of the transects or an indication of area coverage might be a more appropriate measure of achievement.

[9] The Flemish Cap Survey appears to be done in co-operation between Portugal and Spain. SGRN however notes several contradictions in the Reports provided by the two MS on this survey. To be clarified by MS.

Module H - Age and length sampling of landings and discards

[10] Summary tables of length and age measurements are given in proportions of samples and numbers measured per sample (i.e. following the Regulation's approach to define sampling intensities) and not in total numbers. To allow for an evaluation, SGRN had to re-calculate the total numbers planned and achieved. In ICES Sub-area IXa and in the NAFO area, the levels required by the Regulation were achieved for most species, but there is no explanation given in the few cases where the required levels were not achieved. For Sub-area X, no targets are given in the summary tables. In CECAF Division 34.1.2, the sampling levels required were not achieved, and the explanations given were accepted by SGRN. Shortfalls and missing inputs to be clarified by MS.

[11] The discard summary table has numbers of samples collected (as number of hauls) but not numbers of individuals measured, making the evaluation impossible. According to the MS, the NAFO stocks do not require discard sampling since discarding does not exceed 10 % of the catch. To be clarified by MS.

Module I - Other biological parameters

[12] According to the provisions of the Regulation, no report on Other Biological Sampling is required until 2005 (covering the years 2002-2004). However, Portugal did present some results already on sampling for Other Biological Parameters.

Module J - Economic data fishing fleets

[13] SGRN notes that no action was planned in 2003. To be clarified by MS.

Databases

A tender to develop a national database was accepted in 2003, and work will commence in 2004.

Co-ordination

A list of meetings with MS participation is given. International co-operation is only stated in the Module section on surveys.

3.10.3 c. Comments by Module of the Regulation – Extended Programme

Portugal did not apply for an Extended Programme.

3.10.4 d. Request for information on action taken

SGRN recommends that all MS provide a brief report with an overview of the actions that were / will be taken to avoid future non-compliance with the provisions of the Regulation identified in the 2003 Technical Report.

3.11 Country: Spain

3.11.1 a. General comments

Technical Report submitted to Commission before May 31st deadline ?	Yes
Did Technical Report comply with DG Fish / STECF-SGRN Guidelines ?	No (*)
Did Technical Report have all the necessary information to allow DG Fish / STECF-SGRN to evaluate the achievements of the MS' 2003 National Programme ?	Yes
Did Technical Report give precision levels for all parameters for which this is required by the Regulation ?	No
Did Technical Report contain sufficient information on the methods used to calculate precision levels ?	No
Did Technical Report include information on both national and international co-ordination ?	No

(*) Separate institute reports should be combined into a single, National Report by Module of the Regulation and by region.

3.11.2 b. Comments by Module of the Regulation – Minimum Programme

Summary table Minimum Programme			
Module	Subject	Were Regulation targets met ?	See comment
C	Fleet capacity	Yes	1
D	Fuel consumption	Unknown	2
	Fishing effort	Yes	1 3
	Species-specific fishing effort	Yes	1 3
E	Landings: MP species		1 4
	Mediterranean	Yes	
	Atlantic coast	Yes	
	NAFO	Yes	
	CECAF	Yes	
	Large pelagic	Yes	
	Discards: MP species		5
	Mediterranean	Pilot Study	
	Atlantic coast	Pilot Study	5.1
	NAFO	Pilot Study	5.2
	CECAF	Pilot Study	5.3

	Large pelagic	Pilot Study	5.4
	Recreational fisheries	Pilot Study	6
F	Species-specific CPUE data series	Unknown	1 7
G	Surveys Priority 1		8
	IBTS (Gulf of Cadiz)	Yes	
	IBTS (Cantabrico)	Yes	
	PELACUS	Unknown	9
	MEDITS	Yes	
	Flemish Cap Survey	No	10
	BIOMAN	Yes	
	Tuna tagging	Unknown	11
H	Landings: Recovery stocks: Length		
	Atlantic coast	Yes	
	Other areas	Not applicable	
	Landings: Recovery stocks: Age		
	Atlantic coast	Yes	
	Other areas	Not applicable	
	Landings: Other MP stocks: Length		12
	Mediterranean	Yes	
	Atlantic coast	Yes	
	NAFO	No	13
	CECAF	Partial	14
	Landings: Other MP stocks: Age		
	Mediterranean	Yes	
	Atlantic coast	Yes	
	NAFO	No	13
	CECAF	Not applicable	
	Discards: Recovery stocks: Length & age		
	Atlantic coast	Yes	15
	Other areas	Not applicable	
	Discards: Other MP stocks: Length & age		
	Mediterranean	Pilot study	16
	Atlantic coast	Yes	
	NAFO	Yes	
	CECAF	Not applicable	
I	Sex ratios	--	17
	Sexual maturity data	--	17
	Growth data	--	17
J	Economic data fishing fleets		18

General comment on Modules C, D, E and F

[1] In the future, evidence of the data collected should be provided (see Guidelines for the Submission of Technical Reports, Version 2004).

Module C - Fishing capacities

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Module D - Fishing effort

[2] No information on fuel consumption. To be clarified by MS.

[3] For vessels < 10 m, effort in days is estimated from sales notes, given that one sale is equivalent to one day fishing. It is doubtful whether this approach can be classified as "exhaustive" since it is only a proxy for effort.

Module E - Catches and landings

[4] Sales notes, logbooks and landing declarations are crosschecked for validation. The Report however is unclear whether this validation system covers all landings areas (Mediterranean, Atlantic, NAFO, CECAF). To be clarified by MS. In the future, Spain should indicate in more detail how data is collected for each region separately.

[5] Tables with species sampled are different for ICES Sub-areas I & II between the NP proposal and the Technical Report. SGRN notes that there have been problems to achieve the levels of precision and the planned number of days. In the future, the MS should explain what method they have used in their sampling programme to avoid bias.

SGRN notes that in some areas, the number of days carried out was substantially less than the number planned, as a result of operational problems:

[5.1] Targets not reached due to difficulties to access fishing vessels, changes in fleet behaviour, and lack of co-operation from fishermen.

[5.2] Targets not reached due to changes in fleet behaviour.

[5.3] Targets not reached due to difficulties to access fishing vessels.

[5.4] Targets not reached due to lack of co-operation from fishermen.

[6] See SGRN Report on the Evaluation of Pilot Study Reports (May, 2004).

Module F - CPUEs

[7] There is discrepancy between the 80 CPUE data series identified in the text and the 12 data series proposed to be undertaken in the NP. To be clarified by MS.

Module G - Scientific surveys

[8] It is not necessary for the MS to provide lists of survey leaders, participants, biological species, etc.

[9] Number of days and stations planned were not provided. To be clarified by MS.

[10] The Flemish Cap Survey appears to be done in co-operation between Portugal and Spain. SGRN however notes several contradictions in the Reports provided by the two MS on this survey. To be clarified by MS.

[11] There is insufficient information on the action planned in the NP proposal and in the Technical Report. Also see general comment on tuna tagging.

Module H - Age and length sampling of landings and discards

[12] MS should investigate some alternative method for sampling mixed rays species (buying fish, sampling on board, etc.).

[13] Targets were not reached due to difficulties to access fishing vessels.

[14] SGRN notes that octopus is under-sampled, but it accepts the explanation given.

[15] SGRN recommends that the *Nephrops* discards on the Atlantic coast of Spain be adequately sampled, in view of the high level of exploitation of these stocks.

[16] See SGRN Report on the Evaluation of Pilot Study Reports (May, 2004).

Module I - Other biological parameters

[17] According to the provisions of the Regulation, no report on Other Biological Sampling is required until 2005 (covering the years 2002-2004). However, Spain did present some results already on sampling for Other Biological Parameters.

Module J - Economic data fishing fleets

[18] SGRN notes that no action was planned in 2003. To be clarified by MS.

Databases

The Report only gives indirect evidence of the development of a database (examples of file formats under each Module).

Co-ordination

A list of international co-ordination meetings is provided, but there is no information on national co-ordination.

3.11.3 c. Comments by Module of the Regulation – Extended Programme

Spain did not apply for an Extended Programme.

3.11.4 d. Request for information on action taken

SGRN recommends that all MS provide a brief report with an overview of the actions that were / will be taken to avoid future non-compliance with the provisions of the Regulation identified in the 2003 Technical Report.

3.12 Country: Sweden

3.12.1 a. General comments

Technical Report submitted to Commission before May 31st deadline ?	Yes
Did Technical Report comply with DG Fish / STECF-SGRN Guidelines ?	In part (*)
Did Technical Report have all the necessary information to allow DG Fish / STECF-SGRN to evaluate the achievements of the MS 2003 National Programme ?	Yes
Did Technical Report give precision levels for all parameters for which this is required by the Regulation ?	Yes
Did Technical Report contain sufficient information on the methods used to calculate precision levels ?	Yes
Did Technical Report include information on both national and international co-ordination ?	Yes

(*) The Report generally follows the guidelines of SGRN. However, the Report is in two sections, one with a recapitulation of the NP proposal and one with the actual Technical Report, with the resulting repetition of information in each section. The first part is redundant. Also, Modules H and I are treated together in the Technical Report, which makes reading more difficult. Database and co-ordination information is given together in the same section, and there is no list of acronyms and abbreviations.

3.12.2 b. Comments by Module of the Regulation – Minimum Programme

Summary table Minimum Programme			
Module	Subject	Were Regulation targets met ?	See comment
C	Fleet capacity	Yes	1
D	Fuel consumption	See Module J	
	Fishing effort	Yes	1
	Species-specific fishing effort	Yes	1
E	Landings: MP species	Yes	1
	Discards: MP species	Partial	2
	Recreational fisheries	Pilot Study	3
F	Species-specific CPUE data series	Yes	1
G	Surveys Priority 1		
	IBTS	Yes	

	BITS	Yes	
	Herring acoustic survey	Yes	
H	Landings: Recovery stocks: Length	Partial	4
	Landings: Recovery stocks: Age	Partial	4
	Landings: Other MP stocks: Length	Yes	
	Landings: Other MP stocks: Age	Yes	
	Discards: Recovery stocks: Length & age	Yes	
	Discards: Other MP stocks: Length & age	Yes	
I	Sex ratios	--	5
	Sexual maturity data	--	5
	Growth data	--	5
J	Economic data fishing fleets	Yes	6

General comment on Modules C, D, E and F

[1] In the future, evidence of the data collected should be provided (see Guidelines for the Submission of Technical Reports, Version 2004).

Module C - Fishing capacities

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Module D - Fishing effort

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Module E - Catches and landings

[2] In discard sampling, the precision level 1 required in the Regulation was only achieved for gillnets in the Baltic Sea.

[3] See SGRN Report on the Evaluation of Pilot Study Reports (May, 2004).

Module F - CPUEs

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Module G - Scientific surveys

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Module H - Age and length sampling of landings and discards

[4] For cod in ICES Sub-area IIIa, the sampling levels required by the Regulation were not achieved, due to TAC reductions, area closures and lack of co-operation from fishermen.

Module I - Other biological parameters

[5] According to the provisions of the Regulation, no report on Other Biological Sampling is required until 2005 (covering the years 2002-2004). However, data for this Module have been collected for all stocks, except for sprat and herring, where the most obvious source of the samples – the industrial fishery – means that they are not suitable for this type of analysis.

Module J - Economic data fishing fleets

[6] It appears that the requirements of the Regulation have been met, but some detail of population and sample sizes by segment would have been useful. There appears to be some confusion over data definition in the Extended Programme regarding the required breakdown of crew costs. No information is given on progress with the pilot survey of small-scale fisheries referred to in the NP proposal.

Databases

SGRN notes that a revision of the existing national database is in progress.

Co-ordination

National co-ordination is mentioned. Several ICES Working Groups and Study Groups were attended. There is also bilateral co-operation with Norway and Denmark.

3.12.3 c. Comments by Module of the Regulation – Extended Programme

Sweden only requested work under Module H and J for the Extended Programme.

Summary table Extended Programme			
Module	Subject	Were Regulation targets met ?	See comment
H	Landings: All EP stocks: Length	Yes	7
	Landings: All EP stocks: Age	Yes	7
J	Economic data fishing fleets	Partial	8

General comment on Modules C, D, E and F (insofar as they are part of the EP)

[7] In the future, evidence of the data collected should be provided (see Guidelines for the Submission of Technical Reports, Version 2004).

Module J - Economic data fishing fleets

[8] See comment [6].

3.12.4 d. Request for information on action taken

SGRN recommends that all MS provide a brief report with an overview of the actions that were / will be taken to avoid future non-compliance with the provisions of the Regulation identified in the 2003 Technical Report.

3.13 Country: UK

3.13.1 a. General comments

Technical Report submitted to Commission before May 31st deadline ?	No
Did Technical Report comply with DG Fish / STECF-SGRN Guidelines ?	Yes (*)
Did Technical Report have all the necessary information to allow DG Fish / STECF-SGRN to evaluate the achievements of the MS 2003 National Programme ?	Yes
Did Technical Report give precision levels for all parameters for which this is required by the Regulation ?	Yes
Did Technical Report contain sufficient information on the methods used to calculate precision levels ?	No
Did Technical Report include information on both national and international co-ordination ?	Yes

(*) There is no list of acronyms and abbreviations.

3.13.2 b. Comments by Module of the Regulation – Minimum Programme

Summary table Minimum Programme			
Module	Subject	Were Regulation targets met ?	See comment
C	Fleet capacity	Yes	1
D	Fuel consumption	See Module J	
	Fishing effort	Yes	1
	Species-specific fishing effort	Yes	1 2
E	Landings: MP species	Yes	1 3
	Discards: MP species	Partial	4
	Recreational fisheries	Derogation	
F	Species-specific CPUE data series	Yes	1 5
G	Surveys Priority 1		
	All surveys listed in Technical Report (12 in total)	Yes	
H	Landings: Recovery stocks: Length	Yes	
	Landings: Recovery stocks: Age	Yes	
	Landings: Other MP stocks: Length	Partial	6
	Landings: Other MP stocks: Age	Partial	6

	Discards: Recovery stocks: Length & age	Partial	7
	Discards: Other MP stocks: Length & age	Partial	7
I	Sex ratios	--	8
	Sexual maturity data	--	8
	Growth data	--	8
J	Economic data fishing fleets	No	9

General comment on Modules C, D, E and F

[1] In the future, evidence of the data collected should be provided (see Guidelines for the Submission of Technical Reports, Version 2004).

Module C - Fishing capacities

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Module D - Fishing effort

[2] Insufficient information is provided of what was done, although it is stated that precision level 1 was reached. To be clarified by MS. SGRN notes that a study on improved methods for estimating effort by static gears will be carried out in 2004.

Module E - Catches and landings

[3] SGRN notes that operational links have been established with other countries to ensure accurate reporting of UK vessel landings into other countries. There is however no information on the communication of foreign landings into the UK.

[4] For the Northern Ireland fleets, the achieved levels of sampling fell short of the targets, due to a lack of co-operation from the fishing industry. Also see SGRN Report on the Evaluation of Pilot Study Reports (May, 2004).

Module F - CPUEs

[5] Three of the CPUE data series were not covered, because these fleet segments were too small to be representative (< 10 boats).

Module G - Scientific surveys

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Module H - Age and length sampling of landings and discards

[6] For some of the stocks, sampling for length and age was not achieved according the Regulation. In all cases this was due to circumstances beyond the control of the sampling staff.

[7] For all Northern Ireland fleet segments, the achieved levels of sampling fell short of the targets. Again this was due to circumstances beyond the control of the sampling staff.

Module I - Other biological parameters

[8] According to the provisions of the Regulation, no report on Other Biological Sampling is required until 2005 (covering the years 2002-2004). However, the UK did present some results already on sampling for Other Biological Parameters.

Module J - Economic data fishing fleets

[9] The NP proposal and Technical Report are inadequate with regard to economic data collection. It appears that no serious attempt to collect the required data has been made or is intended at this stage. To be clarified by MS.

Databases

SGRN notes that separate databases still exist in Scotland, England & Wales, and Northern Ireland.

Co-ordination

SGRN notes that co-ordination is not yet fully achieved within the UK. Details on participation in international co-ordination meetings are given in the different Module sections. In future, this should be grouped into one section.

3.13.3 c. Comments by Module of the Regulation – Extended Programme

The UK only requested work under Modules C, D, E and F for the Extended Programme, but did not seek financial support for all these activities.

Summary table Extended Programme			
Module	Subject	Were Regulation targets met ?	See comment
C	Fleet capacity	No	10 11
D	Fishing effort	No	10 12
E	Landings: EP species	Yes	10
F	Species-specific CPUE data series	Yes	10
G	Surveys Priority 2		
	All surveys listed in Technical Report (10 in total)	Yes	

General comment on Modules C, D, E and F (insofar as they are part of the EP)

[10] In the future, evidence of the data collected should be provided (see Guidelines for the Submission of Technical Reports, Version 2004).

Module C - Fishing capacities

[11] SGRN notes that no progress was made in 2003 regarding the Extended Programme (additional parameters were not collected).

Module D - Fishing effort

[12] SGRN notes that apportionment of fishing effort to monthly level, as proposed in the NP, has not been carried out yet. Apparently, the delay is caused by technical discussions on how to deal with the so-called "end-of-the-month" problem (fishing trips that extend into the next month).

Module E - Catches and landings

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Module F - CPUEs

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Module G - Scientific surveys

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3.13.4 d. Request for information on action taken

SGRN recommends that all MS provide a brief report with an overview of the actions that were / will be taken to avoid future non-compliance with the provisions of the Regulation identified in the 2003 Technical Report.

4 ANNEX 1: Compilation of sections on precision levels in Member States' 2003 technical reports.

STECF-SGRN Report June 2004

Evaluation of 2003 Technical Reports

Annex 1

Compilation of sections on Precision Levels in MS' 2003 Technical Reports

Table of contents

1. Excerpt from the French 2003 Technical Report

Module E, Section on Discards

Premiers résultats et précisions

Seules les espèces les plus importantes ont fait l'objet d'un calcul mais plus de 70 espèces ont été recensées lors des embarquements et peuvent faire l'objet d'une estimation en volume des rejets.

Les résultats détaillés ne sont pas présentés dans ce bilan (a fortiori les structures en taille et en âge) mais ils sont disponibles sur demande. Seuls les éléments les plus marquants sont résumés et notamment les deux approches méthodologiques développées pour élever les données.

Approche par segment

Les segments polyvalents sont exclus de cette approche, car le choix de concentrer en 2003 l'ensemble de l'étude sur trois métiers fait que l'activité des navires polyvalents n'a pas pu être échantillonnée de façon représentative. L'estimation des rejets par cette approche s'applique à huit segments homogènes croisant métier, taille et façade maritime (chalutiers de fond et fileyeurs, de moins de 12 mètres et de 12 à 24 mètres, en Manche – Mer du Nord et en Atlantique du nord-est). Pour tous ces segments, le taux d'échantillonnage des marées est faible, toujours inférieur à un pour mille.

Les rejets les plus importants sont ceux de langoustine et de merlu par les chalutiers de l'Atlantique (plus de 2 000 tonnes), les rejets de merlan et de maquereau par les chalutiers de Manche - Mer du Nord, de plie par les fileyeurs de Manche - Mer du Nord (de l'ordre de 500 tonnes), de merlan et de sole par les fileyeurs de l'Atlantique (de l'ordre de 200 tonnes). En raison des faibles taux d'échantillonnage et surtout du faible nombre de marées échantillonnées, les estimations sont généralement imprécises, avec des coefficients de variation (CV) de 65% en moyenne (10 à 99%). Les seules valeurs estimées avec un CV inférieur ou égal à l'objectif de 25% sont les rejets de sole par les fileyeurs de moins de 12 m de Manche - Mer du Nord (rejets peu abondants et probablement peu variables); les rejets de plie par les fileyeurs de 12 à 24 m de Manche - Mer du Nord (rejets très abondants); et les rejets de merlu et de langoustines par les chalutiers de fond de 12 à 24 m de l'Atlantique Nord-est, pour lesquels l'effort d'échantillonnage était plus important (44 marées).

Approche par métier

Cette méthode permet de fournir une estimation des rejets des navires des segments polyvalents. Comme l'étude est concentrée sur un nombre limité de métiers, seule une partie de l'activité de chaque segment est prise en compte. L'hypothèse est faite que les métiers générant le plus de rejets ont été pris en compte pour chaque segment décrit.

Les rejets les plus importants sont les mêmes que pour l'approche par segment, ainsi que ceux des segments polyvalents. La valeur élevée des rejets de merlu et de langoustines par les chalutiers et navires polyvalents de l'Atlantique, biaisée, est probablement surestimée, car une composante particulière de ce métier a fait l'objet d'un effort d'échantillonnage intensif au détriment d'autres composantes qui génèrent moins de rejets de ces espèces. La précision des estimations est du même ordre de grandeur que par la méthode précédente.

Les langoustiniers de Bretagne sud

Les résultats présentés ci-dessous sont issus de 110 traits échantillonnés au cours de 42 marées échantillonnées du 24 janvier au 3 décembre 2003 et correspondent à un taux d'environ 2 ‰.

Les langoustiniers de Bretagne Sud ont rejeté 1 034 tonnes de merlu et 1 650 tonnes de langoustine en 2003. Pour chaque marée de un tiers à la totalité des traits ont été échantillonnés, avec une moyenne de 83%. La variance estimée intra-traits est faible, alors que les différences entre les traits d'une même marée peuvent être élevées. Globalement la précision des rejets totaux en poids ou en nombre est de l'ordre de 25% pour les langoustines, 15% pour le merlu, ce qui démontre l'intensité d'effort qu'il faut fournir pour cette flottille pour atteindre les niveaux de précision requis par le programme.

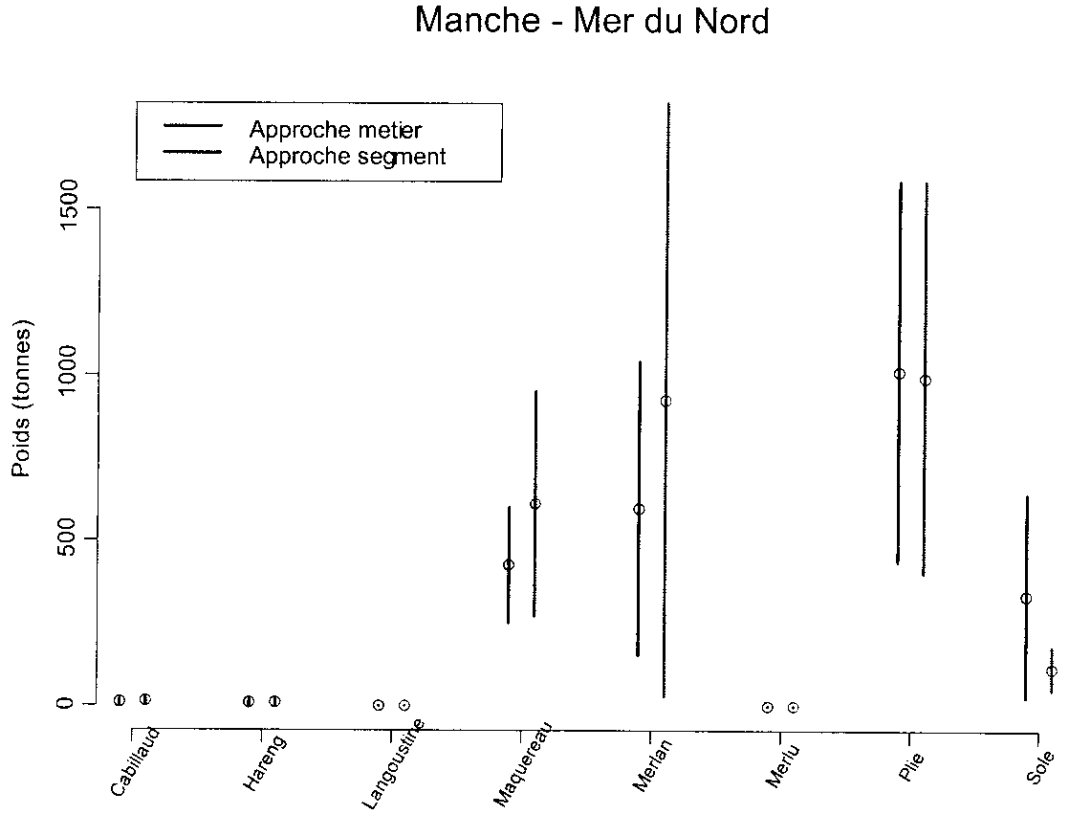


Figure : Estimation des volumes de rejets (en tonnes) pour la façade Manche - Mer du Nord, pour 8 espèces à estimer sur une base annuelle selon les deux méthodologies développées.

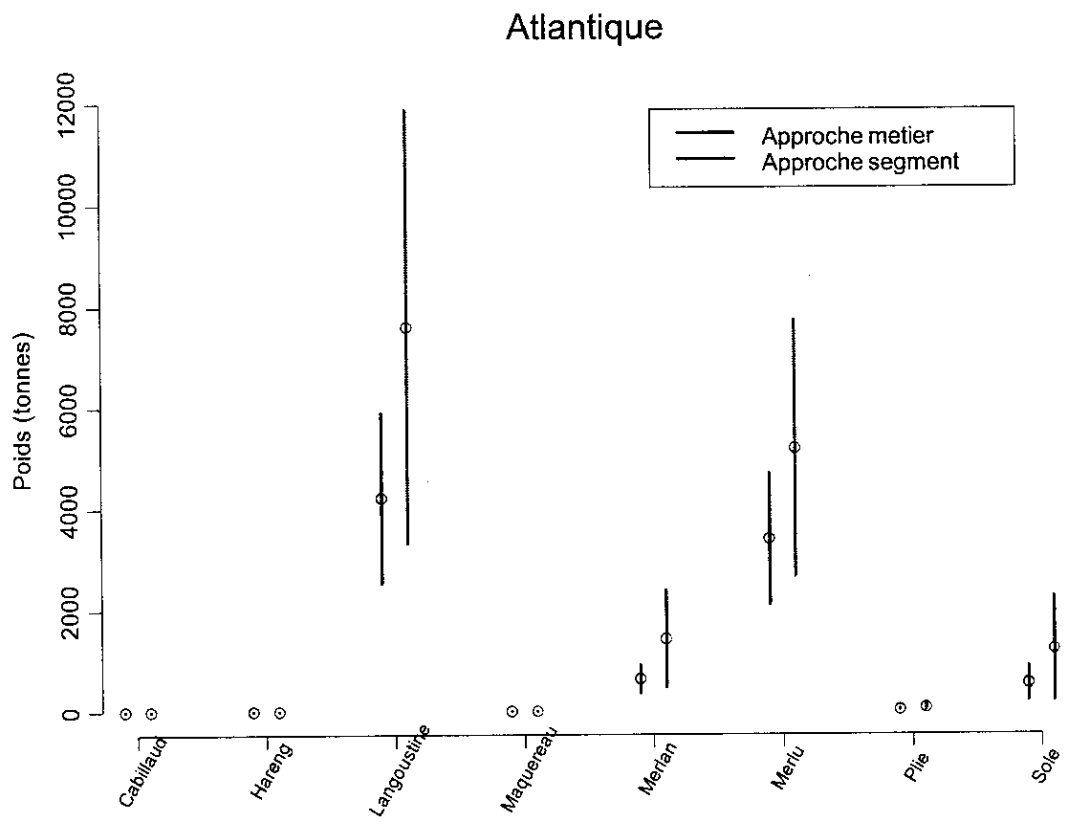


Figure : Estimation des volumes de rejets (en tonnes) pour la façade Atlantique, pour 8 espèces à estimer sur une base annuelle selon les deux méthodologies développées.

2. Excerpts from the German 2003 Technical Report

Annex 9

Method for calculation of precision of discard estimation

- Within a cell -division/quarter/fleet segment/gear- hauls are normalised to hauls per hour i.e. discard in kg/hour
- within such a cell mean weight of discards and standard deviation for normalised hauls are calculated
- precision of mean discard weight M can be estimated by
- (1) $t(\alpha, N-1) * S/\sqrt{N}$ with
  - α confidence interval
  - N number of observed hauls
  - S standard deviation from observed mean M
  - t Student's t-distribution
- Formula (1) can be used to estimate the number of hauls necessary to reach a certain precision based on a given mean and standard deviation. In case of the requested precision of +/- 25% on a 95% confidence level for the estimation of discards in terms of weight this reads:
- (2) $t(0,05;N-1) * S/\sqrt{N} < 0,25 * M$ with M the mean discard weight
- or transformed:
- (3) $$\frac{t(0,05, N-1) * S}{0,25 * M} < \sqrt{N}$$
- Applying an iterative procedure changing N this condition can be met for a certain N which is than the number of hauls necessary to reach the precision +/- 25% on a 95% confidence level for a given mean M and a standard deviation S.

Annex 10

Precision of length-at-age and weight-at-age based on data from commercial landings - according to requirement of EU No. 1639/2001

by

R. Oeberst, Ulrich Berth
Bundesforschungsanstalt für Fischerei Hamburg
Institut für Ostseefischerei Rostock
An der Jägerbäk 2
D - 18069 Rostock, Germany

Abstract

Simulated length-at-age data in combination with weight-length-relationship were used to simulate weight-at-age data. These simulations were used to study the relations between the distribution pattern of length and weight of individuals. Depending on the skewness of length data the skewness of weight data changes. Statistical tests showed that weight-at-age form commercial catches can be lognormally distributed, but, it is also possible that the hypothesis of lognormal distribution must be rejected. Furthermore, it could be shown that the precision of length-at-age is higher than the required one if the required precision is reached for weight-at-age data due to the significant larger coefficient of variation of weight-at-age compared to length-at-age data.

Based on the data from commercial catches in 2002 the precisions of length-at-age and weight-at-age were estimated and the necessary number of measurements which is necessary to reach the precision required by EU was estimated for both cases that weight-at-age is normally or lognormally distributed. The studies showed that in most cases the necessary number of measurements is lower if it is assumed that weight is lognormally distributed due to the reduced effect of some extremely large weights.

Furthermore, it was shown that the precision required by EU No. 1639/2001 is unrealistic because the necessary number of weight-at-age determinations can not be realised during the regular observation process.

An alternative definition of required precision is presented.

Introduction

The decree (EG) No. 1639/2001 of the commission from 25.7.2001 Point I : Other biological parameters (Module I) requires "the mean weight and mean length of each age group is to assess with the precision of Degree 3 for all age groups of the stock which landings together are larger than 95 % of the landings of the country (Appendix XVI)". The precision of Degree 3 is defined by:

It is required that the confidence interval of the means is smaller than 5 % of the means using first kind error of α=0.05. It is necessary to show every third year that these requirements are fulfilled.

Unfortunately, necessary additional requirements were not defined.

Which landings should be used for defining the age groups for which the precision must be fulfilled, landings in number or landings in weight. Depending on the choice of one of the options the oldest age group for that the precision should be fulfilled can change.

Furthermore, the time interval is not defined that should be used to estimate the precision. It is known that fish grow within a quarter with the effect that the variability of length-at-age (subsequently denoted with length) and weight-at-age (subsequently denoted with weight) increases with increasing time interval, and consequently, the necessary number of measurements increases if the same level of precision is required. On the other hand the total number of necessary samplings, probably, also increases if the time interval is too small chosen due to the high variability of weight in comparison to the increase of the mean weight from month to month.

It is well documented that the development of weight of male and female individuals can significantly differ in the different periods of the year. Therefore, it is necessary to lay down whether the precision must be separately reached for each of both sexes

In 2002, an intensive sampling program of the commercial catches was carried out by the Federal Research Centre for Fisheries in Germany. The data of Baltic cod are used to check the precision of the length and weight. Furthermore, the necessary total number of measurements is estimated depending on the required precision and proposal is presented to optimise the number of measurements for obtaining the best accuracy, based on practicable aspects.

Material and Methods

The report of the working group "Baltic Fish Assessment" (ICES 2003) in 2003 was used to define the age groups of Baltic cod for which the precision is required.

Simulations were used to study the relationships between the distribution pattern (mean, standard deviation, coefficient of variation) and the distribution function of length and weight of the same age group. Based on simulated length data the expected weight was estimated using weight-length relationship observed in the Baltic Sea.

Sampling data of commercial cod catches in 2002 were used for estimating means and standard deviations of length and weight by ICES subdivision, month or quarter, sex and age.

Chi-Square goodness-of-fit statistics, Shapiro-Wilks W statistics, Z score skewness and Z score kurtosis tests were used to check whether length and weight of individuals of the same age group are normally or lognormally distributed, and T-test was used to compare the mean weight of the same age group by sex. Furthermore, it was tested whether significant changes of mean weight occur from month to month within a quarter.

Following notations were used:

d	index of ICES subdivision
q	index of quarter
s	index of sex
a	index of age
$\alpha = 0.05$	first kind of error

$N_{d,q,s,a}$	number of measurements by subdivision d, quarter q, sex s, and age a
$\overline{W}_{d,q,s,a}$	mean weight
$V(W_{d,q,s,a})$	variance of weight
$T(\alpha, N_{d,q,s,a}-1)$	quantil of T-distribution

According to the required precision of degree 3 the symmetric confidence interval is given by

$$\overline{W}_{d,q,s,a} \pm T(\alpha/2, N_{d,q,s,a}-1)\sqrt{V(W_{d,q,s,a}}/\sqrt{N_{d,q,s,a}})$$

with half confidence interval

$$D_{d,q,s,a} = T(\alpha/2, N_{d,q,s,a}-1)\sqrt{V(W_{d,q,s,a})}/\sqrt{N_{d,q,s,a}}$$

The necessary number of measurements $N^*_{d,q,s,a}$ is given by

$$2*T(\alpha/2, N^*_{d,q,s,a}-1)\sqrt{V(W_{d,q,s,a})}/\sqrt{N^*_{d,q,s,a}} \le 0.05*\overline{W}_{d,q,s,a}$$

or

$$[2*T(\alpha/2, N^*_{d,q,s,a}-1)\sqrt{V(W_{d,q,s,a})}/0.05/\overline{W}_{d,q,s,a}]^2 \le N^*_{d,q,s,a}$$

Because the age of individuals, the current distribution of age and the current distribution of sex in catches are unknown during the sampling process and because the precision is required for all defined age groups, two options can be used for estimating the number of total necessary measurements $N^*_{total,d,q,s}$ by sex, subdivision and quarter.

For each defined age group it is estimated

$$N^*_{1,total,d,q,s,a} = N^*_{d,q,s,a}/[(\sum_a N_{d,q,s,a})/N_{d,q,s,a}].$$

That means that the number of necessary determinations $N^*_{1,total,d,q,s,a}$ of age group "a" is weighted by the quotient of total number of measurement and the number of measurements of age group "a" of the last year. The maximum of the estimates of the defined age groups

$$N^*_{1,total,d,q,s} = Max_a\{N^*_{1,total,d,q,s,a,}\}$$

presents the total necessary number of measurements because it is necessary that the required precision is reached also for the age groups with low catches. This method hypothises that the age distribution of catches is nearly the same in subsequent years.

An alternative method uses a two step algorithm. During the first step the total number of individuals is estimated given by

$$N^*_{2,total,d,q,s} = \sum_a N^*_{d,q,s,a}$$

Using $N^*_{2,total,d,q,s}$ the accuracy of age groups which are dominant in the catch is higher than the required level. Otherwise the accuracy of the oldest age group is too low due to the low proportion of these individuals in catches. Therefore, additional age and weight data of the

largest individuals are necessary. Naturally, these measurements can not be used for estimating the proportions of age groups in the catch.

Results
Simulations

Following procedure was used for simulating the relation between the length and weight distributions of given age group based on 1001 simulation for each case. Length-weight-relation $W_j = a * L_j^b * \varepsilon_j$ with a =0.00397 and b = 3.26 was used based on female cod captured in first quarter in ICES subdivision 22 (**Fig. 1**). The residual variance of the regression, ε_j, is lognormally distributed with mean 1 and variance $\sigma^2_R = 0.122$. Furthermore, it is assumed that length of individuals Lj $\in$ NV(E(L),σ^2_L) is normally distributed with mean E(L) and standard deviation σ^2_L.

Length was simulated using the following data

E(L)	given mean length,
CV(L)	given coefficient of variation of length,
S(L) = CV(L) * E(L)	resulting standard deviation of length,
E(Lj)	mean length of simulated data,
S(Lj)	standard deviation of the length of simulated data,
CV(Lj)	coefficient of variation of simulated length distribution,
E(Wj)	mean weight of simulated data,
S(Wj)	standard deviation of simulated weight and
CV(Wj)	coefficient of determination of simulated weight.

Using constant CV(L) = 0.15 mean, standard deviation and coefficient of variation of length and weight were estimated for different values of E(L) assuming that the length is normally distributed. The simulations show that CV(Wj) is significantly higher than CV(Lj) (**Tab. 1**). That means that it is only necessary to estimate the necessary number of measurements $N^*_{d,q,s,a}$ depending on variability of weight since this number of measurements also saves the precision of length. Furthermore, the data show that CV(Wj) is independent of E(Lj) if CV(Lj) is constant. A constant standard deviation of length S(Lj) = 3.7 was chosen during a second simulation. That means that CV(Lj) and CV(Wj) decrease with increasing mean length (**Tab. 2**) and that CV(Wj) is dependent on E(Lj). The used test (Chi-Square goodness-of-fit statistics, Shapiro-Wilks W statistics, Z score skewness and Z score kurtosis) showed that the simulated Wj are neither normally nor lognormally distributed. **Figure 2** presents the density traces of length distribution for E(L) = 25 and 45 with S(L) = 3.7, and **Figure 3** shows the density traces of the corresponding weight based on the described length-weight relation. These simulations showed that in both cases the skewness and the kurtosis of Wj were larger than the values that is expected for normal distribution (**Tab. 3**), and that the assumption of an symmetric confidence interval of Wj is not true. Further simulations showed that Wj is lognormally distributed if the length of age groups Lj is lognomally distributed (skewed distributed) (**Tab. 4**).

Summing up the simulations follows that the non linear relation between length and weight of fish results in a skewed distribution of the weight of age groups. Skewness of weight increases with increasing skewness of length. Depending on the skewness of length distribution of age group it is possible that weight of individuals is lognormally distributed. Therefore, it seems to be useful to compare the estimated total number of necessary measurements based on the assumptions that weight is normally or

lognormally distributed. Especially, if it must be taken into account that length of age groups is skewed distributed due to problems in ageing.

Age groups for that the precision is required

Based on the estimates of Assessment working group in 2003 (ICES 2003) the landings of cod in length and weight and sum of landing by subdivision, quarter and age group are given in **Table 5 to 7**. According to the requirement of EU No. 1639/2001 oldest age groups are marked for which the precision is required. In all cases the precision is required for age groups 2 and 3. Whether the precision is also required for older age groups is depending on whether the landings in number or weight are used. The tables also show that oldest age group for which the precision must be reached vary from quarter to quarter

Studies of individuals caught in 2002

Statistical tests showed that total length of age groups combined for month/quarter, sex and age group are neither normally nor lognormally distributed in the most cases probably due to inaccuracies in the ageing process. Consequently, the distribution structure of weight also vary. In some cases the hypothesis can not be rejected that weight is lognormally distributed, and in other cases weight is neither normally nor lognormally distributed. These results suggest that it is very difficult to estimate the necessary sample size with one procedure. Especially, if some extreme large individuals were observed in age groups weight of these individuals are lognormally distributed. In these cases CV(Lj) is large.

Statistical test (T-test) also showed that mean weight of male and female cod significantly differed in some cases (e.g. subdivision 22, age group 2, month 2 and 3), and that significant increase of weight is possible within quarter (e.g. subdivision22, age group 3, males and month 1 and 3). Therefore, the mean weight should be separately estimated by sex. The period for which the precision is not simple to define due to the possible significant increase of weight by age groups within a quarter. However, it must be taken into account that the increase in weight within a quarter is relative low in relation to the high variability of weight. That means that the necessary number of measurements increases by the factor of three if period of month is used as basis for estimating the precision since the variance of weight is nearly the same in different months. Therefore, it is proposed that period of quarter is used in the future.

Estimation of necessary number of measurements based on the mean weight of cod in 2002

Landings of cod in subdivision 22 were dominated by age group 2 and 3 (**Tab. 8 to 10**, Number). Furthermore, landings of age group 1 are large in subdivision 24 in fourth quarter.

Standard deviation of length strongly varied from age group to age group in the same subdivision and quarter, probably influenced by ageing process. The data suggest that S(Lj) is close to 3.5 for all age groups. S(Lj) larger than 3.5 are mostly observed for age groups with low sampling number. In other cases length is skewed distributed (**Fig. 4**), and CV(Lj) and CV(Wj) is correlated with R = 0.87 based on 82 data. S(Wj) also strongly varied, but, it can be assumed that S(Wj) ranges from 250 to 450 and that weight is skewed distributed.

Necessary number of weight measurement $N*_{d,q,s,a}$ by subdivision, quarter, sex and age, and the total number of measurements $N*_{1,total,d,q,s}$ and $N*_{2,total,d,q,s}$ is given in **Table 11** to **13** based on the assumption that weight is normally distributed. Additionally, the proportions of age groups based on catches and the proportions of necessary number of weight measurements $N*_{d,q,s,a}$ are presented. The same estimates are added based on the assumption that weight is lognormally distributed. The estimates showed that in all cases (subdivision, quarter, sex and age) the required number of measurements is higher than the realized number of observations. Consequently, follows that the required precision of weight-at-age was not reached for Baltic cod. The quotient CV(Wj) / E(Wj) varied between 0.07 and 0.37 for the defined age groups. These values are larger than the required 0.05.

The $N*_{d,q,s,a}$ varied between 270 and 2400 if it is assumed that the weight is normally distributed. Comparable values are estimated if weight is lognormally distributed. In most cases $N*_{d,q,s,a}$ is larger assuming normally distributed weight. In some cases the estimated number of necessary measurements based on normally and lognormally distribution significantly differed (e. g. $N*_{24,3,M,4}$) probably due to the large skewness of weight. Therefore, the assumption of lognormally distributed weight should be used for checking the precision.

In all cases $N*_{1,total,d,q,s}$ is larger or equal than $N*_{2,total,d,q,s}$ due to the large difference of proportion of age groups in catches compared to the estimated necessary number of measurements by age groups $N*_{1,d,q,s,a}$. $N*_{1,total,d,q,s}$ varies between 1616 (d=24, q=3, s=F) and more than 200 000 (d=22, q=4, s=M). It is easy to see that such number of measurements can not be realized. $N*_{2,total,d,q,s}$ varies between 1540 (d=25,q=1,s=M) and 4685 (s=24, q=4, s=M). That means that least 2000 males and 2000 females by subdivision and quarter must be weighted if it is taken into account that additional weights of large individuals are necessary. Using these estimates about 12 000 individuals must be weighted by quarter assuming the proportion of male is about 50 % for Baltic cod landings. But, besides cod samples additional samples from other commercial landings must be taken.

These data illustrate that the defined precision required by EU No. 1639/2001 is unrealistic and must be change as fast as possible.

More realistic definition of precision – a first approach

The studies showed that V(Wj) and CV(Wj) strongly vary by subdivision, quarter, sex and age group and that consequently $N*_{d,q,s,a}$ also strongly varied. That means that for each stratum (subdivision, quarter, sex and age group) different sample sizes are required. Furthermore, it is known that E(Wj) and V(Wj) are not only influenced by the variability in length and weight of the age group. They are although influenced by other factors as few measurements and typing errors when the data are stored into the computer. Furthermore, during the process of ageing subjective errors are possible which can significantly influence E(Wj) and V(Wj). For excluding these possible effects concerning the estimated necessary number of measurement the following procedure is proposed:

Precision is required for subdivision, quarter, sex and the three age groups with the highest proportions in landings assuming that weight of age groups is lognormally distributed.
It is required that the confidence interval of mean weight-at-age, CI(Wj), is smaller or equal than 10% of mean weight, E(Wj).

If furthermore it is assumed that the coefficient of variation CV(Wj) is nearly constant for the significant age groups (between 0.30 and 0.35) the necessary number can be estimated by;
$2*T(\alpha/2,N*-1)\sqrt{V(W)}/\sqrt{N*} \le 0.1\overline{W}$.

Using constant CV(Wj) follows
$\sqrt{V(W)} = CV(W_j)\overline{W}_j$,
$2*T(\alpha/2,N*-1)CV(W_j)\overline{W}/\sqrt{N*} \le 0.1\overline{W}$
and
$2*T(\alpha/2,N*-1)CV(W_j)\overline{W}/(0.1\overline{W}) \le \sqrt{N*} = 2*T(\alpha/2,N*-1)CV(W_j)/0.1 \le \sqrt{N*}$

Using the equation follows that the necessary number of measurements is dependent of $CV(W_j)$ and the required width of the confidence interval of weight. N* is about 180 for $CV(W_j) = 0.3$ and about 250 for $CV(W_j) = 0.35$.

Based on this assumption the necessary number of weight-at-age data should be 250 individuals multiplied by the number of significant age groups. That means that 1 500 individuals of Baltic cod should be measured by subdivision, quarter. That is a constant value which can be planned. These requirements mean that the precision of age groups with the highest proportion in landings is better than the required level and that precision of age groups with small proportion in landings is lower than the required level.

It must be stress that the presented proposal is only usable for Baltic cod and that the required precision must be separately defined by species and stocks dependent on the coefficient of variation of length-at-age and weight-at-age.

The following table illustrates the effects of α and k related to the necessary number of determinations, N*, based on the following equation:
$2*T(\alpha/2,N*-1)CV(W_j)/k \le \sqrt{N*}$
In this equation it is required that the confidence interval is less than k % of mean weight using $CV(W_j) = 0.35$.

k	α = 0.05	α = 0.10
k	N*	N*
0.05	988	755
0.10	250	191
0.15	112	86
0.20	65	49

Addendum: Precision of sex ratio by subdivision, quarter and age group

Notations:

$P_{d,q,a}$	proportion of female in subdivision d, quarter q and age group a
$P_{d,q,a} * (1- P_{d,q,a})$	variance of $P_{d,q,a}$

Required precision is

$$2T(\alpha/2, N^*_{d,q,a}-1)\sqrt{V(P_{d,q,a}}\sqrt{N^*_{d,q,a}} \leq 0.05P_{d,q,a}$$

Using this equation $N^*_{d,q,a}$ is larger than 1000. That means that the required precision for estimating the proportion of sex ration is also unrealistic.
The use of 250 individuals save a precision of less than $0.1*P_{d,q,a}$.

Table 1: Relation between CV(Lj) and CV(Wj) based on simulated data using constant coefficients of variation, CV(Lj), for different mean length, E(Lj)

E(L)	E(Lj)	S(Lj)	CV(Lj)	E(Wj)	S(Wj)	CV(Wj)
25	25.1	3.7	0.1486	158.7	79.5	0.501
25	24.9	3.8	0.152	157.5	79.3	0.503
25	24.9	3.7	0.149	154.8	74.6	0.482
25	24.8	3.8	0.151	154.8	80.2	0.518
25	24.8	3.7	0.148	153.3	72.6	0.474
35	35.0	5.3	0.151	472.3	227.3	0.481
35	35.1	5.4	0.153	474.3	237.9	0.502
35	34.8	5.2	0.149	464.4	230.9	0.497
35	35.0	5.4	0.155	472.9	236.8	0.501
35	35.3	5.4	0.154	483.6	239.3	0.495
45	45.0	6.7	0.150	1072.4	546.1	0.509
45	45.1	6.9	0.153	1076.2	536.2	0.498
45	45.0	6.8	0.151	1070.0	550.4	0.154
45	45.4	6.6	0.145	1099.2	540.3	0.492
45	44.7	6.7	0.151	1046.2	519.0	0.496
55	54.8	8.1	0.148	2031.3	1018.3	0.501
55	54.9	8.0	0.147	2049.6	1006.1	0.491
55	55.1	8.7	0.158	2099.8	1094.5	0.521
55	55.1	8.1	0.148	2051.5	1001.6	0.488
55	55.3	8.2	0.148	2096.1	1024.0	0.489

Table 2: Relation between CV(Lj) and CV(Wj) based on simulated data using constant standard deviation of length, S(Lj), for different mean length, E(Lj)

E(L)	E(Lj)	S(Lj)	CV(Lj)	E(Wj)	S(Wj)	CV(Wj)
25	24.9	3.7	0.149	155.7	74.5	0.478
25	25	3.7	0.148	157.6	78.2	0.496
25	24.9	3.6	0.145	155.2	73.2	0.472
25	24.9	3.6	0.145	155.6	75	0.482
25	25.1	3.7	0.147	159.5	76.5	0.480
35	35	3.7	0.106	452.3	158.1	0.350
35	35	3.7	0.106	445.2	161.9	0.364
35	34.8	3.7	0.106	443	160	0.361
35	35.2	3.7	0.105	458.1	165.5	0.361
35	34.9	3.8	0.109	450.9	170.7	0.379
45	44.9	3.6	0.080	1007.6	298.8	0.297
45	44.8	3.9	0.087	1002.3	310.8	0.310
45	45	3.7	0.082	1017.1	298.9	0.294
45	44.9	3.7	0.082	999.9	299.2	0.299
45	45.1	3.6	0.080	1020.4	298.2	0.292
55	55	3.7	0.067	1927.9	481.1	0.250
55	54.8	3.6	0.066	1903.8	460.6	0.242
55	54.8	3.8	0.069	1888.3	474.2	0.251
55	55.1	3.7	0.067	1938.8	482.6	0.249
55	55	3.8	0.069	1942.1	504.6	0.260

Table 3: Distribution parameter of simulated length and weight data related by $W_j = a * L_j^b * \varepsilon_j$ using normally distributed length with S(L) = 3.7 for different mean length E(L)

E(L)	25	45
Number of simulations	2002	2002
E(Lj)	24.99	44.97
S(Lj)	3.76	3.67
Skewness(Lj)	0.79	0.42
Kurtosis(Lj)	-1.11	0.74
E(Wj)	158.01	1007.02
S(Wj)	79.91	293.54
Skewness(Wj)	22.24	12.29
Kurtosis(Wj)	24.25	6.50
E(ln(Wj))	4.94	6.87
S(ln(Wj))	0.52	0.29
Skewness(ln(Wj))	-6.04	-3.80
Kurtosi(ln(Wj))	0.84	1.07

Table 4: Distribution parameter of simulated length and weight data related by $W_j = a * L_j^b * \varepsilon_j$ using lognormally distributed length

E(L)	34	55
Number of simulations	3003	3003
E(Lj)	33.60	55.05
S(Lj)	5.01	8.38
Skewness(Lj)	10.67	10.23
Kurtosis(Lj)	4.85	3.07
E(ln(Lj))	3.50	4.00
S(ln(Lj))	0.15	0.15
Skewness(ln(Lj))	0.24	0.50
Kurtosis(ln(Lj))	1.02	-1.40
E(Wj)	415.89	2075.34
S(Wj)	222.40	1126.43
Skewness(Wj)	39.41	38.96
Kurtosis(Wj)	61.74	64.47
E(ln(Wj))	5.91	7.51
S(ln(Wj))	0.50	0.51
Skewness(ln(Wj))	-0.10	0.69
Kurtosis(ln(Wj))	1.37	-1.73

Table 5: Landings in number and weight in subdivision 22 in 2002 based on Report of WGBFAS 2003 and sum of landings

	Catch in number				Mean weight in catch				Sum of catch in number				Sum of catch in weight			
Age	1. Quarter	2. Quarter	3. Quarter	4. Quarter	1. Quarter	2. Quarter	3. Quarter	4. Quarter	1. Quarter	2. Quarter	3. Quarter	4. Quarter	1. Quarter	2. Quarter	3. Quarter	4. Quarter
1				40704				550	0	0	3.4		0	0.0		1.8
2	1120364	442916		1070278	595	601		1023	48.8	56.1	92.8		30.6	38.3		88.6
3	1007868	272381		81408	1130	1055		1545	92.7	90.6	**99.6**		83.0	79.7		**98.6**
4	94129	41944		2394	1700	1479		2299	**96.8**	**95.9**	99.8		90.4	88.6		99.0
5	27550	26843		2394	2494	2139		5193	98.0	99.3	100		93.5	**96.9**		100.0
6	41335	5527			2756	3894			99.8	100	100		**98.8**	100		100.0
7	4592				5894				100	100	100		100.0	100.0		100.0
Total	2295838	789611		1197178												

Table 6: Landings in number and weight in subdivision 24 in 2002 based on Report of WGBFAS 2003 and sum of landings

	Catch in number				Mean weight in catch				Sum of catch in number				Sum of catch in weight			
Age	1. Quarter	2. Quarter	3. Quarter	4. Quarter	1. Quarter	2. Quarter	3. Quarter	4. Quarter	1. Quarter	2. Quarter	3. Quarter	4. Quarter	1. Quarter	2. Quarter	3. Quarter	4. Quarter
1	2076	22258	22423	874769	456	511	528	635	0.5	5.2	7.5	53.6	0.2	2.8	3.5	44.3
2	323409	136542	122877	497770	724	667	769	808	78.4	37.1	48.6	84.1	62.1	25.4	31.2	76.4
3	80956	199891	118393	226853	1317	988	1328	1102	**97.9**	83.8	88.2	**98.0**	90.2	74.3	77.4	**96.3**
4	7059	58212	34083	31009	3098	1195	2173	1385	99.6	**97.4**	**99.6**	99.9	**96.0**	91.5	**99.2**	99.7
5		8133	1196	1632		2443	2241	2182	99.6	99.3	100	100	96.0	**96.5**	100.0	100.0
6	1661	2140			9083	4268			100	99.8	100	100	100.0	98.7	100.0	100.0
7		856				5998			100	100	100	100	100.0	100.0	100.0	100.0
Total	415161	428032	298972	1632033												

Table 7: Landings in number and weight in subdivision 25 in 2002 based on Report of WGBFAS 2003 and sum of landings

	Catch in number				Mean weight in catch				Sum of catch in number				Sum of catch in weight			
Age	1. Quarter	2. Quarter	3. Quarter	4. Quarter	1. Quarter	2. Quarter	3. Quarter	4. Quarter	1. Quarter	2. Quarter	3. Quarter	4. Quarter	1. Quarter	2. Quarter	3. Quarter	4. Quarter
1				1593				455	0			0.3	0.0			0.1
2	87151			109149	592			541	20.3			19.7	16.9			11.3
3	247285			368872	674			877	77.9			85.2	71.4			72.5
4	93591			26523	909			1198	**99.7**			**89.9**	**99.3**			78.6
5	1288			49396	1721			1803	100			98.7	100.0			**95.4**
6				7170				3386	100			100	100.0			100.0
Total	429315			562703												

Table 8: Distribution parameter of length and weight in subdivision 22 by quarter, sex and age

SD	Quarter	Sex	Age	Number	E(Lj)	S(Lj)	CV(Lj)	E(Wj)	S(Wj)	CV(Wj)
22	1	F	2	316	37.6	3.6	9.5	546.7	173.3	31.7
22	1	F	3	295	47.4	4.8	10.2	1241.4	411.4	33.1
22	1	F	4	37	53.6	3.7	6.8	1796.1	462.0	25.7
22	1	F	5	7	60.9	3.4	5.5	2643.1	481.1	18.2
22	1	F	6	4	63.5	3.4	5.3	2922.3	537.5	18.4
22	1	M	1	1	32.0	0.0	0.0	379.0	0.0	0.0
22	1	M	2	342	37.3	3.6	9.7	549.5	162.8	29.6
22	1	M	3	311	46.3	4.0	8.6	1051.8	284.1	27.0
22	1	M	4	22	53.0	5.1	9.7	1558.5	492.1	31.6
22	1	M	5	3	57.0	0.8	1.4	2077.3	98.3	4.7
22	2	F	1	1	30.0	0.0	0.0	286.0	0.0	0.0
22	2	F	2	173	39.5	3.2	8.1	625.5	168.8	27.0
22	2	F	3	70	47.4	4.8	10.1	1088.0	349.5	32.1
22	2	F	4	4	52.5	4.4	8.4	1450.0	421.3	29.1
22	2	F	5	3	52.0	4.3	8.3	1586.0	298.8	18.8
22	2	M	1	1	29.0	0.0	0.0	221.0	0.0	0.0
22	2	M	2	200	38.0	3.3	8.6	554.5	141.1	25.5
22	2	M	3	128	46.6	4.2	9.0	991.3	273.2	27.6
22	2	M	4	17	49.5	5.8	11.7	1219.5	433.9	35.6
22	2	M	5	1	50.0	0.0	0.0	1013.0	0.0	0.0
22	4	F	1	58	35.3	3.8	10.9	441.1	148.1	33.6
22	4	F	2	357	46.6	3.8	8.2	1027.8	254.7	24.8
22	4	F	3	44	56.9	6.0	10.6	1941.6	657.6	33.9
22	4	F	4	1	61.0	0.0	0.0	2528.0	0.0	0.0
22	4	F	5	4	71.3	7.1	10.0	4072.3	1817.5	44.6
22	4	M	1	92	35.1	3.6	10.3	433.3	146.9	33.9
22	4	M	2	408	46.0	3.5	7.5	986.0	221.2	22.4
22	4	M	3	41	53.4	5.1	9.5	1570.8	497.0	31.6
22	4	M	4	2	59.5	4.5	7.6	2555.5	868.5	34.0
22	4	M	5	1	68.0	0.0	0.0	3864.0	0.0	0.0

Table 9: Distribution parameter of length and weight in subdivision 24 by quarter, sex and age

SD	Quarter	Sex	Age	Number	E(Lj)	S(Lj)	CV(Lj)	E(Wj)	S(Wj)	CV(Wj)
24	1	F	1	8	28.5	2.6	8.9	253.0	67.6	26.7
24	1	F	2	92	39.0	4.9	12.7	678.8	271.0	39.9
24	1	F	3	28	49.6	3.7	7.5	1318.0	306.8	23.3
24	1	F	4	4	64.3	2.5	3.9	3080.8	539.6	17.5
24	1	F	6	1	103.0	0.0	0.0	9683.0	0.0	0.0
24	1	M	1	15	29.3	2.9	10.0	285.5	94.3	33.0
24	1	M	2	105	37.7	4.8	12.6	607.2	229.2	37.8
24	1	M	3	14	49.4	3.1	6.3	1361.1	323.2	23.7
24	2	F	1	17	32.5	3.4	10.4	382.6	136.6	35.7
24	2	F	2	22	38.4	4.4	11.4	674.3	240.9	35.7
24	2	F	3	34	45.4	4.0	8.9	1113.2	282.6	25.4
24	2	F	4	10	47.6	5.5	11.5	1283.9	485.3	37.8
24	2	F	5	4	62.8	3.1	5.0	3046.5	655.3	21.5
24	2	F	7	1	83.0	0.0	0.0	5329.0	0.0	0.0
24	2	M	1	39	31.8	3.4	10.8	340.9	112.2	32.9
24	2	M	2	61	38.0	3.1	8.1	599.6	169.3	28.2
24	2	M	3	63	44.0	4.0	9.1	926.8	288.5	31.1
24	2	M	4	16	46.4	5.4	11.6	1136.8	420.3	37.0
24	2	M	5	2	52.0	2.0	3.8	1456.0	194.0	13.3
24	3	F	1	44	32.9	4.5	13.5	387.9	154.2	39.8
24	3	F	2	110	41.6	3.7	8.9	742.2	203.3	27.4
24	3	F	3	110	51.3	4.0	7.8	1359.6	344.4	25.3
24	3	F	4	28	59.9	6.6	11.0	2146.6	728.9	34.0
24	3	F	5	1	70.0	0.0	0.0	3128.0	0.0	0.0
24	3	M	1	47	32.8	3.2	9.8	367.6	109.8	29.9
24	3	M	2	72	42.6	4.2	9.8	804.0	237.1	29.5
24	3	M	3	62	49.9	4.3	8.7	1251.1	384.9	30.8
24	3	M	4	19	60.1	5.5	9.1	2160.8	495.6	22.9
24	3	M	5	1	53.0	0.0	0.0	1513.0	0.0	0.0
24	4	F	0	3	26.0	0.8	3.2	191.3	11.8	6.2
24	4	F	1	489	38.4	4.9	12.8	632.4	251.2	39.7
24	4	F	2	382	43.3	5.4	12.5	856.7	357.7	41.8
24	4	F	3	148	49.5	7.3	14.8	1280.8	864.2	67.5
24	4	F	4	32	54.9	7.0	12.7	1576.9	797.0	50.5
24	4	F	5	3	67.7	2.1	3.0	2686.3	746.5	27.8
24	4	M	0	7	26.7	3.4	12.8	212.7	66.3	31.2
24	4	M	1	322	36.8	4.4	12.0	545.3	208.6	38.2
24	4	M	2	210	42.3	5.9	13.9	797.8	374.7	47.0
24	4	M	3	119	47.5	6.4	13.5	1100.1	603.4	54.8
24	4	M	4	12	47.7	2.9	6.1	960.6	246.7	25.7
24	4	M	5	2	84.0	10.0	11.9	8283.0	2994.0	36.1
24	4	M	0	2	25.5	2.5	9.8	193.0	61.0	31.6

Table 10: Distribution parameter of length and weight in subdivision 25 by quarter, sex and age

SD	Quarter	Sex	Age	Number	E(Lj)	S(Lj)	CV(Lj)	E(Wj)	S(Wj)	CV(Wj)
25	1	F	1	2	26.0	1.0	3.8	161.5	5.5	3.4
25	1	F	2	28	34.5	5.5	15.9	452.2	233.5	51.6
25	1	F	3	57	41.2	3.6	8.7	733.8	193.8	26.4
25	1	F	4	21	46.3	3.8	8.1	1023.6	215.6	21.1
25	1	F	5	2	53.0	6.0	11.3	1417.0	304.0	21.5
25	1	M	1	4	27.3	1.1	4.0	196.0	38.4	19.6
25	1	M	2	48	35.4	4.0	11.2	476.9	173.3	36.3
25	1	M	3	52	39.1	2.9	7.3	629.5	140.5	22.3
25	1	M	4	33	44.5	2.7	6.1	932.2	161.7	17.3
25	4	F	1	2	31.5	0.5	1.6	315.5	34.5	10.9
25	4	F	2	77	38.8	4.7	12.2	665.6	305.9	46.0
25	4	F	3	215	44.1	3.9	8.8	981.7	289.2	29.5
25	4	F	4	162	48.5	3.5	7.2	1312.5	292.6	22.3
25	4	F	5	23	55.0	3.9	7.2	1836.4	390.3	21.3
25	4	F	6	5	69.2	5.7	8.3	3425.6	557.3	16.3
25	4	M	1	12	32.4	2.1	6.5	355.1	86.2	24.3
25	4	M	2	132	36.5	3.6	9.9	526.8	171.2	32.5
25	4	M	3	322	41.3	3.5	8.5	762.7	208.9	27.4
25	4	M	4	179	46.7	3.2	6.9	1095.4	251.7	23.0
25	4	M	5	33	53.8	4.2	7.8	1589.5	436.6	27.5

Table 11: Number of necessary measurements based on the assumption of normally and lognormally distributed weight for cod captured in subdivision 22 by quarter, sex and age

SD	Quarter	Sex	Age	$N^*_{d,q,s,a}$ normally distributed weight	$N^*_{1,total,d,q,s}$ normally distributed weight	$N^*_{2,total,d,q,s}$ normally distributed weight	Proportion of age group in landings	Proportion of age group in $N^*_{d,q,s,a}$ normally	$N^*_{d,q,s,a}$ lognormally distributed weight	$N^*_{1,total,d,q,s}$ lognormally distributed weight	$N^*_{2,total,d,q,s}$ lognormally distributed weight	Proportion of age group in $N^*_{d,q,s,a}$ lognormally
22	1	F	2	811	1693	811	52	48	639	1335	639	45
22	1	F	3	886	1982	1697	48	52	767	1716	1406	55
22	1	F	4	535	**9540**	**2231**	6	19	535	**9543**	**1941**	22
22	1	F	5	269	25391	2501	1	10	208	19611	2149	9
22	1	F	6	275	45360	2776	1	10	255	42075	2404	11
22	1	M	1									
22	1	M	2	708	1406	708	50	33	661	1312	661	34
22	1	M	3	590	1287	1298	46	28	540	1179	1201	28
22	1	M	4	804	**24826**	**2102**	3	38	714	**22037**	**1915**	37
22	1	M	5	21	4721	2123	0	1	21	4753	1936	1
22	2	F	1									
22	2	F	2	588	853	588	69	25	500	725	500	24
22	2	F	3	833	2985	1421	28	35	680	2438	1180	33
22	2	F	4	682	**42768**	**2102**	2	29	557	**34952**	**1737**	27
22	2	F	5	288	24119	2391	1	12	325	27192	2062	16
22	2	M	1									
22	2	M	2	524	1208	909	43	22	470	1083	755	23
22	2	M	3	613	2209	1406	28	26	610	2197	1220	30
22	2	M	4	1020	**27673**	**2331**	4	44	910	**24677**	**2005**	45
22	2	M	5									
22	4	F	1	909	7272	909	13	23	755	6040	755	25
22	4	F	2	497	645	1406	77	13	465	604	1220	15
22	4	F	3	925	**9755**	**2331**	9	24	785	**8278**	**2005**	26
22	4	F	4									
22	4	F	5	1604	186079	3935	1	41	1060	122960	3065	35
22	4	M	1	927	5482	927	17	30	740	4376	740	27
22	4	M	2	407	543	1334	75	13	412	549	1152	15
22	4	M	3	808	10717	2142	8	26	647	8585	1799	24
22	4	M	4	931	**253351**	**3074**	0	30	895	243440	2694	33
22	4	M	5									

Table 12: Number of necessary measurements based on the assumption of normally and lognormally distributed weight for cod captured in subdivision 24 by quarter, sex and age

SD	Quarter	Sex	Age	$N^*_{d,q,s,a}$ normally distributed weight	$N^*_{1,total,d,q,s}$ normally distributed weight	$N^*_{2,total,d,q,s}$ normally distributed weight	Proportion of age group in landings	Proportion of age group in $N^*_{d,q,s,a}$ normally	$N^*_{d,q,s,a}$ lognormally distributed weight	$N^*_{1,total,d,q,s}$ lognormally distributed weight	$N^*_{2,total,d,q,s}$ lognormally distributed weight	Proportion of age group in $N^*_{d,q,s,a}$ lognormally
24	1	F	1	578	9602	578	6	23	620	10308	620	26
24	1	F	2	1284	1856	1862	69	50	1140	1648	1760	48
24	1	F	3	439	2083	2300	21	17	347	1648	2107	15
24	1	F	4	250	**8300**	**2550**	3	10	270	**8978**	**2377**	11
24	1	F	6									
24	1	M	1	879	7856	879	11	35	920	8219	920	39
24	1	M	2	1149	1466	2028	78	46	1060	1353	1980	45
24	1	M	3	456	**4367**	**2484**	10	18	382	**3656**	**2362**	16
24	2	F	1	1028	5323	1028	19	25	990	5125	990	26
24	2	F	2	1029	4115	2057	25	25	980	3920	1970	26
24	2	F	3	521	1348	2578	39	13	505	1307	2475	13
24	2	F	4	1151	**10133**	**3729**	11	28	980	**8624**	**3455**	26
24	2	F	5	375	8247	4104	5	9	301	6622	3756	8
24	2	F	7									
24	2	M	1	873	873	873	22	25	1050	1050	1050	36
24	2	M	2	644	412	1517	34	18	465	297	1515	16
24	2	M	3	782	484	2299	35	22	610	378	2125	21
24	2	M	4	1102	**2685**	**3401**	9	31	663	**1616**	**2788**	23
24	2	M	5	146	2839	3546	1	4	145	2828	2933	5
24	3	F	1	1273	8480	1273	15	38	1030	6859	1030	33
24	3	F	2	606	1614	1879	38	18	585	1558	1615	19
24	3	F	3	519	**1382**	**2398**	38	16	505	**1345**	**2120**	16
24	3	F	4	930	9729	3328	10	28	968	10129	3088	31
24	3	F	5									
24	3	M	1	721	3081	721	23	28	710	3036	710	29
24	3	M	2	702	1960	1423	36	27	633	1767	1343	26
24	3	M	3	764	**2477**	**2186**	31	29	612	**1984**	**1955**	25
24	3	M	4	426	4504	2612	9	16	452	4782	2407	19
24	3	M	5									
24	4	F	0	34	11841	34	0	0	34	11979	34	1
24	4	F	1	1271	2748	1305	46	14	1100	2378	1134	20

24	4	F	2	1404	3886	2709	36	16	1075	2975	2209	20
24	4	F	3	3663	**26159**	**6372**	14	40	1355	**9677**	**3564**	25
24	4	F	4	2056	67923	8428	3	23	1133.3	37434	4697	21
24	4	F	5	624	219775	9052	0	7	727	256146	5424	13
24	4	M	0	784	75457	784	1	9	800	77029	800	14
24	4	M	1	1179	2467	1962	48	14	960	2009	1760	17
24	4	M	2	1776	5702	3739	31	21	1310	4204	3070	23
24	4	M	3	2421	13712	6160	18	28	1185	6712	4255	21
24	4	M	4	533	**29940**	**6693**	2	6	430	**24152**	**4685**	8
24	4	M	5	1053	354943	7746	0	12	1005	338685	5690	18
24	4	M	0	806	271614	8552	0	9	0	0	5690	0

Table 13: Number of necessary measurements based on the assumption of normally and lognormally distributed weight for cod captured in subdivision 2 by quarter, sex and age

SD	Quarter1	Sex	Age	$N^*_{d,q,s,a}$ normally distributed weight	$N^*_{1,total,d,q,s}$ normally distributed weight	$N^*_{2,total,d,q,s}$ normally distributed weight	Proportion of age group in landings	Proportion of age group in $N^*_{d,q,s,a}$ normally	$N^*_{d,q,s,a}$ lognormally distributed weight	$N^*_{1,total,d,q,s}$ lognormally distributed weight	$N^*_{2,total,d,q,s}$ lognormally distributed weight	Proportion of age group in $N^*_{d,q,s,a}$ lognormally
25	1	F	1	12	655	12	2	0	12	660	12	0
25	1	F	2	2146	**8431**	2158	25	62	1665	**6541**	1677	56
25	1	F	3	563	1087	2721	52	16	550	1061	2227	19
25	1	F	4	360	1883	**3081**	19	10	366	1917	**2593**	12
25	1	F	5	373	20514	3454	2	11	367	20185	2960	12
25	1	M	1	312	10692	312	3	15	290	9933	290	16
25	1	M	2	1065	**3039**	1377	35	53	865	**2469**	1155	48
25	1	M	3	403	1063	**1780**	38	20	385	1014	**1540**	21
25	1	M	4	245	1016	2025	24	12	270	1121	1810	15
25	2	F	1	99	23977	99	0	3	99	23958	99	4
25	2	F	2	1701	**10691**	1800	16	49	985	**6191**	1084	39
25	2	F	3	701	1577	2501	44	20	550	1238	1634	22
25	2	F	4	403	1203	**2903**	33	12	387	1156	**2021**	15
25	2	F	5	366	7704	3269	5	11	285	5997	2306	11
25	2	F	6	216	20880	3485	1	6	220	21296	2526	9
25	2	M	1	477	26929	477	2	16	485	27403	485	19
25	2	M	2	852	**4378**	1329	19	29	735	**3775**	1220	29
25	2	M	3	606	1276	1935	47	20	500	1053	1720	20
25	2	M	4	428	1619	**2363**	26	14	366	1386	**2086**	14
25	2	M	5	609	12520	2972	5	21	448	9204	2534	18

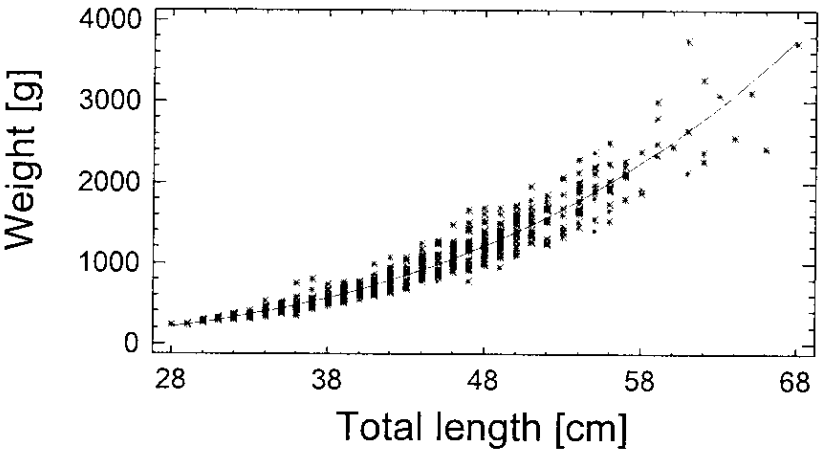


Figure 1: Weight-length relation of female cod captured in Subdivision 22 in first quarter 2002 – W = a =0.00397 * $L^{3.26}$, N = 660, R = 0.98

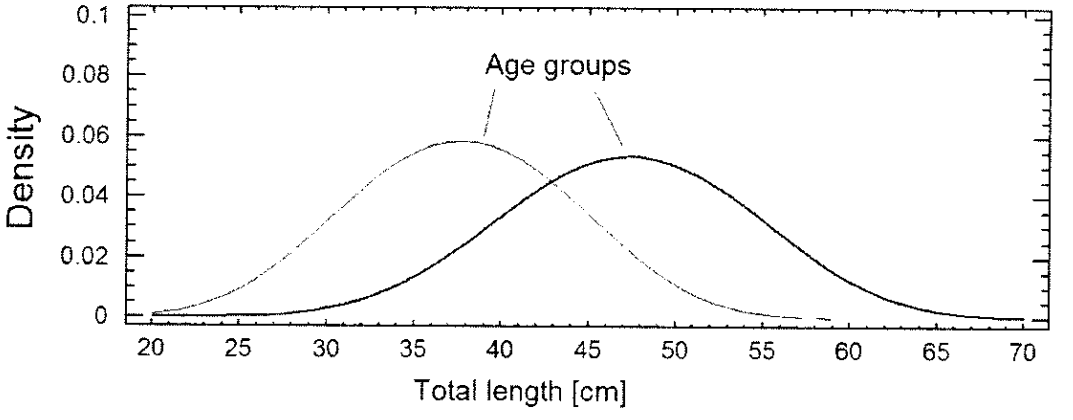


Figure 2: Density traces of length distribution for simulated age groups with mean length E(L) = 25 and 45 and standard deviation of S(L) = 3.7.

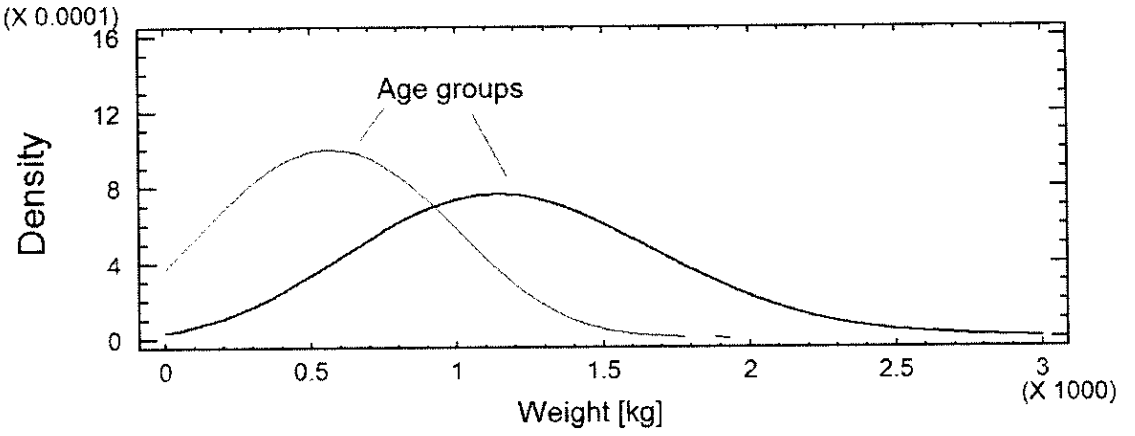
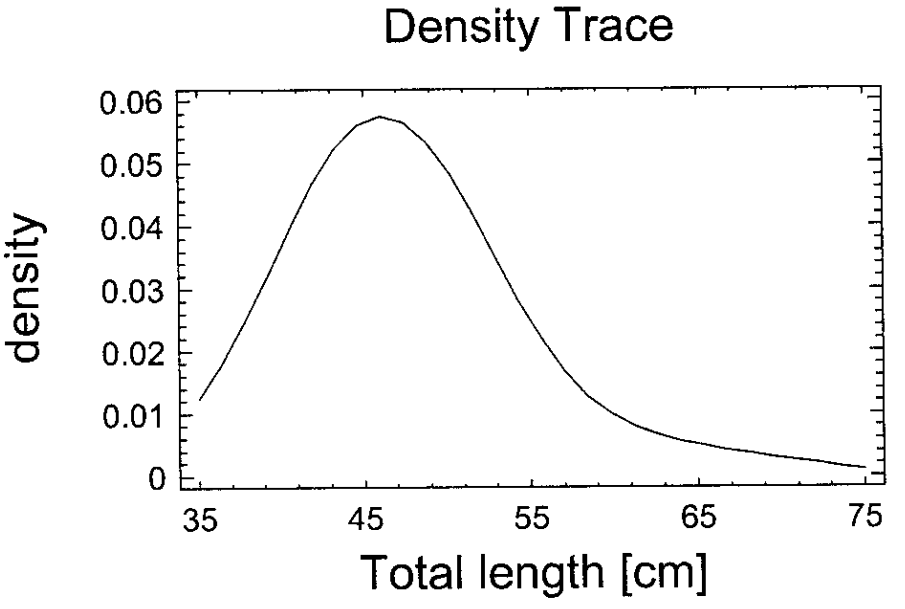


Figure 3: Density traces of the corresponding weight of simulated age groups based on the



described length-weight relation

Figure 4: Density trace of female cod with age 3 captured in subdivision 24 in fourth quarter with a standard deviation of length of 7.3

3. Excerpts from the Irish 2003 Technical Report

Appendix II

Method used to estimate discards per strata with associated variance

Discards

In 2003, the Marine Institute changed the focus of the discard-sampling programme to a more fleet based approach (see Module E). Following from a workshop on Discards in September 2003 better ways to minimise the bias and maximise the precision of discard estimates were established. The raising method used is trips.

Mean discard per strata was estimated using the following equation (Borges *et al,* submitted).

$$\bar{d}_{yf} = \frac{\sum_{1}^{t}\sum_{1}^{h} d_{ht}}{t}$$

with variance of

$$\sigma^2_{yf} = \frac{1}{t-1}\sum_{1}^{t}\left(\sum_{1}^{h} d_{ht} - \bar{d}_{yf}\right)$$

where h is the number of hauls in each trip, t is the number of trips in each stratum, and yf is the strata defined by year and fleet. the mean discard ($yf\,d$) in stratum yf was raised to fleet level using number of fishing trips ($yfT\ D$), using the following equations (Borges *et al,* submitted).

$$D_{yfT} = T_{yf}\bar{d}_{yf}$$

with variance of

$$Var(D_{yfT}) = \left(\frac{T^2}{t} - T\right)\sigma^2_{yf}$$

where $yf\,T$ is the total number of trips of the fleet, $yf\,d$ is the total number of discards in stratum yf.

References

Borges, L., Rogan, E. and Officer, R. (2003): Discarding by the demersal fishery in the waters around Ireland.
ICES Journal of Marine Science, Submitted.

Appendix III

Precision estimation method used in biological sampling

Bootstrap

The precision estimates given in Module I tables I1 and I2 are based on a nonparametric bootstrap method. Bootstrapping aims to provide information in the variability of a statistic by re-sampling observed data. Bootstrap samples are drawn with replacement and have the same number of observations as the original data. (Effron and Gong, 1983).

In this specific case there are two sample sets, which can be considered to be independent. The first is the length distribution of the fish that were measured only. Secondly there is the length-stratified sample of fish that were aged and sexed etc. Bootstrap samples can be drawn from both datasets independently and all parameters (length-at-age, sex ratio at age etc.) can be calculated for each bootstrap replication. The choice of the sampling unit is dependent on the survey design: as all samples are taken from the same survey, using the same gear etc. one can treat individual fish as the sampling unit. This has the advantage of large sample sizes. The measured-only sample set consists of a number of samples with different raising factors as in some cases only a sub-sample of the catch is measured. Each sample with a unique raising factor can be treated as a stratum and re-sampled independently (all samples with a raising factor of one can be combined into one stratum). The stratified bootstrap samples can be combined into one raised length frequency for each bootstrap iteration.

One could resample the aged sample separately by length class, but the number of observations within a length class is frequently quite low (less than 10). However, if all observations are combined into one sample, the resultant bootstrap samples will have a different number of observations in each length class from the original sample. This might result in missing values in length classes that have few observations. Fortunately this will have a negligible impact on the result simply because these length classes do not contribute much to the population estimate (if they did there would be more observations). For these reasons, missing values (in e.g. the age-length keys) are not interpolated, but rather treated as zeros.

Parameters are estimated within each iteration, not between iterations, so for every bootstrap iteration one set of parameters is estimated from the re-sampled length frequency and age-length key (or sex-age-length key or maturity-age-length-key). Bootstrapping is repeated 1000 times, which seems to be more than adequate to achieve stable results. Figure one gives an overview of the bootstrapping procedure.

Precision of maturity estimates

For most species there is an ambiguous maturity stage, which, outside of the spawning period could include virgin fish as well as mature fish. As most species spawn around spring, it was not possible to get accurate estimates of *Maturity* in November, when the survey took place. However it was possible to determine a minimum and maximum proportion mature by including the ambiguous stage in the immature and mature group respectively. The 95% confidence interval can then be obtained for both estimates and the combined CI is the minimum 95% confidence limit of the lower estimate and maximum 95% confidence limit of the higher estimate. In practice, plaice were the only species for which the minimum and maximum maturity estimates were reasonably close together. The other species for which *Maturity* estimates were produced are herring and the four most common ray species.

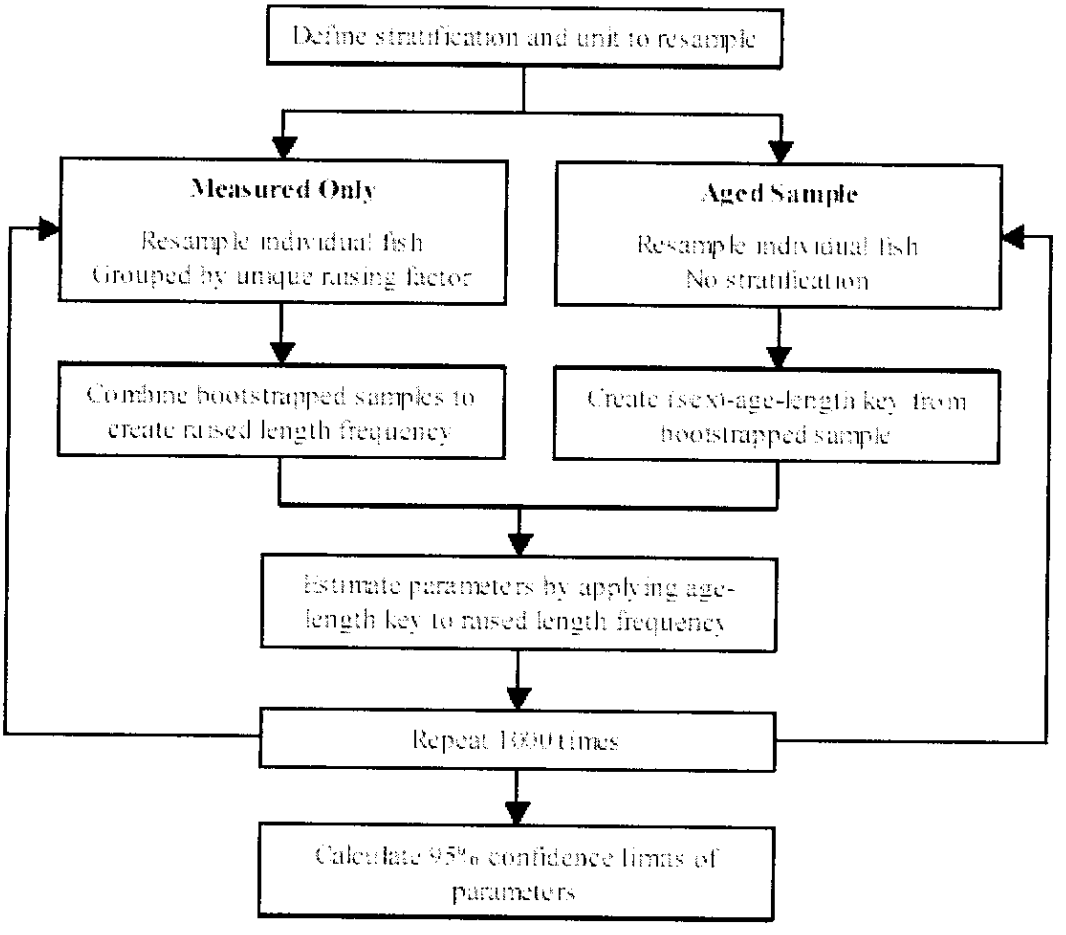


Figure 1. Bootstrapping procedure. The two sample sets (measured only and aged samples) are re-sampled independently and parameters are estimated for each bootstrap iteration.

References

Effron, B. and Gong, G. (1983): A leisurely look at the bootstrap, the jackknife and crossvalidation. The American Statistician 37: 36-48

Appendix IV

Exploring precision and the sample numbers required for biological sampling

Precision levels are defined as follows:
Level 1: level making it possible to estimate a parameter with the precision of plus or minus 25% for a 95% confidence level.
Level 2: level making it possible to estimate a parameter with the precision of plus or minus 10% for a 95% confidence level.
Level 3: level making it possible to estimate a parameter with the precision of plus or minus 5% for a 95% confidence level.

To estimate the minimum sample numbers required to achieve the required precision level, 95% confidence intervals (CI) were estimated for a large number of samples of various stocks, taken from port sampling and surveys in 2003. The precision of the following parameters was estimated: Length; Weight; Sex Ratio and Numbers for each length class. The bootstrapping technique described in Appendix III was used for precision estimates. The results indicate that the number of fish taken for biological analysis (age, sex, maturity) shows a strong relationship with the realised precision level. To achieve precision level 3 for Length-at-age, a biological sample of 100 fish per age class was usually sufficient (Figure 1.). At the same sample size, the CI for Weight-at-age was typically twice as large as that of Length-at-age.

It would require a sample of around 500 fish per age class to achieve the precision level 3. This difference can be explained by the fact that weight is related to length to the power of three, so a small change in length can cause a much larger change in weight. The Sex ratio requires even higher numbers to be sampled in each age class. The CI is typically 4 times as large as those for Length-at-age. No samples in 2003 were large enough to achieve a precision level 3 for Sex ratio-at-age. By extrapolation it can be estimated that the sample number should lie in the order of 1000 per age class.

Binomial theory can shed some light on the reason why such high sample numbers are required. To achieve precision level 1 from a random binomial sample requires anywhere between 72 and 400 samples depending on the proportion: the closer the proportion lies to 0.5, the higher the required sample numbers. A typical sex ratio is close 0.5 so it would require nearly 400 samples, moreover sex ratios are not obtained from random samples (with the exception of some flatfish and rays) so the additional variance can be attributed to the length-stratified sampling regime. Maturity-at-age is estimated in the same way as Sex-at age and will have similar precision levels except where maturity needs to be obtained for both sexes, in which case the precision will be even lower. The DCR gives the option to express the sex ratio and maturity by length class but this does not improve the situation unless length classes are combined to very coarse length groups in which case it is much more meaningful to refer to age classes. Numbers-at-age seems to be the parameter estimate that is least precise, although precision increases rapidly with increasing sample numbers.

Obviously, at the time of sampling, the age of the fish is unknown so sampling targets are usually defined by length class. The actual number that is required for each length class depends on the age-length distribution. Quite typically, the required sample size per cm length class is 1/5 to 1/10 of the required sample size per age class. What follows from this is that 10-20 fish are required to be aged per length class to achieve precision level 3 for Length-at age. This is in line with current sampling intensities. However to achieve level 3 for Weight-at- age, 50 to 100 fish would have to be aged per length class. For proportions like Sex Ratio and Maturity 100-200 fish would have to be sampled in each length class. This is not realistically achievable and precision level 1 seems more realistic for these parameters.

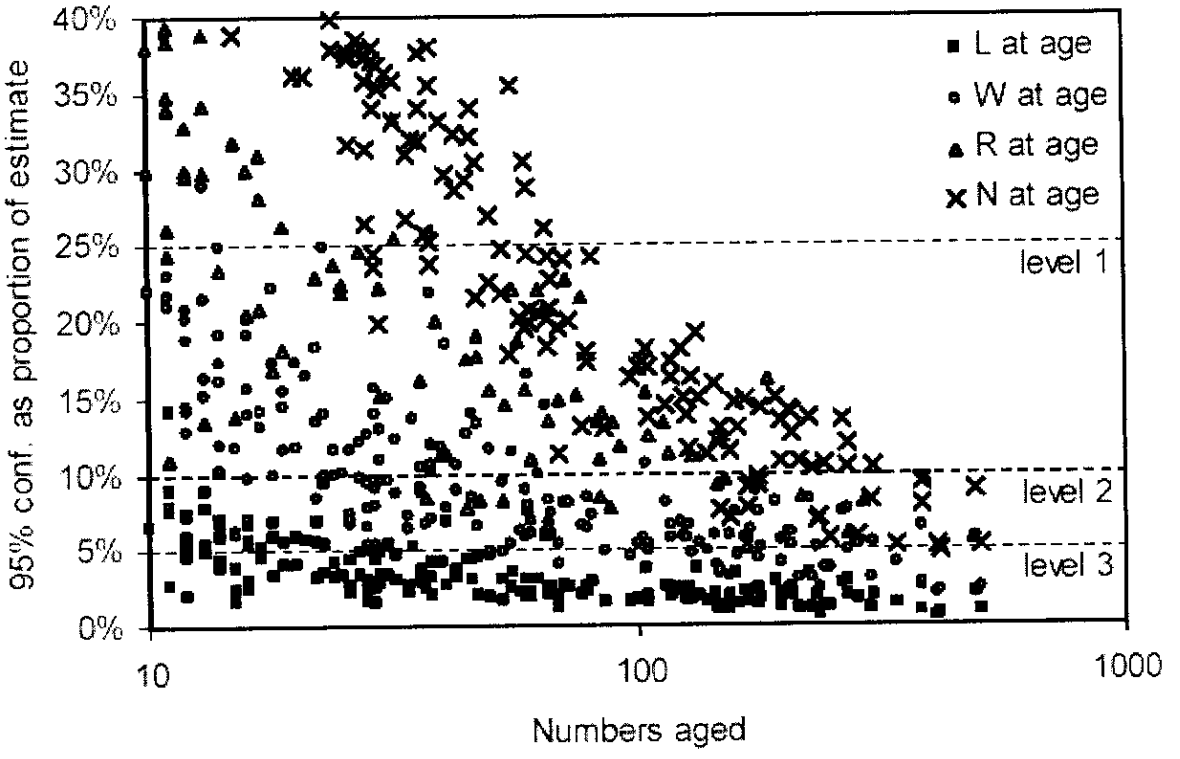


Figure 1. The confidence limits become smaller as the number of biological samples (number of fish aged) per age class increases (note logarithmic scale). The confidence interval is expressed as a proportion of the parameter estimate, so a 'relative confidence interval' of 10% means that in 95% of the cases the parameter estimate is within 10% of the 'true' value. L, W, R and N at age are length, weight, sex ratio and numbers at age respectively.

4. Excerpts from the Italian 2003 Technical Report

Estimation of the sample errors for the specific fishing effort

To evaluate sampling variance and the relative precision level of the estimated variable, the expression of the estimate $\hat{Y}$ of the total Y has been used:

$$V(\hat{Y}) = \sum_{h=1}^{H} M_h^2 \frac{M_h - m_h}{M_h} \frac{S_h^2}{m_h} + \sum_{i=1}^{H} \frac{M_h}{m_h} \sum_{i=1}^{Mh} N_{hi}^2 \frac{N_{hi} - n_{hi}}{N_{hi}} \frac{S_{hi}^2}{n_{hi}}$$

in which:
h: stratum index (h = 1, ...,H)
i: primary-unit index
j: secondary-unit index
M_h: number of primary units in stratum h
m_h: number of sample primary units in stratum h
S^2_h: variance of target variable between totals of primary units in stratum h
N_{hi}: number of secondary units of primary unit i in stratum h
n_{hi}: number of sample secondary units of primary unit i in stratum h
S^2_{hi}: variance of target variable within primary unit i of stratum h

From this expression we obtain the absolute and the relative sampling error:

$$\sigma(\hat{Y}) = \sqrt{V(\hat{Y})}$$

and

$$\varepsilon(\hat{Y}) = \frac{\sigma(\hat{Y})}{Y} 100$$

The last one has been used as indicator of the precision level (statistically significant sampling estimates with 25% maximum permissible error, 95% confidence level).
In Tab. 1 are reported the precision levels of the national estimated variables; in Tab. 2 and 3 the same for every stratum of the sample design.

Tab. 1 - Precision levels of the national estimated variables

SPECIES English common name	SPECIES Scientific name	relative sampling error TARGET SPECIES	relative sampling error BY CATCH SPECIES
Albacore	*Thunnus alalunga*	24,8	32,9
Anchovy	*Engraulis encrasicolus*	14,7	19,0
Whiting	*Merlangus merlangus*	34,9	36,2
Hake	*Merluccius merluccius*	24,0	20,3

Swordfish	*Xiphias gladius*	23,6	20,3
Sardine	*Sardina pilchardus*	13,5	20,2
Norway lobster	*Nephrops norvegicus*	23,7	28,5
Mackerel	*Scomber scombrus*	5,6	8,9
Sole	*Solea vulgaris*	12,6	13,5
Sprat	*Sprattus sprattus*	34,9	40,5
Horse mackerel	*Trachurus spp.*	22,9	14,5
Bluefin tuna	*Thunnus thynnus*	31,1	22,7

Tab. 2a – Relative sampling error for every stratum of the sample design – Target species

TIPO DI TECNICA	GSA	Albacore	Anchovy	Whiting	Hake	Swordfish	Sardine
Surrounding nets	Ligurian Sea and Upper Tyrrhenian	0	6	0	0	0	21
Dredges	Ligurian Sea and Upper Tyrrhenian	0	0	0	0	0	0
Gears using hooks	Ligurian Sea and Upper Tyrrhenian	0	0	0	43	12	0
Polyvalent (combining mobile and passive gears)	Ligurian Sea and Upper Tyrrhenian	0	0	0	11	0	0
Polyvalent (passive gears)	Ligurian Sea and Upper Tyrrhenian	0	5	0	6	1	33
Drift and fixed nets	Ligurian Sea and Upper Tyrrhenian	0	0	0	20	11	65
Demersal trawl	Ligurian Sea and Upper Tyrrhenian	0	0	0	18	0	0
Surrounding nets	Lower Tyrrhenian	0	6	0	0	0	6
Dredges	Lower Tyrrhenian	0	0	0	0	0	0
Gears using hooks	Lower Tyrrhenian	13	0	16	5	0	0
Polyvalent (combining mobile and passive gears)	Lower Tyrrhenian	30	0	0	43	29	0
Polyvalent (passive gears)	Lower Tyrrhenian	25	56	35	34	29	35
Drift and fixed nets	Lower Tyrrhenian	0	0	0	0	0	0
Demersal trawl	Lower Tyrrhenian	0	0	0	10	0	0
Gears using hooks	Sardinia	0	0	0	0	0	0
Polyvalent (combining mobile and passive gears)	Sardinia	0	0	0	19	0	0
Polyvalent (passive gears)	Sardinia	0	0	0	0	0	0
Drift and fixed nets	Sardinia	0	0	0	0	0	0
Demersal trawl	Sardinia	0	0	0	14	0	0
Surrounding nets	Sicilian Channel	0	25	0	0	0	0
Gears using hooks	Sicilian Channel	0	0	0	0	0	0
Polyvalent (combining mobile and passive gears)	Sicilian Channel	0	0	0	0	12	0
Polyvalent (passive gears)	Sicilian Channel	0	0	0	0	11	0
Drift and fixed nets	Sicilian Channel	0	0	0	0	0	0
Demersal trawl	Sicilian Channel	0	0	0	30	65	0
Pelagic trawl and seiners	Sicilian Channel	0	9	0	0	0	14
Surrounding nets	Upper and Mid-Adriatic	16	7	0	27	0	32
Dredges	Upper and Mid-Adriatic	0	0	0	0	0	0
Gears using hooks	Upper and Mid-Adriatic	1	0	0	0	7	0

Polyvalent (combining mobile and passive gears)	Upper and Mid-Adriatic	0	0	35	0	0	0
Polyvalent (passive gears)	Upper and Mid-Adriatic	20	0	0	0	0	0
Beam Trawl	Upper and Mid-Adriatic	0	0	0	0	0	0
Drift and fixed nets	Upper and Mid-Adriatic	0	0	0	0	0	0
Demersal trawl	Upper and Mid-Adriatic	0	0	35	25	0	35
Pelagic trawl and seiners	Upper and Mid-Adriatic	0	7	0	0	0	7
Surrounding nets	Lower Adriatic	0	7	0	0	0	30
Dredges	Lower Adriatic	0	0	0	0	0	0
Gears using hooks	Lower Adriatic	12	0	0	9	12	0
Polyvalent (combining mobile and passive gears)	Lower Adriatic	0	0	0	7	0	0
Polyvalent (passive gears)	Lower Adriatic	0	0	0	0	0	0
Drift and fixed nets	Lower Adriatic	0	0	0	0	0	0
Demersal trawl	Lower Adriatic	0	0	0	51	0	51
Pelagic trawl and seiners	Lower Adriatic	0	3	0	0	0	40
Surrounding nets	Western Ionian	0	4	0	0	0	6
Gears using hooks	Western Ionian	23	0	0	8	20	0
Polyvalent (combining mobile and passive gears)	Western Ionian	22	0	0	31	19	0
Polyvalent (passive gears)	Western Ionian	0	22	0	37	0	0
Drift and fixed nets	Western Ionian	0	0	0	0	0	0
Demersal trawl	Western Ionian	0	0	0	16	0	0

Tab. 2b – Relative sampling error for every stratum of the sample design - Target species

TIPO DI TECNICA	GSA	Norway lobster	Mackerel	Sole	Sprat	Horse mackerel	Bluefin tuna
Surrounding nets	Ligurian Sea and Upper Tyrrhenian	0	0	0	0	24	0
Dredges	Ligurian Sea and Upper Tyrrhenian	0	0	0	0	0	0
Gears using hooks	Ligurian Sea and Upper Tyrrhenian	0	0	0	0	0	44
Polyvalent (combining mobile and passive gears)	Ligurian Sea and Upper Tyrrhenian	0	0	0	0	0	0
Polyvalent (passive gears)	Ligurian Sea and Upper Tyrrhenian	0	0	36	0	0	0
Drift and fixed nets	Ligurian Sea and Upper Tyrrhenian	0	0	0	0	0	0
Demersal trawl	Ligurian Sea and Upper Tyrrhenian	0	0	0	0	0	0
Surrounding nets	Lower Tyrrhenian	0	0	0	0	0	0
Dredges	Lower Tyrrhenian	0	0	0	0	0	0
Gears using hooks	Lower Tyrrhenian	11	0	0	0	11	16
Polyvalent (combining mobile and passive gears)	Lower Tyrrhenian	0	0	0	0	0	42
Polyvalent (passive gears)	Lower Tyrrhenian	0	0	0	0	0	23
Drift and fixed nets	Lower Tyrrhenian	0	0	0	0	0	0
Demersal trawl	Lower Tyrrhenian	13	0	21	0	0	0
Gears using hooks	Sardinia	0	0	0	0	0	0
Polyvalent (combining mobile and passive gears)	Sardinia	0	0	0	0	0	0
Polyvalent (passive gears)	Sardinia	0	0	0	0	0	0

Drift and fixed nets	Sardinia	0	0	0	0	0	0
Demersal trawl	Sardinia	0	0	0	0	0	0
Surrounding nets	Sicilian Channel	0	25	0	0	25	0
Gears using hooks	Sicilian Channel	0	0	0	0	0	0
Polyvalent (combining mobile and passive gears)	Sicilian Channel	0	0	0	0	0	0
Polyvalent (passive gears)	Sicilian Channel	0	0	14	0	0	0
Drift and fixed nets	Sicilian Channel	0	0	29	0	0	0
Demersal trawl	Sicilian Channel	47	0	0	0	0	59
Pelagic trawl and seiners	Sicilian Channel	0	0	0	0	0	0
Surrounding nets	Upper and Mid-Adriatic	0	0	0	0	0	44
Dredges	Upper and Mid-Adriatic	0	0	0	0	0	0
Gears using hooks	Upper and Mid-Adriatic	0	0	0	0	0	15
Polyvalent (combining mobile and passive gears)	Upper and Mid-Adriatic	0	0	9	0	0	0
Polyvalent (passive gears)	Upper and Mid-Adriatic	0	0	12	0	0	36
Beam Trawl	Upper and Mid-Adriatic	0	0	8	0	0	0
Drift and fixed nets	Upper and Mid-Adriatic	0	0	9	0	0	0
Demersal trawl	Upper and Mid-Adriatic	0	0	0	35	31	0
Pelagic trawl and seiners	Upper and Mid-Adriatic	0	0	0	0	0	0
Surrounding nets	Lower Adriatic	0	0	0	0	0	0
Dredges	Lower Adriatic	0	0	0	0	0	0
Gears using hooks	Lower Adriatic	0	0	0	0	0	0
Polyvalent (combining mobile and passive gears)	Lower Adriatic	27	0	0	0	0	0
Polyvalent (passive gears)	Lower Adriatic	0	0	0	0	25	0
Drift and fixed nets	Lower Adriatic	0	0	0	0	0	0
Demersal trawl	Lower Adriatic	47	0	0	0	0	0
Pelagic trawl and seiners	Lower Adriatic	0	5	0	0	0	0
Surrounding nets	Western Ionian	0	0	0	0	0	0
Gears using hooks	Western Ionian	0	0	0	0	0	46
Polyvalent (combining mobile and passive gears)	Western Ionian	0	0	0	0	0	0
Polyvalent (passive gears)	Western Ionian	0	25	0	0	0	0
Drift and fixed nets	Western Ionian	0	0	0	0	0	0
Demersal trawl	Western Ionian	0	0	0	0	0	0

Tab.3a - Relative sampling error for every stratum of the sample design – Bycatch species

TIPO DI TECNICA	GSA	Albacore	Anchovy	Whiting	Hake	Swordfish	Sardine
Surrounding nets	Ligurian Sea and Upper Tyrrhenian	0	17	0	0	0	12
Dredges	Ligurian Sea and Upper Tyrrhenian	0	0	0	0	0	0
Gears using hooks	Ligurian Sea and Upper Tyrrhenian	0	0	0	0	0	0
Polyvalent (combining mobile and passive gears)	Ligurian Sea and Upper Tyrrhenian	0	0	0	5	0	0
Polyvalent (passive gears)	Ligurian Sea and Upper Tyrrhenian	0	24	0	11	0	27
Drift and fixed nets	Ligurian Sea and Upper Tyrrhenian	0	0	0	23	0	0

Demersal trawl	Ligurian Sea and Upper Tyrrhenian	0	0	0	17	0	0
Surrounding nets	Lower Tyrrhenian	0	14	0	0	0	9
Dredges	Lower Tyrrhenian	0	0	0	0	0	0
Gears using hooks	Lower Tyrrhenian	0	13	11	11	0	0
Polyvalent (combining mobile and passive gears)	Lower Tyrrhenian	36	0	0	24	29	0
Polyvalent (passive gears)	Lower Tyrrhenian	35	37	0	33	19	0
Drift and fixed nets	Lower Tyrrhenian	0	0	0	0	0	0
Demersal trawl	Lower Tyrrhenian	0	0	0	9	0	0
Gears using hooks	Sardinia	0	0	0	0	0	0
Polyvalent (combining mobile and passive gears)	Sardinia	0	0	23	9	0	0
Polyvalent (passive gears)	Sardinia	0	0	0	66	0	0
Drift and fixed nets	Sardinia	0	0	0	0	0	0
Demersal trawl	Sardinia	0	0	0	8	0	0
Surrounding nets	Sicilian Channel	0	0	0	0	0	16
Gears using hooks	Sicilian Channel	0	0	0	0	0	0
Polyvalent (combining mobile and passive gears)	Sicilian Channel	0	0	0	24	14	0
Polyvalent (passive gears)	Sicilian Channel	0	0	0	11	0	0
Drift and fixed nets	Sicilian Channel	0	0	0	0	0	0
Demersal trawl	Sicilian Channel	0	0	0	28	60	0
Pelagic trawl and seiners	Sicilian Channel	0	13	0	0	34	8
Surrounding nets	Upper and Mid-Adriatic	0	0	0	14	0	9
Dredges	Upper and Mid-Adriatic	0	0	0	0	0	0
Gears using hooks	Upper and Mid-Adriatic	62	0	0	0	0	0
Polyvalent (combining mobile and passive gears)	Upper and Mid-Adriatic	0	17	20	14	0	21
Polyvalent (passive gears)	Upper and Mid-Adriatic	0	0	0	0	0	0
Beam Trawl	Upper and Mid-Adriatic	0	0	0	13	0	0
Drift and fixed nets	Upper and Mid-Adriatic	0	0	0	22	0	0
Demersal trawl	Upper and Mid-Adriatic	0	35	36	29	0	37
Pelagic trawl and seiners	Upper and Mid-Adriatic	0	10	0	0	0	7
Surrounding nets	Lower Adriatic	0	33	0	0	0	10
Dredges	Lower Adriatic	0	0	0	0	0	0
Gears using hooks	Lower Adriatic	9	0	0	13	12	0
Polyvalent (combining mobile and passive gears)	Lower Adriatic	0	7	0	8	0	11
Polyvalent (passive gears)	Lower Adriatic	0	0	0	0	0	0
Drift and fixed nets	Lower Adriatic	0	0	0	0	0	0
Demersal trawl	Lower Adriatic	0	0	0	52	0	36
Pelagic trawl and seiners	Lower Adriatic	0	58	0	0	0	4
Surrounding nets	Western Ionian	0	6	0	0	0	5
Gears using hooks	Western Ionian	32	0	0	0	0	0
Polyvalent (combining mobile and passive gears)	Western Ionian	20	0	0	31	24	0
Polyvalent (passive gears)	Western Ionian	0	17	0	20	0	13
Drift and fixed nets	Western Ionian	0	17	0	24	0	24
Demersal trawl	Western Ionian	0	0	0	11	0	0

Tab. 3b - Relative sampling error for every stratum of the sample design – Bycatch species

TIPO DI TECNICA	GSA	Norway lobster	Mackerel	Sole	Sprat	Horse mackerel	Bluefin tuna
Surrounding nets	Ligurian Sea and Upper Tyrrhenian	0	19	0	0	24	0
Dredges	Ligurian Sea and Upper Tyrrhenian	0	0	0	0	0	0
Gears using hooks	Ligurian Sea and Upper Tyrrhenian	0	0	0	0	0	21
Polyvalent (combining mobile and passive gears)	Ligurian Sea and Upper Tyrrhenian	0	10	0	0	6	0
Polyvalent (passive gears)	Ligurian Sea and Upper Tyrrhenian	0	0	28	0	36	2
Drift and fixed nets	Ligurian Sea and Upper Tyrrhenian	0	0	24	0	23	0
Demersal trawl	Ligurian Sea and Upper Tyrrhenian	20	0	0	0	42	0
Surrounding nets	Lower Tyrrhenian	0	0	0	0	0	0
Dredges	Lower Tyrrhenian	0	0	0	0	0	0
Gears using hooks	Lower Tyrrhenian	0	0	0	0	0	0
Polyvalent (combining mobile and passive gears)	Lower Tyrrhenian	28	0	0	0	23	26
Polyvalent (passive gears)	Lower Tyrrhenian	0	0	0	0	32	28
Drift and fixed nets	Lower Tyrrhenian	0	0	0	0	0	0
Demersal trawl	Lower Tyrrhenian	11	0	10	0	8	0
Gears using hooks	Sardinia	0	0	0	0	0	0
Polyvalent (combining mobile and passive gears)	Sardinia	0	0	0	0	0	0
Polyvalent (passive gears)	Sardinia	0	0	0	0	0	0
Drift and fixed nets	Sardinia	0	0	0	0	0	0
Demersal trawl	Sardinia	11	0	0	0	0	0
Surrounding nets	Sicilian Channel	0	21	0	0	17	0
Gears using hooks	Sicilian Channel	0	0	0	0	0	0
Polyvalent (combining mobile and passive gears)	Sicilian Channel	0	0	0	0	13	0
Polyvalent (passive gears)	Sicilian Channel	0	5	5	0	5	0
Drift and fixed nets	Sicilian Channel	0	6	6	0	6	0
Demersal trawl	Sicilian Channel	34	0	0	0	46	0
Pelagic trawl and seiners	Sicilian Channel	0	0	0	0	0	0
Surrounding nets	Upper and Mid-Adriatic	13	0	0	0	0	0
Dredges	Upper and Mid-Adriatic	0	0	0	0	0	0
Gears using hooks	Upper and Mid-Adriatic	0	0	0	0	0	0
Polyvalent (combining mobile and passive gears)	Upper and Mid-Adriatic	0	21	11	35	0	0
Polyvalent (passive gears)	Upper and Mid-Adriatic	0	0	24	0	0	0
Beam Trawl	Upper and Mid-Adriatic	0	0	12	0	0	0
Drift and fixed nets	Upper and Mid-Adriatic	22	0	8	0	0	0
Demersal trawl	Upper and Mid-Adriatic	40	36	45	42	31	0
Pelagic trawl and seiners	Upper and Mid-Adriatic	0	0	0	0	16	0
Surrounding nets	Lower Adriatic	0	16	0	0	0	0
Dredges	Lower Adriatic	0	0	0	0	0	0
Gears using hooks	Lower Adriatic	0	0	0	0	18	25
Polyvalent (combining mobile and passive gears)	Lower Adriatic	6	0	0	0	27	0

Polyvalent (passive gears)	Lower Adriatic	0	24	0	0	19	0
Drift and fixed nets	Lower Adriatic	0	0	0	0	0	0
Demersal trawl	Lower Adriatic	52	42	0	0	51	0
Pelagic trawl and seiners	Lower Adriatic	0	0	0	0	16	0
Surrounding nets	Western Ionian	0	0	0	0	0	0
Gears using hooks	Western Ionian	0	0	0	0	0	27
Polyvalent (combining mobile and passive gears)	Western Ionian	32	0	0	0	0	0
Polyvalent (passive gears)	Western Ionian	0	18	0	0	0	0
Drift and fixed nets	Western Ionian	0	16	0	0	0	0
Demersal trawl	Western Ionian	15	0	20	0	0	0

Estimation of the sample errors for the fishing effort by type of technique

The sampling relative error depends on the sampling design and, therefore, even the relative error estimator depends on the sampling design.

The population has been split up into H stratum and, in each of them, units are homogeneous in variables we are studying.

From each stratum, independently and without replacement, sample units have been selected with probability proportional to size (PPS sampling). In this case, the "size" is defined by the LFT (length overall).

Sample units have been selected with the Hanurav-Vijayan algorithm and the variable totals have been estimated through the Horvitz-Thompson estimator:

$\hat{Y} = \sum_{h=1}^{H} \sum_{i=1}^{n_h} \frac{y_{hi}}{\pi_{(h)i}}$, Where h is the stratum exponent and i indicates the sample units.

To evaluate the goodness of this estimator, the relative error has been calculated.

The estimate of the relative error is the coefficient of variation for the variable "total estimator":

$$\overline{CV} = \frac{\hat{\sigma}(\hat{Y})}{\hat{Y}},$$

where: $\hat{\sigma}(\hat{Y}) = \sum_{h=1}^{H} \sum_{i=1}^{n_h} \sum_{j>i}^{n_h} \left(\frac{\pi_{(h)i}\pi_{(h)j}}{\pi_{(h)ij}} - 1 \right) \left(\frac{y_{hi}}{\pi_{(h)i}} - \frac{y_{hj}}{\pi_{(h)j}} \right)^2$, that is the Sen-Yates-Grundy formula.

This formula has been used because we refer to the Hanurav-Vijayan algorithm to select sample units.

It enables computation of joint selection probabilities and provides joint selection probabilities values that usually ensure non negativity and stability of Sen-Yates-Grundy variance estimator.

In the following tables, estimates of the sample errors are reported for the variable days at sea used for the calculation of the fishing effort.

Table 1- Estimate of the relative error (CV) for fishing techniques and quarter

	I quarter 03	**II quarter 03**	**III quarter 03**
demersal trawls	0,015	0,013	0,016
pelagic trawls and seiners	0,042	0,033	0,052
polyvalent - passive gears	0,077	0,037	0,149
dredges	0,038	0,053	0,046
passive gears <12m	0,031	0,028	0,031
combining mobile and passive gears	0,028	0,032	0,034

Estimation of the sample errors for landings per species

The sampling relative error depends on the sampling design and, therefore, even the relative error estimator depends on the sampling design.

The population has been split up into H stratum and, in each of them, units are homogeneous in variables we are studying.

From each stratum, independently and without replacement, sample units have been selected with probability proportional to size (PPS sampling). In this case, the "size" is defined by the LFT (length overall).

Sample units have been selected with the Hanurav-Vijayan algorithm and the variable totals have been estimated through the Horvitz-Thompson estimator:

$\hat{Y} = \sum_{h=1}^{H} \sum_{i=1}^{n_h} \frac{y_{hi}}{\pi_{(h)i}}$, Where h is the stratum exponent and i indicates the sample units.

To evaluate the goodness of this estimator, the relative error has been calculated. The estimate of the relative error is the coefficient of variation for the variable "total estimator":

$\overline{CV} = \frac{\hat{\sigma}\left(\hat{Y}\right)}{\hat{Y}}$,

where:

$\hat{\sigma}(\hat{Y}) = \sum_{h=1}^{H} \sum_{i=1}^{n_h} \sum_{j>i}^{n_h} \left(\frac{\pi_{(h)i}\pi_{(h)j}}{\pi_{(h)ij}} - 1 \right) \left(\frac{y_{hi}}{\pi_{(h)i}} - \frac{y_{hj}}{\pi_{(h)j}} \right)^2$, that is the Sen-Yates-Grundy formula.

This formula has been used because we refer to the Hanurav-Vijayan algorithm to select sample units.

It enables computation of joint selection probabilities and provides joint selection probabilities values that usually ensure non negativity and stability of Sen-Yates-Grundy variance estimator.

In the following table, estimates of the sample errors are reported for the landings per species (volume and value), per fishing technique and per quarter. For each fishing technique only relative errors of most relevant species (in terms of quantities) are reported.

Table 1- Estimate of the relative error (CV) for fishing techniques, quarter and species

		I quarter 03	II quarter 03	III quarter 03

Fishing technique	Species (scientific name)	volume	value	volume	value	volume	value
demersal trawls	*Boops boops*	0,08	0,08	0,06	0,09	0,08	0,09
	Micromesistius poutassou	0,08	0,07	0,06	0,08	0,08	0,11
	Merluccius merluccius	0,04	0,05	0,05	0,05	0,04	0,05
	Trachurus trachurus	0,09	0,12	0,08	0,10	0,09	0,11
	Mullus barbatus	0,09	0,06	0,06	0,07	0,09	0,08
	Osteichthyes	0,07	0,09	0,05	0,09	0,05	0,08
	Ommastrephidae	0,04	0,05	0,06	0,07	0,06	0,06
	Sepia officinalis	0,14	0,09	0,06	0,06	0,08	0,07
	Octopus spp	0,14	0,12	0,15	0,13	0,12	0,12
	Eledone cirrosa	0,09	0,11	0,08	0,10	0,11	0,18
	Eledone moschata	0,08	0,08	0,08	0,09	0,08	0,09
	Mollusca	0,19	0,14	0,19	0,16	0,15	0,14
	Parapenaeus longirostris	0,05	0,05	0,05	0,05	0,07	0,06
	Nephrops norvegicus	0,08	0,08	0,08	0,06	0,08	0,07
	Squilla mantis	0,07	0,08	0,07	0,07	0,07	0,07
pelagic trawls and seiners	*Engraulis encrasicolus*	0,07	0,07	0,08	0,06	0,07	0,08
	Sardina pilchardus	0,11	0,11	0,10	0,10	0,12	0,11
	Thunnini	0,03	0,05	0,05	0,04	0,05	0,05
	Scomber japonicus	0,14	0,17	0,13	0,16	0,11	0,18
	Boops boops	0,08	0,17	0,22	0,28	0,43	0,49
	Mugilidae	0,22	0,26	0,47	0,34	0,26	0,23
	Trachurus trachurus	0,27	0,37	0,12	0,15	0,18	0,20
	Osteichthyes	0,10	0,09	0,15	0,21	0,13	0,23
polyvalent - passive gears	*Thunnus alalunga*	0,50	0,62	0,17	0,08	0,65	0,73
	Sarda sarda	0,22	0,22	0,92	0,92	0,81	0,76
	Xiphias gladius	0,14	0,13	0,24	0,27	0,32	0,36
	Osteichthyes	0,18	0,15	0,08	0,06	0,27	0,24
dredges	*Venus gallina*	0,05	0,05	0,03	0,04	0,06	0,06
passive gears <12m	*Thunnus alalunga*	0,27	0,30	0,30	0,30	0,45	0,50
	Sarda sarda	0,33	0,31	0,41	0,39	0,54	0,49
	Boops boops	0,23	0,23	0,20	0,22	0,17	0,21
	Mugilidae	0,51	0,27	0,24	0,20	0,18	0,18
	Merluccius merluccius	0,34	0,27	0,18	0,16	0,14	0,14
	Mullus barbatus	0,14	0,16	0,13	0,12	0,16	0,14
	Osteichthyes	0,07	0,07	0,08	0,07	0,07	0,09
	Sepia officinalis	0,11	0,11	0,09	0,09	0,09	0,09
	Octopus spp	0,17	0,13	0,09	0,09	0,13	0,13
	Mollusca	0,29	0,18	0,66	0,30	0,03	0,50

combining mobile and passive gears	*Scomber scombrus*	0,25	0,25	0,40	0,39	0,22	0,22
	Boops boops	0,23	0,25	0,25	0,24	0,46	0,43
	Trisopterus minutus capelanus	0,45	0,45	0,45	0,52	0,32	0,30
	Spicara spp	0,44	0,45	0,44	0,44	0,70	0,57
	Merluccius merluccius	0,12	0,12	0,12	0,10	0,30	0,30
	Trachurus trachurus	0,28	0,25	0,29	0,28	0,09	0,10
	Mullus barbatus	0,13	0,13	0,26	0,19	0,33	0,27
	Osteichthyes	0,08	0,09	0,08	0,07	0,17	0,16
	Ommastrephidae	0,12	0,13	0,14	0,17	0,13	0,11
	Sepia officinalis	0,11	0,11	0,18	0,15	0,16	0,18
	Eledone cirrosa	0,16	0,16	0,13	0,15	0,14	0,15
	Eledone moschata	0,19	0,19	0,16	0,18	0,43	0,36
	Mollusca	0,22	0,23	0,18	0,19	0,27	0,29
	Parapenaeus longirostris	0,25	0,30	0,26	0,33	0,33	0,32
	Xiphias gladius	0,30	0,29	0,20	0,20	0,36	0,41
	Squilla mantis	0,22	0,22	0,22	0,23	0,20	0,23

Table 2- Estimate of the relative error (CV) for species and quarter

	I quarter 03		**II quarter 03**		**III quarter 03**	
Species	**volume**	**value**	**volume**	**value**	**volume**	**value**
Engraulis encrasicolus	0,10	0,08	0,08	0,09	0,08	0,09
Sardina pilchardus	0,11	0,14	0,10	0,12	0,12	0,15
Thunnus alalunga	0,26	0,31	0,12	0,12	0,29	0,33
Sarda sarda	0,21	0,22	0,29	0,29	0,38	0,38
Thunnus thynnus	0,34	0,37	0,08	0,10	0,26	0,29
Thunnini	0,74	0,70	0,25	0,26	0,22	0,19
Xiphias gladius	0,19	0,22	0,13	0,13	0,12	0,13
Scomber scombrus	0,12	0,12	0,15	0,14	0,18	0,15
Scomber japonicus	0,14	0,16	0,13	0,15	0,10	0,17
Tetrapturus belone	0,67	0,66	0,32	0,31	0,46	0,46
Boops boops	0,10	0,13	0,09	0,11	0,17	0,18
Trisopterus minutus capelanus	0,25	0,23	0,26	0,26	0,33	0,26
Mugilidae	0,21	0,17	0,24	0,19	0,13	0,14
Eutrigla gurnardus	0,20	0,27	0,25	0,22	0,14	0,16
Conger spp	0,13	0,16	0,15	0,19	0,15	0,17
Atherinidae	0,19	0,27	0,19	0,25	0,23	0,27
Lophius budegassa	0,08	0,08	0,08	0,09	0,08	0,10
Lophius piscatorius	0,16	0,14	0,13	0,13	0,12	0,12
Micromesistius poutassou	0,08	0,10	0,06	0,08	0,08	0,11
Spicara spp	0,20	0,21	0,25	0,24	0,21	0,29
Merlangius merlangus	0,15	0,11	0,15	0,15	0,17	0,20
Merluccius merluccius	0,05	0,05	0,04	0,04	0,04	0,04

Pagellus erythrinus	0,12	0,11	0,10	0,13	0,10	0,16
Seriola dumerili	0,21	0,22	0,37	0,38	0,19	0,15
Trachurus mediterraneus	0,01	0,02	0,00	0,01	0,00	0,01
Trachurus trachurus	0,09	0,10	0,11	0,13	0,13	0,12
Solea vulgaris	0,33	0,17	0,19	0,12	0,18	0,19
Trigla lucerna	0,53	0,50	0,55	0,51	0,56	0,52
Mullus barbatus	0,08	0,06	0,06	0,06	0,07	0,06
Mullus surmuletus	0,13	0,12	0,09	0,09	0,13	0,10
Raja miraletus	0,87	0,87	0,60	0,58	0,60	0,54
Raja clavata	0,43	0,40	0,42	0,32	0,37	0,31
Elasmobranchii	0,24	0,25	0,27	0,30	0,22	0,25
Osteichthyes	0,04	0,04	0,04	0,05	0,05	0,06
Venus gallina	0,05	0,05	0,03	0,04	0,06	0,06
Loligo vulgaris	0,07	0,08	0,07	0,08	0,07	0,08
Ommastrephidae	0,04	0,06	0,07	0,10	0,07	0,09
Sepia officinalis	0,08	0,06	0,07	0,06	0,05	0,05
Octopus spp	0,10	0,08	0,08	0,07	0,08	0,08
Eledone cirrosa	0,08	0,10	0,07	0,08	0,10	0,17
Eledone moschata	0,07	0,08	0,07	0,09	0,08	0,09
Pecten jacobeus	0,39	0,39	0,46	0,45	0,60	0,54
Veneridae	0,27	0,27	0,32	0,33	0,30	0,31
Mollusca	0,15	0,11	0,33	0,14	0,46	0,18
Parapenaeus longirostris	0,06	0,06	0,05	0,06	0,08	0,07
Aristeomorpha foliacea	0,16	0,16	0,10	0,10	0,11	0,11
Aristeus antennatus	0,21	0,22	0,15	0,16	0,23	0,21
Nephrops norvegicus	0,08	0,07	0,07	0,06	0,08	0,07
Squilla mantis	0,07	0,08	0,07	0,08	0,08	0,11
Penaeus kerathurus	0,29	0,22	0,40	0,38	0,32	0,29
Crangon crangon	0,25	0,28	0,25	0,24	0,36	0,34
Portunus spp	0,21	0,22	0,24	0,28	0,22	0,29
Crustacea	0,13	0,14	0,10	0,12	0,10	0,12
Total landings	0,03	0,02	0,03	0,02	0,03	0,02

Table 3- Estimate of the relative error (CV) of landings (volume and value) for fishing techniques and quarter

	I quarter 03		**II quarter 03**		**III quarter 03**	
	volume	**value**	**volume**	**value**	**volume**	**value**
demersal trawls	0,03	0,02	0,02	0,02	0,03	0,02
pelagic trawls and seiners	0,06	0,04	0,05	0,04	0,06	0,05
polyvalent - passive gears	0,21	0,18	0,05	0,11	0,27	0,28
dredges	0,04	0,04	0,04	0,05	0,04	0,05
passive gears <12m	0,07	0,05	0,07	0,05	0,07	0,05
combining mobile and passive gears	0,06	0,05	0,07	0,05	0,08	0,05

Estimation of the sample errors for economic data by group of vessels

The sampling relative error depends on the sampling design and, therefore, even the relative error estimator depends on the sampling design.

The population has been split up into H stratum and, in each of them, units are homogeneous in variables we are studying.

From each stratum, independently and without replacement, sample units have been selected with probability proportional to size (PPS sampling). In this case, the "size" is defined by the LFT (length overall).

Sample units have been selected with the Hanurav-Vijayan algorithm and the variable totals have been estimated through the Horvitz-Thompson estimator:

$\hat{Y} = \sum_{h=1}^{H} \sum_{i=1}^{n_h} \frac{y_{hi}}{\pi_{(h)i}}$, Where h is the stratum exponent and i indicates the sample units.

To evaluate the goodness of this estimator, the relative error has been calculated. The estimate of the relative error is the coefficient of variation for the variable "total estimator":

$\overline{CV} = \frac{\hat{\sigma}(\hat{Y})}{\hat{Y}}$,

where: $\hat{\sigma}(\hat{Y}) = \sum_{h=1}^{H} \sum_{i=1}^{n_h} \sum_{j>i}^{n_h} \left(\frac{\pi_{(h)i}\pi_{(h)j}}{\pi_{(h)ij}} - 1 \right) \left(\frac{y_{hi}}{\pi_{(h)i}} - \frac{y_{hj}}{\pi_{(h)j}} \right)^2$, that is the Sen-Yates-Grundy formula.

This formula has been used because we refer to the Hanurav-Vijayan algorithm to select sample units.

It enables computation of joint selection probabilities and provides joint selection probabilities values that usually ensure non negativity and stability of Sen-Yates-Grundy variance estimator.

In the following tables, estimates of the sample errors are reported for the economic variables for the year 2002.

Table 1- Estimate of the relative error (CV) for fishing techniques

	Gross revenues	Fuel cost	Repair and maintenance	Other productive costs	Labour costs	Total production costs
demersal trawls	0,021	0,018	0,067	0,022	0,027	0,019
pelagic trawls and seiners	0,024	0,019	0,080	0,035	0,029	0,024
dredges	0,031	0,095	0,110	0,149	0,033	0,043
passive gears <12m	0,074	0,043	0,129	0,073	0,113	0,083
combining mobile and passive gears	0,022	0,034	0,097	0,039	0,028	0,025
Total fleet	0,022	0,014	0,051	0,022	0,031	0,021

5 ANNEX 2: LIST OF PARTICIPANTS

Name	Address	phone	fax	e-mail
Arneri Enrico	ISMAR-CNR Sezione Pesca Marittima Largo Fiera della Pesca 60125 Ancona Italy	+39-071-20-78-849	+39-071-55-313	e.arneri@ismar.cnr.it
Borges Lisa	Fisheries Science Services The Marine Institute Snugboro Road Abbotstown Dublin 15 Ireland	+35-31-822-8200	+35-31-8205077	Lisa.borges@marine.ie
Cardinale Massimiliano	Havsfiskelaboratoriet Box 4 453 21 Lysekil Sweden	+46-730-34-22-09	+46-523-18977	massimiliano.cardinale@fiskeriverket.se
Chicharo Luis	Urb. Gambelinhas Lote 8 8000 Gambelas Faro Portugal	+35 12 89 8179 92	+35-289-818353	Ichichar@ualg.pt
Di Natale Antonio	Aquastudio via Trapani, 6 98121 Messina Italy	+-39-090-34-64-08 / +39-010-23-45-221	00-39-090-36-45-60 / 00-39-010-25-61-60	aquauno@tin.it adinatale@acquariodigenova.it
Eltink Guus	RIVO-DLO Rijksinstituut voor Visserijonderzoek Haringkade 1 P.O. Box 68 NL – 1970 AB Ijmuiden	+31 255 56 46 91	+31 255 56 46 44	Guus.Eltink@wur.nl
Ernst Peter	Bundesforschungsanstalt für Fischerei An der Jägerbäk, 2 18069 Rostock Germany	+49-38-18-10-352	00-49-38-18-10-445	peter.ernst@jor.bfa-fisch.de

Folmer Ole	Danish Institute for Fisheries Research Charlottenlund Slot 2920 Charlottenlund Denmark	+45-33-96-3300	+45-33-963333	ofo@dfu.min.dk
Hatcher Aaron	Centre for the Economics and Management of Aquatic Resources (CEMARE) Department of Economics University of Portsmouth Boathouse 6 HM Naval Dockyard Portsmouth PO1 3LJ United Kingdom	+44-23-92-844230	+44-23-92-844614	Aaron.hatcher@port.ac.uk
Klepper Rainer	Federal Research Center of Agriculture Germany	+49-531-15-965322	+49-531-59-65322	Rainer.klepper@fal.de
Koutrakis Manos	National Agricultural Research Foundation Fisheries Research Institute 640 07 Kavala Greece	+30 59 40 22 692	+30 5940 222 22	koutrman@otenet.gr (fri@otenet.gr)
Martin Paloma	CSIC Instituto de Ciencias del Mar Passeig Marítim, 37-39 08003 Barcelona Spain	+34-93-2309552	+34-93-2309555	paloma@icm.csic.es
Millner Richard	Cefas Fisheries Laboratory Pakefield Road Lowestoft Suffolk NR 33 OHT United Kingdom	+44 1502 56 22 44	+44 1502 52 45 11	r.s.millner@cefas.co.uk
Myllylä Timo	Finish Game and Fisheries Research Institute Turku Game and Fisheries Research	+358-205-751-686	+358-205-751-689	timo.myllyla@rktl.fi

	Itäinen Pitkäkatu 3 FIN – 20520 TURKU			
Newton Andrew	Fisheries Research Services The Marine Laboratory 375 Victoria Road Aberdeen AB11 9DB United Kingdom	+44-12-24-295396	+44-12-24-295511	newtona@marlab.ac.uk
Quincoces Iñaki	AZTI Itsas Ikerketa Saila Unidad de Investigación Marina Marine Research Division Txatxarramendi Ugartea, z/g 48395 Sukarrieta Bizkai Spain	+34-94-602-94-00	+34-94-687-00-06	iquincoces@suk.azti.es
Redant Franck	CLO – Sea Fisheries Department Ankerstraat 1 8400 Oostende Belgium	+32-59-34-22-61	+32-59-33-06-29	Frank.redant@dvz.be
Rodgers Philip	Centre for Fisheries Economics Research 125 Mill Lane, Saxilby Lincs LNI 2HN United Kingdom	+44-15-22-703203	+44-15-22-703203	phil@cferltd.com
Sabatella Evelina	Irepa Onlus Via San Leonardo, trav. Migliaro Salerno Italia	+39-089-338978	+39-089-330835	Esabatella@irepa.org
Vigneau Joël	IFREMER 150 Quai Gambetta F-62321 Boulogne sur mer Cedex France	+33-2-31-51-13-00	+33-2-31-51-13-01	Joel.vigneau@ifremer.fr