PGCCDBS REPORT 2011

ICES ADVISORY COMMITTEE

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Report of the Planning Group on Commercial Catches, Discards and Biological Sampling (PGCCDBS)

7 – 11 February 2011

Vienna, Austria

ICES International Council for the Exploration of the Sea

CIEM Conseil International pour l'Exploration de la Mer

International Council for the Exploration of the Sea
Conseil International pour l'Exploration de la Mer

H. C. Andersens Boulevard 44–46
DK-1553 Copenhagen V
Denmark
Telephone (+45) 33 38 67 00
Telefax (+45) 33 93 42 15
www.ices.dk
info@ices.dk

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Executive summary

The Planning Group on Commercial Catches, Discards and Biological Sampling [PGCCDBS] (Co-Chairs: Christoph Stransky, Germany, and Kjell Nedreaas, Norway) met in Vienna, Austria, 7-11 February 2011. The Planning Group and workshops are proposed in response to the EC-ICES Memorandum of Understanding that requests ICES to provide support for the Data Collection Framework (DCF; EC Reg. 199/2008 and 665/2008, Decisions 2008/949/EC and 2010/93/EU). PGCCDBS is the ICES forum for planning and co-ordination of collection of data for stock assessment purposes; it coordinates and initiates the development of methods and adopts sampling standards and guidelines. Many activities in this group are closely linked to the activities of the DCF, and DG MARE of the European Commission is a member of PGCCDBS to ensure coordination with the DCF activities. Stock assessment requires data covering the total removal from the fish stocks and the PG serves as a forum for coordination with non-EU member countries where appropriate. Since 2007, Mediterranean scientists have organised a Mediterranean Planning Group for Methodological Development (PGMED) to deal with specific sampling issues of this area. Although organised in an autonomous group, it was agreed among all scientists that the contact and cooperation between the Mediterranean area the ICES area should be promoted and maintained. The link between the two planning groups is maintained through: (i) the organisation of parallel meetings; (ii) the organisation of joint plenary sessions for generic issues, and (iii) the organisation of joint workshops.

Last year's recommendations and intersession work were reviewed. Most of them were concluded with success and those not concluded gave rise to developments carried out during this year.

The intersession work was related to developing a strategy for the analysis of between-reader variation of ageing and maturity staging, the further development of a forum for age readers, the review of relevant conferences and self-sampling programmes, as well as creating an overview page on past age-reading workshops and exchanges.

The Group reviewed reports from relevant Expert Groups with respect to recommendations addressed to PGCCDBS. As feedback mechanism from data users (mainly assessment WGs and benchmark assessment WKs) to the PG, 'data contact persons' have been nominated with a set of tasks to report on data problems and function as link between data collectors and data users. PGCCDBS acts as an advisory group on the further development of InterCatch.

Recent changes in data collection (e.g. through the revised EU DCF) were reviewed and the need for workshops was defined.

PGCCDBS was requested by WGCHAIRS 2011 to develop some templates for reporting on quality of input data for stock assessments. Suggested formats for documenting international sampling coverage and intensity are given in the report.

In order for ICES to demonstrate that fishery management advice is based on the best available, quality-assured and peer-reviewed data according to the QAF, the PGCCDBS recommends a complete revision of the way in which AWGs manage their data compilation and evaluation. The Group found it important to build a strong bridge between data collection and processed data sets and parameter estimates used in stock assessments, and suggest the establishment of Data workshops to facilitate this.

PGCCDBS stresses that initiatives should be taken in order to make sure that all countries give access to VMS and logbook data. PGCCDBS also suggest establishing a forum, participated by field sampling staff and IT-developers, engineers, in which new ideas and new techniques can be discussed and suggested.

Workshops have become an important tool to deal with tasks required by the PG. At the moment, there are two types of workshops: methodological workshops that deal with general methods of applications to all areas/species/fisheries; and calibration workshops that include age reading and maturity staging and deal with promoting agreement among scientists classifying otoliths and gonads of specific species or groups of species. All workshops are carried out as official ICES workshops and the reports stored on the PGCCDBS documents repository:
http://www.ices.dk/reports/acfm/pgccdbs/PGCCDBSdocrepository.asp

The results of the several workshops on methodology, maturity staging and age reading were presented and discussed. In general, there was a good acceptance of the work done so far although several issues were identified that require improvements.

The methodological workshops WKACCU, WKPRECISE and WKMERGE previously initiated by PGCCDBS have provided valuable general knowledge in how catch sampling programs can be designed and the reports are beneficial for countries aiming to improve on current programs by reducing or eliminating sources of bias, and improve the cost-efficiency. PGCCDBS further stresses the need to establish a methodological support system for designing and analyses of catch sampling programs, and suggests that a series of workshops on practical implementation of national and regional catch sampling programs be set up. The goal is to include case-studies in WKPICS1 and WGPICS2 that together with the findings from the prior workshops will form the basis for a reference book on survey sampling methods applied to catch-sampling programs, as this is missing at the present time. The main aim with the series of workshops would be to provide countries with enough support to design and implement scientifically sound and transparent sampling programs enabling quality assessment of estimates used for stock assessment.

Guidelines for organizing otolith exchanges, workshops on age calibration and on maturity staging were updated and will ensure that the key issues are addressed in a consistent manner. Based on the reviewed information, a set of small otolith exchanges (brill, black-spot sea bream, mullets, sprat, Spanish mackerel, sea bass, Bay of Biscay sole, redfish, hake) and full otolith exchanges (anglerfish, turbot, roundnose grenadier) are planned for 2011-2013. Furthermore, methodological workshops (catch sampling), age reading workshops (deepwater species) and maturity workshops (gadoids; turbot & brill; sole, plaice, dab and flounder) were proposed for 2012-2013. Furthermore, a workshop for national age reader coordinators will be held in 2011 and a workshop for maturity workshop chairs is recommended for 2012.

The report also contains a full and updated list of national age readers and coordinators.

1 Introduction

1.1 Terms of Reference

2010/2/ACOM41 The **Planning Group on Commercial Catches, Discards and Biological Sampling** [PGCCDBS], chaired by Christoph Stransky, Germany, and Kjell Nedreaas, Norway, will meet in Vienna, Austria, 7-11 February 2011, to:

a) Review and follow up of last year's recommendations and intersession work;

b) Review reports from PGCCDBS contact persons with Assessment Working Groups. Where appropriate, propose changes to sampling strategies, protocols, and levels for implementation within the EU Data Collection Framework and national centres responsible for sampling commercial catches;

c) Identify changes or proposals for changes in data collection, which may have a potential impact on stock assessment, and summarise these changes for consideration by the Assessment Working Groups;

d) Report on the implementation of the Quality Assurance Framework (QAF) into stock assessments;

e) Review progress in methods and equipment to improve the data collection from fisheries;

f) Agree on a workplan for 2012 for further developing and finalising standards and best practices for sampling commercial fisheries.

1.2 Participants

First name	Last name	Country
Mike	Armstrong	UK-England
Margaret	Bell	UK-Scotland
Ulrich	Berth	Germany
Antonio	Cervantes	European Commission
Ken	Coull	UK-Scotland
Jørgen	Dalskov	Denmark
Christian	Dintheer	France
Jon	Elson	UK-England
Mónica	Felício	Portugal
Wlodzimierz	Grygiel	Poland
Ryszard	Grzebielec	Poland
Maria	Hansson	Sweden
Georgs	Kornilovs	Latvia
Ari	Leskelä	Finland
Kélig	Mahé	France
William	McCurdy	UK-Northern Ireland
Kelle	Moreau	Belgium
Cristina	Morgado	ICES Secretariat
Estanis	Mugerza	Spain
Kjell	Nedreaas*	Norway

First name	Last name	Country
Gráinne	Ní Chonchúir	Ireland
Jukka	Pönni	Finland
Alastair	Pout	UK-Scotland
Tiit	Raid	Estonia
Herwig	Ranner	European Commission
Dália	Reis	Portugal
Katja	Ringdahl	Sweden
Jose	Rodriguez	Spain
Fran	Saborido-Rey	Spain (part-time)
Romas	Statkus	Lithuania
Marie	Storr-Paulsen	Denmark
Christoph	Stransky*	Germany
Els	Torreele	Belgium
Edwin	van Helmond	The Netherlands
Sieto	Verver	The Netherlands
Francesca	Vitale	Sweden
Jon Helge	Vølstad	Norway
Lotte	Worsøe Clausen	Denmark
Lucia	Zarauz	Spain
Annemie	Zenner	Belgium

*Co-chairs

1.3 Background

The Planning Group and related workshops are proposed in response to the EC-ICES Memorandum of Understanding (MoU) that requests ICES to provide support for the Data Collection Framework (DCF; EC Reg. 199/2008, 665/2008; Decisions 2008/949/EC and 2010/93/EU).

PGCCDBS is the ICES forum for planning and co-ordination of collection of data for stock assessment purposes; it coordinates and initiates the development of methods and adopts sampling standards and guidelines. Many activities in this group are closely linked to the activities of the DCF, and DG MARE is a member of PGCCDBS to ensure coordination with the DCF activities. Stock assessment requires data covering the total removal from the fish stocks and the PG serves as a forum for coordination with non-EU member countries where appropriate.

The PG shall develop and approve standards for best sampling practices within its remits and for fisheries in the ICES area. The implementation of these practices is discussed regionally and implemented nationally.

The PG coordinates initiatives for workshops and other activities to address specific problems. The success of the workshops requires a substantial amount of preparatory work in the laboratories. This preparatory work is the responsibility of the national laboratories. ICES has been informed that this work is included in the DCF National Programmes.

There are five Regional Co-ordination Meetings (RCMs) relevant to the PG work: 1) North Sea and Eastern Arctic, 2) Baltic Sea, 3) North Atlantic, 4) Mediterranean, 5) Long-Distance Fisheries. These RCMs are fora where EU Member States discuss how best to implement their National Programmes.

1.4 General introductory remarks and work plan

The PGCCDBS has increasingly become a more action-based group that could plan and execute tasks. With this is mind, the experts attending the group aim at moving beyond recommending, by providing actions, identifying responsibilities and defining schedules to fulfil the tasks proposed.

PGCCDBS took on some tasks and defined intersession work to be carried out during 2011. The tasks, their coordinators and deadlines were agreed during the meeting and are included in a specific section about intersession work (section 7.4).

Once more, the stabilisation of the ToRs contributed to clarify the role of the PG in the ICES advisory system and largely contributed to an efficient meeting. The work of an expert group like PGCCDBS, with 40 participants from 16 countries, was built along the years and increasingly found its role within ICES.

The meeting was organised in small subgroups with 4 to 10 scientists dealing with specific tasks. This allowed the group to be more efficient and promoted a wider contribution to our final results.

The use of online tools to deal with our tasks and support the meeting organisation was extended. The SharePoint site was used to store background information and presentations, revise sub-group results and report sections. These tools supported the development of our work and created conditions to continue our tasks intersessionally.

1.5 Cooperation with PGMED

Since 2007, Mediterranean scientists have organised a Mediterranean Planning Group for Methodological Development (PGMED) to deal with specific sampling issues of this area. Although organised in an autonomous group, it was agreed among all scientists that the contact and cooperation between the Mediterranean area the ICES area should be promoted and maintained.

The link between the two planning groups is maintained through: (i) the organisation of parallel meetings; (ii) the organisation of joint plenary sessions for generic issues, and (iii) the organisation of joint workshops. The PGMED report is available under the PGCCDBS Sharepoint
http://groupnet.ices.dk/PGCCDBS2011/PGMed/Forms/AllItems.aspx.

1.6 Workshops

Workshops have become an important tool to deal with tasks required by the PG. At the moment, there are two types of workshops:

- methodological workshops that deal with general methods of applications to all areas/species/fisheries;
- calibration workshops that include age reading and maturity staging and deal with promoting agreement among scientists classifying otoliths and gonads of specific species or groups of species.

All workshops are carried out as official ICES workshops and the reports stored on the "PGCCDBS Documents Repository", in PDF format and available to the public (http://www.ices.dk/reports/acfm/pgccdbs/PGCCDBSdocrepository.asp), maintained by the ICES Secretariat.

The group continues to promote the idea that the work done in (a group of) certain workshops should be published under the ICES Cooperative Research Report series (CRR) when ready for synopsis. Such a publication should constitute a major contribution to the literature by reporting the state of the art of scientific knowledge regarding a species or a group of species. It is our view that this process will promote quality of this work and will constitute an important recognition of the scientists involved. During 2009, a CRR on hake age calibration was published (Piñeiro *et al.* 2009), and other examples will be promoted.

1.7 Project proposals

The project proposal on the 'Age Determination and Maturity Staging of species not previously subjected to biological sampling for analytical assessments', drafted at PGCCDBS 2009 and 2010, was further developed at this year's meeting (incorporating latest progress in the NESPMAN project and ICES WGNEW 2010) and is presented in section 7.4.3.

Further development of COST (a Common "Open Source" Tool for assessing the accuracy of the biological data and parameters estimates collected for stock assessment purposes, see section 5.4) and WebGR (web services for support of growth and reproduction studies, see section 4.4.2) was discussed during the meeting, and project proposals will be made (see sections 7.4.4 and 7.4.5).

A reference book in catch sampling with contemporary methodology and examples is presently missing from the fisheries literature. The goal is to apply for funding to collate the findings of previous workshops arranged by PGCCSBS (e.g., WKACCU, WKPRECISE, and WKMERGE), as well as results from the planned WKPICS1 and WKPICS2, into a reference book. This book should describe how national and regional sampling schemes and associated estimators can be developed and implemented in practice for a wide range of typical fishery sampling scenarios. The completion of a reference book will require the participation of a team of experts in survey sampling methods and practitioners as well as experts on the DCF. A project proposal will be made, see section 7.4.6.

1.8 Organisation of the report

This report is organised by Terms of Reference (ToR), starting with Section 2 for ToR a) to Section 7 for ToR f). A set of annexes was added including the list of participants, agenda, ToR for 2012, the WK proposals and recommendations, as well as other information that is too spacious for the main part of the report.

2 Review and follow up of last year's recommendations and intersession work (ToR a)

The group reviewed last year's PGCCDBS recommendations:

PGCCDBS 2010 report section	Recommendation	For follow up by	Timeframe	Status at PGCCDBS 2011
2	PGCCDBS recommends that those involved in future age calibration exchanges and workshops should adhere to the guidelines for both exchanges and workshops as outlined by the PG in its 2008 report.	Chairs of age reading WKs and co-ordinators of otolith exchanges.	From now on.	Guidelines for age reading workshops and otolith exchanges were revised, see section 4.2.6 and Annexes 9 and 10.
3.1	PGCCDBS recommends that RCMs provide an overview of data collection and availability for protected species.	RCMs	April/May 2010	RCMs have commented that they only deal with DCF sampling (fish and commercially utilised invertebrates, no marine mammals or sea turtles), SGBYC should define the list of "protected species"
3.1	PGCCDS recommends that ICES Secretariat provides a list of stocks to WGDEEP and relevant RCMs so that RCMs can provide an overview of deep-sea fisheries data available.	ICES Secretariat, RCMs	April/May 2010	RCM NA has provided lists of metier-based and stock-based sampling of deep-sea fish(eries).
3.1	PGCCDBS recommends that data on discards, length distributions of landings and ALKs for megrim in Div. VIIIc/IXa, with indicators of quality, should be provided by Portugal to WGHMM.	RCM North Atlantic	April 2010	RCM NA recommended that Portugal provides these data and that STECF-SGRN monitors this progress.
3.1	PGCCDBS recommends that an internationally coordinated project to obtain basic biological data for *Nephrops* from the various FUs should be instigated. Data to include growth, natural mortality, burrow occupancy and size of animal in relation to burrow size.	ICES SGNEPS	Nov. 2010	This recommendation was dealt with at SGNEPS 2010, no follow-up necessary.
3.1	PGCCDBS recommends that WGSAM, in conjunction with IBTSWG and WGBIFS formulate a common proposal to address multispecies interactions in the North Sea and Baltic Sea. A new international coordinated stomach sampling program is recommended	WGSAM, IBTSWG, WGBIFS	Oct. 2010, March 2010/2011	WGSAM 2010 recommended that IBTSWG and WGBIFS include stomach sampling in their manuals; Sampling from commercial fleet

PGCCDBS 2010 report section	Recommendation	For follow up by	Timeframe	Status at PGCCDBS 2011
	both in the North Sea and the Baltic Sea to track changes in the food web, to be used for estimation of predation mortalities and to facilitate an ecosystem approach to management.			may complement coverage of seasons and areas. Funding of stomach analyses has to be raised through external funds (e.g. EU Calls for Tender).
3.1	PGCCDBS recommends that ICES further collaborates with the fishing industry to provide a stock-by-stock list of data requirements that can be incorporated into national data collection programmes, considering the the outcomes of WKUFS and WKSC.	MIRAC	January 2011	Collaboration between ICES and RACs on this issue was initiated early 2011.
3.1	PGCCDBS recommends that the documentation of discarding of deep-waters sharks should be improved by developing or intensifying collaborative projects with the fishing industry, including self-sampling and collection of samples for lab analysis. Consideration should be given to the outcomes of WKUFS and WKSC.	MIRAC	January 2011	Collaboration between ICES and RACs on this issue was initiated early 2011.
3.1	PGCCDBS recommends that WGEF formulates a proposal for a small-scale study to: a) improve logbook recordings by species ID keys and by revision of legal requirements, and b) establish species ID methods by genetics etc., in order to improve species ID for the Centrophoridae family, particularly those occurring in the NE Atlantic (e.g. *C. granulosus, C. lusitanicus*).	WGEF	June 2010	WGEF is working on this issue intersessionally until their next meeting (June 2011).
3.1	PGCCDBS recommends that WGEF formulates a proposal for a small-scale study on stock structure of deep-water sharks that should be considered in conjunction with the proposed workshop on age reading (WKARDS 2012, see Annex 15).	WGEF	June 2010	WGEF is working on this issue intersessionally until their next meeting (June 2011).
3.1	PGCCDBS recommends that the ICES Secretariat contacts the Chair of WKMSEL to ensure that the following issues are addressed in their ToRs: 1) address reproductive strategy of the deep-water squalid sharks *Centrophorus squamosus* and *Centroscymnus coelolepis*, 2) adopt standard maturity scale and	ICES Secretariat, WKMSEL	until October 2010	Although not included as separate ToRs, WKMSEL discussed these issues.

PGCCDBS 2010 report section	Recommendation	For follow up by	Timeframe	Status at PGCCDBS 2011
	calibrate the staging criteria between labs, 3) consequently, consider a workshop for standardization of criteria used to assign maturity stages between labs as well as on sampling protocols to guarantee adequate levels of precision.			
3.1	PGCCDBS recommends that WGDEEP prepares illustrated definitions on length measurement procedures for roundnose grenadier and distribute these through RCMs.	WGDEEP, RCMs	April/May 2010/2011	Not followed up by WGDEEP 2010, PGCCDBS repeats this recommendation for WGDEEP 2011.
4.2.2.8	PGCCDBS recommends the use of the Age Reader Forum (see section 4.2.4) in tandem with the WebGR tool (see section 4.4.3) for otolith exchanges and age reading workshops.	Co-ordinators of otolith exchanges, Age reading WK Chairs	From now on	See section 4.2.4 (Age Readers Forum)
4.2.3	PGCCDBS recommends stronger collaboration between stock-assessment statisticians and Chairs of age reading workshops. The approach of the WKAEH could serve as a good example in this respect.	Assessment WGs, Age reading WK Chairs	From now on	WGCHAIRS 2011 suggested that Assessment WG Chairs could be invited to Age reading WKs to establish this link.
4.2.3	PGCCDBS recommends developing the 'Guus Eltink spreadsheet' for comparisons of age readings further and into a non-Excel based shape. The outcomes of calibration exercises should feed directly into assessment models, e.g. by producing a matrix stating the variance or CV around the estimation of a given age and quantifying this into a variance parameter for the age distribution of the stock.	PGCCDBS intersession work.	until PGCCDBS 2011	WKNARC should discuss further progress on this issue.
4.2.3	PGCCDBS recommends that precision levels and acceptable 'widths' of confidence bands for age estimates should be evaluated by species, based on simulations with various degrees of disagreement by age.	PGCCDBS intersession work.	until PGCCDBS 2011	In progress. Discussed in chapter 5 on data quality.
4.2.4	PGCCDBS recommends that each PG member speaks to their age-reading coordinators and encourage them to raise awareness of the 'Age Readers Forum' amongst their age readers.	PGCCDBS members	From now on.	See section 4.2.4 (Age Readers Forum)

PGCCDBS 2010 report section	Recommendation	For follow up by	Timeframe	Status at PGCCDBS 2011
4.2.4	PGCCDBS recommends establishing a 'SharePoint team' to take responsibility for updating the contents of the 'Age Readers Forum'. One person will be appointed to monitor the forum and update information, and this role should be rotated annually, amongst the various laboratories, ensuring the various laboratories become familiar with the forum.	PGCCDBS intersession work. Gráinne Ní Chonchúir (Ireland) will act as co-ordinator.	From now on.	See section 4.2.4 (Age Readers Forum)
4.3.2	PGCCDBS recommends that a sixth maturity stage, 'abnormal', is included in standard maturity scales for crustaceans, as this can be used as an ecosystem indicator.	National laboratories	From now on.	Not forwarded to national labs yet, but will be part of a letter to national delegates.
4.3.2	PGCCDBS recommends that the need for, and details of, a new workshop on maturity staging of crustaceans should be considered in PGMED & PGCCDBS 2011.	PGCCDBS, PGMED	PGCCDBS/ PGMED 2011	WKMSC 2009 chair does not consider a new WK necessary, as no new data are available. See section 7.3.2.2.
4.3.2	PGCCDBS recommends that survey planning groups (WGBIFS, IBTSWG, WGBEAM) review the WKMSSPDF recommendation to 'put the content of a gonad under a microscope in case of disagreement or doubt on the maturity stage of a fish (if time allows during a survey)', and include it in sampling manuals if appropriate.	WGBIFS, IBTSWG, WGBEAM	March/June 2010/2011	Has been addressed by WGBEAM 2010 and should be addressed by WGBIFS 2011 and IBTSWG 2011.
4.3.5	PGCCDBS recommends that the FRESH-COST action reports information maturity staging of species following different reproductive strategies, such as viviparity and hermaphrodism in fishes, crustaceans and cephalopods.	FRESH-COST action	Until PGCCDBS 2011	See section 4.3.3. (FRESH-COST Liaison)
4.3.6	PCCCDBS recommends that a workplan on the analysis of between-reader variation in maturity staging is being developed in close collaboration with the FRESH-COST action, considering general techniques to assess maturity and improve agreement between investigators.	PGCCDBS intersession work. Fran Saborido-Rey (Spain), Francesca Vitale (Sweden) and David Maxwell (UK-England) and Ernesto Jardim	Until PGCCDBS 2011	See section 4.3.3. (FRESH-COST Liaison) See also ToR of WKMATCH and WKSABCAL in Annex 11.

PGCCDBS 2010 report section	Recommendation	For follow up by	Timeframe	Status at PGCCDBS 2011
		(Portugal) will act as co-ordinators.		
4.4.2	PGCCDBS recommends that the updated proposal for a project on 'Age Determination and Maturity Staging of species not previously subjected to biological sampling for analytical assessments' be considered by the DCF Liaison Meeting for inclusion in the EC Work Programme 2011 or 2012.	European Commission, DCF Liaison Meeting	2011 or 2012	See section 4.4.2 (study proposal).
5.1	PGCCDBS recommends on the basis of the WKPRECISE workshop that catch sampling programs should be based on statistically robust survey designs with clear definitions (and documentation) of the sampling frame, the primary sampling units (PSUs), the stratification schemes employed, and the methods used for selecting samples in each stratum.	National laboratories	From now on	See section 5.1 (template for data quality). WKPICS will deal with this issue. Not forwarded to national labs yet, but will be part of a letter to national delegates.
5.1	PGCCDBS also recommends that the precision of estimates of key parameters is given in terms of standard errors or relative standard errors (often referred to as the coefficient of variation for a parameter estimate). In addition, the number of primary sampling units observed along with estimates of the effective sample size for the associated estimate should be given.	National laboratories	From now on	See section 5.1 (template for data quality). WKPICS will deal with this issue. Not forwarded to national labs yet, but will be part of a letter to national delegates.
5.2	PGCCDBS recommends on the basis of the WKMERGE that primary data held in databases should be real observations and not imputations done manually or with automated routines. Imputation must be carried out external to the data base using transparent and robust methods.	National laboratories	From now on	See section 5.1 (template for data quality). WKPICS will deal with this issue(?) Not forwarded to national labs yet, but will be part of a letter to national delegates.
5.2	PGCCDBS recommends the formation of a Study Group or EU contract to consider methods and tools for optimisation of sampling schemes between MS to achieve international precision targets and consistent collection of data to allow analysis by domains covering international strata within regions (e.g. metiers).	RCMs, European Commission, National laboratories	2010/11	See section 5. WKPICS will also deal with this issue.

PGCCDBS 2010 report section	Recommendation	For follow up by	Timeframe	Status at PGCCDBS 2011
	Further development of data basis and COST tools should aim to cater for different possible sampling designs and associated procedures described in WKMERGE			
5.3	PGCCDBS recommends that a series of workshops be set up, based on case studies allowing for a more thorough discussion on the details of design and implementation of catch sampling schemes. The case studies should from a methodological point of view be of general interest and should be well prepared prior to the workshop. Special attention should be given to design and implementation of regional sampling schemes. The PGCCDBS further consider it beneficial to collate the findings from the series of workshop into a reference book as this at present time is missing. This book should contain documentations of survey designs and methods for estimating the basic parameters and statistics used in stock assessment and advice, with measures of uncertainty,	ICES Secretariat and PGCCDBS WKPICS	2010/11	See section 5. WKPICS is the first workshop in a series dealing with these aspects.
5.4	PGCCDBS would like to maintain the recommendations from last year and hope that the Secretariate can allocate sufficient resources to complete the above worklist [further development of Intercatch] for 2010 before the PGCCDBS 2011 meeting.	ICES Secreratiat	2010/11	See section 5.3 (Intercatch)
6.2	PGCCDBS recommends that the outcome of the workshops, conferences or symposia on data collection from commercial fisheries should be reviewed as an intersessional work and reported to the 2011 PG meeting.	PGCCDBS intersession work.	Until PGCCDBS 2011	See section 6.2 (relevant conferences)
6.3	PGCCDBS recommends that all countries, before starting new self-sampling programmes, to look at the outcomes from these two WKs (WKUFS, WKSC) to get some valuable guidance.	National laboratories	From now on.	Not forwarded to national labs yet, but will be part of a letter to national delegates.
6.3.6	PGCCDBS recommends that countries analyse the data collected from the self-sampling programmes and observer programmes to be able to validate the effectiveness and quality of the data collected.	National laboratories	From now on.	Not forwarded to national labs yet, but will be part of a letter to national delegates.

PGCCDBS 2010 report section	Recommendation	For follow up by	Timeframe	Status at PGCCDBS 2011
6.3.6	PGCCDBS recommends that the importance of prioritizing the validation of data collected from self-sampling programmes could be discussed by EFARO in order to get support on such a focus. Furthermore, the PG recommends that the outcome of the analysis is published and reported to the PGCCDBS meeting in 2011.	EFARO, PGCCDBS intersession work.	Until PGCCDBS 2011	See section 7.4.6
7.2.1	PGCCDBS recommends that all organisers of workshops and co-ordinators for otolith exchanges follow the planning procedures set out in section 7.2.1, including criteria for classifying ageing performance into 'good', 'medium' or 'bad'.	Co-ordinators of otolith exchanges, Age reading WK Chairs	From now on.	Not forwarded to national labs yet, but will be part of a letter to national delegates. Guidelines for otolith exchanges updated (Annex 9).
7.2.1	PGCCDBS recommends that the request to set target levels for the percentage of agreement and CV's for the different stocks, is included in the ToRs of the assessment working groups. During the AWG's, the data contact persons should stress this request and make sure the target levels list is completed and included in the WG's reports.	ICES Secretariat, Data contact persons	March-May 2010/2011	See section 7.4.2 (Intersession work).
7.2.2	PGCCDBS recommends a small otolith exchange of brill (*Scophthalmus rhombus*)	Co-ordinator: Annemie Zenner (Belgium)	2010	Exchange will be carried out in 2011, see section 7.2.1.1.1.
7.2.2	PGCCDBS recommends a small otolith exchange of black spot sea bream (*Pagellus bogaraveo*)	Co-ordinator: Juan Gil Herrera (Spain)	2010-11	Exchange will be carried out in 2011, see section 7.2.1.1.2.
7.2.2	PGCCDBS recommends a small otolith exchange of red mullet (*Mullus surmuletus*) and striped red mullet (*M. barbatus*)	Co-ordinator: Kélig Mahé (France)	2011	Exchange will be carried out in 2011, see section 7.2.1.1.3.
7.2.2	PGCCDBS recommends a small otolith exchange of North Sea sprat (*Sprattus sprattus*)	Co-ordinator: Lotte Worsøe Clausen (Denmark)	2010-11	Exchange will be carried out in 2011, see section 7.2.1.1.4.
7.2.2	PGCCDBS recommends a small otolith exchange of Spanish mackerel (*Scomber japonicus*)	Co-ordinator: Maria Manuel Martins	2012-13	Sampling in 2011, exchange in 2012, see section 7.2.1.1.5.

PGCCDBS 2010 report section	Recommendation	For follow up by	Timeframe	Status at PGCCDBS 2011
		(Portugal)		
7.2.2	PGCCDBS recommends a small otolith exchange of tusk (*Brosme brosme*)	Co-ordinator: Gróa Pétursdóttir (Iceland)	2010-11	Finished, report available, see section 4.2.2.7 (extended abstract).
7.2.2	PGCCDBS recommends a small otolith exchange of megrim (*Lepidorhombus whiffiagonis*)	Co-ordinator: Mark Etherton (UK-England)	2011	Finished, report available, see section 4.2.2.6.
7.2.2	PGCCDBS recommends a small otolith exchange of sea bass (*Dicentrarchus labrax*) and Sparidae spp.	Co-ordinator: Kélig Mahé (France)	2010-11	Exchange will be carried out in 2011, see section 7.2.1.1.6.
7.2.2	PGCCDBS recommends a full otolith exchange of European eel (*Anguilla anguilla*)	Co-ordinator: Françoise Daverat (France)	2010	Finished. Exchange results will be discussed at WKAREA2 (22-24 March 2011), see section 4.2.2.3.
7.2.2	PGCCDBS recommends a full otolith exchange of European Atlantic sardine (*Sardina pilchardus*)	Co-ordinators: Eduardo Soares (Portugal) and Isabel Riveiro (Spain)	2010-11	Finished. Report available. Exchange results will be discussed at WKARAS (14-18 Feb 2011), see section 4.2.2.4.
7.2.2	PGCCDBS recommends a full exchange for angler (*Lophius piscatorius*) and black-bellied angler (*L. budegassa*)	Co-ordinator: Jorge Landa (Spain)	2011	Exchange will be carried out in 2011, with *L. piscatorius* only, see section 7.2.1.2.1.
7.2.2	PGCCDBS recommends a full otolith exchange of Baltic, North Sea and Black Sea turbot (*Psetta maxima*)	Co-ordinator: Annemie Zenner (Belgium)	2010-11	Exchange will be carried out in 2011, see section 7.2.1.2.2.
7.2.2	PGCCDBS recommends a full otolith exchange of roundnose grenadier (*Coryphaenoides rupestris*)	Co-ordinator: France	2011	See section 7.2.1.2.3 and WKAMDEEP proposal (Annex 11)
7.2.3	PGCCDBS recommends a Workshop on Age Reading of European and American Eel [WKAREA-2]	ICES Secretariat	2011	WKAREA2 will take place in Bordeaux, 22-24 Mar 2011
7.2.3	PGCCDBS recommends a Workshop of National Age Reader Coordinators [WKNARC]	ICES Secretariat	2011	WKNARC will take place in Boulogne-sur-Mer, 5-9 Sep 2011

PGCCDBS 2010 report section	Recommendation	For follow up by	Timeframe	Status at PGCCDBS 2011
7.2.3	PGCCDBS recommends a Workshop on Age Reading of European Atlantic Sardine [WKARAS]	ICES Secretariat	2011	WKARAS will take place in Lisbon, 14-18 Feb 2011
7.3.1	PGCCDBS recommends a Workshop on Sexual Maturity Staging of Cod, Whiting, Haddock, Saithe and other gadoids [WKMSGAD]	ICES Secretariat	2011	WKMSGAD will take place in Copenhagen in Oct/Nov 2012.
7.3.1	PGCCDBS recommends a Workshop on sexual maturity staging of sole, plaice, dab and flounder [WKMSSPDF2]	ICES Secretariat	2012	WKMSSPDF2 will take place in Ostend, 9-13 Jan 2012
7.3.1	PGCCDBS recommends a Workshop on Sexual Maturity Staging of Turbot and Brill [WKMSTB]	ICES Secretariat	2012	WKMSTB will take place in IJmuiden, 5-9 March 2012
7.3.1	PGCCDBS recommends that the RCM-NS&EA and RCM-NA maintain and update the maturity sampling tables (Annex 10), and that RCM Baltic documents maturity sampling in the same way as the other RCMs.	RCMs North Sea & Eastern Arctic, RCM North Atlantic, RCM Baltic	April/May 2010	Done.
7.4	PGCCDBS recommends the creation of a HTML version of Annex 8 to facilitate the long-term planning of age reading workshops, the update and simplification of Annex 9, and the construction of a HTML version in which coloured cells will contain links to existing age calibration Exchange and Workshop reports. This tool should be constructed in collaborat ion with the ICES Secretariat, and hosted on the PGCCDBS documents repository, enabling open reader access and downloading for these reports.	ICES Secretariat, PGCCDBS intersession work. Willie McCurdy (Northern Ireland) will act as co-ordinator.	Until PGCCDBS 2011	In progress, see section 7.4.1 (Interession work)

3 Review reports from PGCCDBS contact persons with Assessment Working Groups. Where appropriate, propose changes to sampling strategies, protocols, and levels for implementation within the EU Data Collection Framework and national centres responsible for sampling commercial catches (ToR b)

3.1 Review reports from PGCCDBS contact persons with Assessment Working Groups and Benchmark Assessments

The Group reviewed Assessment Working Group, Benchmark and Workshop reports with respect to requests addressed to PGCCDBS. These came from the Data Contact Persons of Assessment WGs (see section 3.2) or from Expert Group recommendations.

Table 3.1 Requests from ICES Assessment Working Groups, Benchmark Assessments and Workshops, and PGCCDBS comments.

Issues related to catch data collection and methodological improvements:

AWG/WK	Stock	Data problem	How to be addressed/ by whom	PGCCDBS Comments
WGCEPH	All	WGCEPH should have access to up-to-date data on cephalopod landings, directed effort, discards and survey catch data, in order to complete its ToRs. Such data have generally not been available to the group in the last few years. While most landings data do ultimately become available in the ICES database, it is of lesser interest to evaluate the state of the fisheries 3-4 years previously. In addition, cephalopod survey catch data are poorly represented in the ICES IBTS database, even in cases where national fisheries labs collect the data.	To be passed on to RCMs by PGCCDBS	PGCCDBS recommends RCMs should compile an overview of the cephalopod catch data available and WGCEPH participants should approach the relevant national laboratories. The issue relating to the survey data should be forwarded to IBTSWG.
WGCEPH	All	In relation to the DCR, WGCEPH recommends that for major cephalopod stocks in which assessment and management are likely to be necessary in the near future (e.g. English Channel cuttlefish), data collection under the DCR should be modified to reflect the additional data requirements imposed by the short life cycles. We recommend: (a) Increases in the level of cephalopod sampling in metiers where these	ACOM/PGCCDBS will deal with this in first instance and will then pass on to the other recipients if appropriate.	Issues relating to the minimum sampling requirements for cephalopod biological data in the DCF should be considered at SGRN. PGCCDBS recommend this to be forwarded and resolved by SGRN in light of DCF requirements.

AWG/WK	Stock	Data problem	How to be addressed/ by whom	PGCCDBS Comments
		are highly valuable, based on the short life cycle of cephalopods. Thus, sampling of cephalopod species on a quarterly basis is not adequate. (b) Focus of the more intensive sampling (i.e. weekly or monthly) during periods of higher catches in order to ensure adequate characterizations of the length compositions of the multiple microcohorts that are often present, while avoiding unproductive sampling effort at times of low abundance. (c) Collection of maturity data for the most important cephalopod fisheries, to facilitate comparison of trends in maturity and length composition data by cohort, from research surveys versus the fishery, in order to assess trends in recruitment and length at 50% maturity (L50).		
WKMERGE	All	Primary data held in databases should be real observations and not imputations done manually or with automated routines. Imputation must be carried out external to the data base using known robust methods. If modeling is to be used for imputation (e.g. for non-accessible vessels), the data collection scheme should ensure that the necessary auxiliary data are collected for those vessels. (End users to be made aware)		This is crucial for quality assurance. If imputed data is held on databases the imputation needs to be thoroughly documented and flagged. This should be available for and considered by all end users including EGs within ICES and STECF.
WKMERGE	All	Strata should be defined so that there is controlled sample selection probability. Take necessary steps to achieve representative sampling of fishing trips or vessels within strata using random or systematic (with random element) schemes. Avoid targeted non-random sampling (quota sampling) to reach sample sizes for highly resolved domains (e.g. Level 6 metiers) present within the primary sampling strata. Sampling schemes should provide the ability to provide data allowing		PGCCDBS agrees and refers MS to follow to the series of workshops (WKPICS).

AWG/WK	Stock	Data problem	How to be addressed/ by whom	PGCCDBS Comments
		robust estimates for domains within strata, when estimates by domain are required..		
WKMERGE	All	Where key variables that are required for establishing sampling and estimation schemes and determining sampling probability or weighting (e.g. mesh size; area fished) are missing or inaccurately recorded in vessel log-books or not available (e.g. small vessels without logbooks) – the impact on estimation should be evaluated and steps taken, if necessary, to improve recording accuracy or collection of variables.		PGCCDBS agrees and refers MS to follow to the series of workshops (WKPICS).
WKMERGE	All	Further development of data bases and COST tools should aim to cater for the different possible sampling designs and associated raising procedures described in WKMERGE. Otherwise consider use of commercially available gold-standard software such as SUDAAN© (http://www.rti.org/sudaan/index.cfm) and Survey analysis package in R (package "survey", http://faculty.washington.edu/tlumley/survey		PGCCDBS agrees that a common tool should be able to accommodate different sampling designs, but until this is available, national laboratories should be aware of the existence of other software as an alternative.
WKMERGE	All	Formation of a Study Group or EU contract would be appropriate to consider methods and tools for optimisation of sampling schemes between MS to achieve international precision targets and consistent collection of data to allow analysis by domains covering international strata within regions (e.g. metiers) – (conditional on having the data collected on an appropriate basis for input to optimisation schemes.)		Based on the outcome of PGCCDBS2010, a series of workshops (WKPICS) is scheduled. MS are recommended to attend or review the outcomes of WKPICS.
WKMERGE	All	Merging of metiers should be treated as a concept more applicable to a-priori defining domains of interest e.g. metiers that are stable in time. This is distinct from establishing optimal stratification for sampling in order to provide the		PGCCDBS agrees with the concept. This is a fundamental issue in design of sampling strategy.See section 5 for details.

AWG/WK	Stock	Data problem	How to be addressed/ by whom	PGCCDBS Comments
		domain data. Any scientific evidence brought for grouping metiers should be discussed at RCMs for international agreement. Further development and agreement of statistical methods e.g. multi-variate methods is recommended for identifying homogeneous metiers that are stable over time and relevant to fishery management.		
WGBIFS	Baltic flatfish	RCM Baltic is requested to make guideline how biological flatfish data should be processed when the data collected is too sparse to maintain national expertise.		National laboratories should take note of the resolution suggested by RCM Baltic 2010 (Chapter 3.4.2).
WGHMM	All	Closer tracking of the recommendations made by the group to PGCCDBS and resolutions concerning them in RCM meetings.		PGCCDBS agrees that guidelines on recommendations need to be established (issues need to be clear and better described) and suggest the ICES secretariat set up a tracking system for those recommendations formulated.
WGCRAN	Brown shrimp	Increase and standardise sampling effort for bycatch program: improve seasonal and spatial coverage		Forward to SGRN - relates to prioritising the allocation of sampling effort in the general context of the DCF. RCMs should look into the outcomes of SGRN.
SGBYC	Protected species	Collaboration with PGCCDBS to make better use of discard sampling surveys in recording protected species bycatch occurrence in a range of other fisheries		Refer to recommendations from PGCCDBS2010. Forward to SGRN March 2011.
WGBAST	Baltic salmon	Reporting of certain data within the DCF-programme on a quartenal basis (following Commission Decision 2008/949/EC, page 43) is not necessary for assessment purposes. For WGBAST purposes reporting of catch estimates from recreational fisheries on a yearly basis, and for commercial on half year basis, is sufficient.		Forward to SGRN EW11 02 as this is a DCF issue

AWG/WK	Stock	Data problem	How to be addressed/ by whom	PGCCDBS Comments
WGBAST	Baltic salmon	The proportion of adipose fin clipped salmon and sea trout in Baltic fisheries should be monitored in conjunction with DCF or other data collection programmes		PGCCDBS agrees and forward the recommendation to the RCM Baltic for implementation in the sampling programs.
WKDEEP	All	WKDEEP recommends that landings of WKDEEP species be fully reported within ICES areas. For some species this may require a change in focus from landings, as has been the basis of the historical database, to specific catches (i.e. landings plus discards). In addition, to the extent possible, future reporting should be explicitly spatially indexed. It is recommended that haul-by-haul data should be collected and reported for all trawl and longline fisheries.		This will require a change to current legislation or agreement by the fishers to supply this information. Needs to be addressed by SGRN.
WKDEEP	Round-nose grenadier	WKDEEP recommends that roundnose grenadier effort data should be provided by all involved countries.	To be forwarded to RCMs.	It is not clear whether countries have effort data and do not supply this data or that there is insufficient data. Forward to EU meeting of National Correspondents.
WKDEEP	Round-nose grenadier	The quality of pre-anal fin length measurement is unknown. WKDEEP recommends that some exercises should be made to evaluate between observers (or for the same person) the quality of pre-anal fin length measurement.	To be forwarded to RCMs.	Refer to recommendations from PGCCDBS2010.
WKDEEP	Round-nose grenadier	The length distribution of the stock per depth is poorly known. WKDEEP recommend that some trip should include full measurement of length of the catches and the depth of the haul should be reported.	To be forwarded to RCMs.	MS should ensure that when collecting these samples depth is recorded with all samples. Sampling should be spread across a number of trips rather than relying on large samples from fewer trips.
WKDEEP	Deep-water sharks	Taxonomic problems on the identification of species include in the Centrophoridae family particularly those occurring at NE Atlantic (e.g. C. granulosus, C. lusitanicus). WKDEEP	To be forwarded to RCMs.	Refer to recommendations from PGCCDBS2010.

AWG/WK	Stock	Data problem	How to be addressed/ by whom	PGCCDBS Comments
		recommends studies to improve deep-water sharks identifications, namely by means of genetic approach.		
WKDEEP	Greater forkbeard	There is a problem in the species-specific identification of landings. Landing tables could include significant landings of *Phycis* spp, *Urophycis* spp species. WKDEEP recommends the edition of a guide and training of observers in the identification of the most common *Phycis* species.		PGCCDBS regards this as a QA measure for each country.
WKDEEP	Greater forkbeard	Few countries supply discard data to the WG. WKDEEP recommends increase of number discard samplings (% of trips covered by observers) on commercial vessels.	To be forwarded to RCMs.	Its not clear whether countries have discard data and do not supply this data or that there is insufficient sampling. Forward to SGRN - this may relate to prioritising the allocation of sampling effort in the general context of the DCF. RCMs should review the outcome of SGRN.
WKFLAT	Sole in IIIa (Kattegat-Skagerrak)	Problems with age–length key (ALK). Small sampling size results in what is considered to be an unreliable disaggregation of ages in data. WKFLAT noted that improvements are possible, but did not make any specific recommendations.		Forward to Denmark for consideration.
WKROUND	All	A template for a scorecard to evaluate data quality and other factors was presented at WKROUND 2010. There was insufficient time during the workshop to complete these scorecards. The panel recommends that these scorecards be completed by the stock coordinators prior to future benchmark workshops in order to provide organized information about the quality of data being used in the assessment to the panel and participants. This scorecard should become a regular section of all Stock Annexes.		PGCCDBS agrees with the concept. This is an important issue for all working groups. However these 'score cards' should be completed by the National Coordinator and the Stock Coordinator could provide the overall evaluation of bias for the stock at the EG. See chapter 5 for details.
WGEF	Pelagic sharks	WGEF recommends that PGCCDBS examine the	To be forwarded to RCMs.	To be forwarded to RCMs.

AWG/WK	Stock	Data problem	How to be addressed/ by whom	PGCCDBS Comments
		possibility of a longline survey for large pelagic sharks. (in the absence of any fisheries-independent data) (follow this up in porbeagle chapter).		
WGNSSK	All	The WG feels that there are still some potential gaps between the data collections programs and the metier-based sampling discussed in DCF and RCM in the one hand, and the way this is used for raising catch data for WGNSSK in the other hand (for both landings and discards). There is often unsufficient knowledge in the WG on how the data are raised before being provided to stock coordinators. The raising is largely done within a country based on national samples, before being provided, and not by metier across nations which would potentially allow different stratification for the data raising. The WG recommends better communication between the various data forums in order to consider whether the current sampling raising procedures are still appropriate.		This is an important issue for all working groups. See chapter 5 for details.
WKWATSUP	Herring in SD 22-24, IIIa and IVa	Increase and/or redesign sampling for spawning data in herring catches in ICES area IVa and IIIa and 22-24		PGCCDBS recommends that National Laboratories should have a Data Compilation workshop to consider stock separation and assessment data quality. See recommendation below.
WKWATSUP	Herring in SD 22-24, IIIa and IVa	Quantitative estimation of historic misreporting by all Nations with reported catches of herring in Division IIIa and Subdivisions 22-24.		PGCCDBS recommends that National Laboratories should have a Data Compilation workshop to consider stock separation and assessment data quality.
AFWG	NEA saithe	Reduction in samples north of 67N from Q3 2009 for gillnet, Danish seine and line	The sampling should be im-proved from 2011 onwards (by Nor-way)	In general, data delivery to EGs is an national responsibility. Problems with this should be taken up

AWG/WK	Stock	Data problem	How to be addressed/ by whom	PGCCDBS Comments
				with National Delegates and/or ACOM members. Data Compilations Lists from RCMs will in future provide EGs with an overview of existing data.
AFWG	NEA saithe	Lack of purse seine samples between 62-67N	The sampling should be improved from 2011 onwards	In general data delivery to EGs is a national responsibility. Problems with this should be taken up with National Delegates and/or ACOM members.
AFWG	NEA cod	Recruitment indices	Study group for recruitment	Forward to ACOM/SCICOM
AFWG	*Sebastes mentella*	Not all countries fishing *S. mentella* in international waters of the Norwegian Sea report their catches to NEAFC and ICES. EU reported catches are not split by individual country, which is problematic for the assessment. Lack of consistency between daily reports from the sea to NEAFC and later official reports by delegates to NEAFC.	NEAFC should provide ICES and AFWG with both the daily reports from the sea and the official reports to NEAFC by delegates.	In general, data delivery to EGs is a national responsibility. Problems with this should be taken up with National Delegates and/or ACOM members.
AFWG	*Sebastes* spp.	Reduction in samples from the commercial fisheries for *S. mentella* and *S. marinus*	The sampling should be improved from 2010 onwards	In general, data delivery to EGs is a national responsibility. Problems with this should be taken up with National Delegates and/or ACOM members.
HAWG	Western Baltic spring-spawning herring	Sampling of mixed stock in Transfer area: Not adequate sampling of the mixed stock in the transfer area (IVaE); this results in a transfer of old, heavy NSS into IIIa (as the VS split gives them the ID 'spring'), inflating the SSB.	Sampling of herring from the Transfer area should be covering all quarters and the entire ALK; but in particular in the Transfer area, so the entire SD IVaE Age-Length Key is not applied to the transfer area. Stock ID should be performed following an agreed protocol. PGCCDBS should recommend a bilateral agreement between Norway,	See more recent WKWATSUP recommendation.

AWG/WK	Stock	Data problem	How to be addressed/ by whom	PGCCDBS Comments
			Sweden and Denmark to facilitate this sampling. The DCF should hold financing opportunities for this work.	
HAWG	Clyde herring	Catches have increased in 2009; no sampling performed on this stock?	Sampling of age-weight-length information needed. Should be a part of the DCF for relevant countries	In general, data delivery to EGs is a national responsibility. Problems with this should be taken up with National Delegates and/or ACOM members. Data Compilations Lists from RCMs could in future provide EGs with an overview of existing data.
WGHMM	Ang-78	The precise methodology used for splitting catches between both *Lophius* species is not available to the WGHMM and no precision estimates are delivered	Strong request for providing these data to Member States. Also to be dealt with by RCM-NA and SGRN.	It is important that the process of splitting grouped species catches into species is thoroughly documented by national data providers and this is made available to the EGs. Data providers are strongly reccomended to provide this information in order to assure/evaluate the quality of the data.
WGHMM	Ang-89	The metier sampling adopted in Spain and Portugal in 2009, following the requirement of the EU Data Collection Framework, can have an effect in the provided data. Problems with the splitting of the two species have been detected. Inconsistencies in length composition of landings. An important reduction of Portuguese sampling levels was observed in 2009.	Revision of 2009 Spanish landings data. Revision of 2009 Spanish length samplings. Also to be dealt with by RCM-NA and SGRN	
WGNEW	Flounder in IV	Poor sampling for age and biological parameters, especially of the landings	Intensified sampling, in all years or e.g. every 3 years. Also to be dealt with by RCM NS&EA.	Issues relating to the minimum sampling requirement in the DCF should be considered at SGRN. PGCCDBS recommend this to be forwarded and resolved by SGRN in light of DCF requirements.
WGWIDE	Blue whiting	No data provided by Sweden and Lithuania	Catch at age (or at least landings by quarter) should be provided to the WG. National laborato-	In general, data delivery to EGs is a national responsibility. Problems with this should be taken up with National Delegates and/or

AWG/WK	Stock	Data problem	How to be addressed/ by whom	PGCCDBS Comments
			ries should provide data to stock coordinator.	ACOM members. Data Compilations Lists from RCMs could in future provide EGs with an overview of existing data.
WGWIDE	Horse Mackerel (all stocks)	No data provided by France and Lithuania	Catch at age (or at least landings by quarter) should be provided to the WG. National laboratories should provide data to stock coordinator.	
WGWIDE	NEA mackerel	Limited data supplied by France	Catch data should be supplied by quarter and area. French national laboratory should provide data to stock coordinator.	
WGWIDE	NEA mackerel	Lack of samples during spawning season	There is often a lack of sampling in areas VIIb,j during spawning season (March, April, May). Targeted sampling is required in order that appropriate samples for deriving stock weights can be made available to the WG. National laboratories should provide data to stock coordinator.	In general data delivery to EGs is a national responsibility. Problems with this should be taken up with National Delegates and/or ACOM members. Data Compilations Lists from RCMs could in future provide EGs with an overview of existing data. If there is a problem relating to the timing of the samples, this should be addressed by the RCMNA and RCMNS&EA.
WGWIDE	NEA mackerel	Lack of samples for some area/quarter/fleet combinations	Sampling coverage could be improved by increased co-operation between national labs (especially those with similar fleets). National laboratories should provide data to stock coordinator.	
WGWIDE	NEA mackerel	Incomplete and inconsistent discard data	Observers should be placed on vessels in those areas where discarding occurs and existing observer programmes should be continued and expanded. Sampling methods and	PGCCDBS realise that there could be problems relating to sampling the discard/catch mortality of pelagic fisheries. These issues include the distribution of discard events as mentioned in the report of WKDRP 2007

AWG/WK	Stock	Data problem	How to be addressed/ by whom	PGCCDBS Comments
			raising procedures should be established. National laboratories should provide data to stock coordinator. Intercessional work is required for the establishment of procedures.	but also observer effects and small sampling size. The number of sampling events needs to be increased (observer or electronic catch monitoring - see section 5 of this report).
WGWIDE	Horse Mackerel (all stocks)	Most catch data is submitted on spreadsheets. Only some countries provided data in the InterCatch format.	Catch data should be provided in the InterCatch format. Catches by statistical rectangle and quarter should also be provided on spreadsheets. ICES should inform all fishing countries/members to report catch data in the correct format (InterCatch and spreadsheet).	In general, data delivery to EGs is a national responsibility. Problems with this should be taken up with National Delegates and/or ACOM members.
WGCSE	Fish and *Nephrops* stocks in Celtic Seas Ecoregion	Accuracy/quality of landings (species and area misreporting) and effort information	Increase sampling levels through: a) Self-sampling of catches (both landings and discards), b) Development and promote enhanced catch sampling through reference fleets and or fully documented fisheries	RCM NA should consider increasing sampling levels in the light of these demands.
WGCSE	Fish and *Nephrops* stocks in Celtic Seas Ecoregion	Lack of information on total catch and catch composition - there is a need to obtain reliable catch and effort data and reintroduce these to the assessment.	Increase sampling levels through: a) Self-sampling of catches (both landings and discards), b) Development and promote enhanced catch sampling through reference fleets and or fully documented fisheries	
WGCSE	Fish and *Nephrops* stocks in Celtic Seas Ecoregion	Bias in discard estimates – quality and quantification of discard data	Review of discard sampling levels and procedures for raising and incorporation of discards into assessments	WGCSE should use the sampling level information from RCM NA and review raising procedures in accordance with WKDRP 2007.

AWG/WK	Stock	Data problem	How to be addressed/ by whom	PGCCDBS Comments
WGCSE	Cod (VIa, VIIa, VIIe-k) in particular	Unaccounted mortality (relative proportions of fishing and natural mortality)	Tagging work should be developed and promoted to address mortality (natural and total) and biological, growth uncertainties.	RCM NA should develop a Study Proposal for tagging in the light of these uncertainties in the assessment.
WGCSE	Cod (VIa, VIIa, VIIe-k), Haddock (VIa, VIb), Whiting (VIa), Anglerfish (IIa, IIIa, IV and VI), etc.	There is uncertainty concerning the stock definition and hence the degree of connectivity between the VIa gadoid stocks and the North Sea stocks, the anglerfish stock and cod stocks.	Tagging work should be developed and promoted to address migration and stock definition uncertainties.	
WKCOD	Cod 347d	Uncertainty and bias in discard data	Most countries supply discard data for North Sea cod but sampling levels for discard are still quite low for the main fleets of most countries. Information on CVs (or similar measures) and bias (coverage in space and time, changes in fishermen behaviour) would help to judge on the reliability of submitted data. Delegates of the EU Member States and Norway should deliver this information.	At the very least, National Data Providers should provide a synopsis on the quality of all data provided to the EGs. PGCCDBS reccomendations relating to a common QA template are provided in PGCCDBS2011.
WKCOD	Cod 347d	Bias in reported landings	Unallocated removals are a major issue in the assessment of North Sea cod. In recent years more and more doubt is expressed by the industry and scientists that the high numbers of unallocated removals estimated by the	At the very least, National Data Providers should provide a synopsis on the quality of all data provided to the EGs. PGCCDBS reccomendations relating to a common QA template are provided in PGCCDBS2011.

AWG/WK	Stock	Data problem	How to be addressed/ by whom	PGCCDBS Comments
			assessment models are valid. Any information available on detected or suggested misreportings would help to clarify whether misreporting is still going on or whether other explanations (underestimates of discard, highgrading, changes in the catchability of scientific surveys) are more likely explanations. Delegates of the EU Member States and Norway should deliver this information. EC and North Sea RAC to be informed.	
WKBench	Saithe in Subarea IV, VI and Division IIIa	Age sampling from commercial fleets	Possible cluster sampling due to few vessels in the reference fleet (Norway), needs review / redesign. To be followed up by Norway.	It is the responsibility of the institutes/countries to set up proper sampling programmes and evaluate the quality (precision, bias) of the collected data. At the very least, National Data Providers should provide a synopsis on the quality of all data provided to the EGs. PGCCDBS recommendations relating to a common QA template are provided in PGCCDBS2011.
WKBench	Saithe in Subarea IV, VI and Division IIIa	No discard data used in assessment	Quality control of available data sources, including Norwegian reference fleet data. To be followed up by Norway, France Germany and Scotland.	At the very least, National Data Providers should provide a synopsis on the quality of all data provided to the EGs. PGCCDBS recommendations relating to a common QA template are provided in PGCCDBS2011.
Age reading–related issues:				
WGANSA	Sardine	A workshop in 2011 on sardine	Was already	The Workshop on Age

AWG/WK	Stock	Data problem	How to be addressed/ by whom	PGCCDBS Comments
		age reading is recommended, to standardize age reading methodology and criteria between the different areas.	discussed at PGCCDBS 2010	Reading of European Atlantic Sardine (WKARAS), will meet in Lisbon, Portugal, 14-18 Feb 2011 and address these issues.
WGHMM	Hake	Research on hake growth should continue. Otoliths should continue to be collected, as age reading methods could soon be available.	RCMs	PGCCDBS agrees and forwards the recommendation to the RCMs for implementation in the sampling programs.
WGHMM	Bay of Biscay sole	Otolith exchange for Bay of Biscay sole, to be coordinated by Gérard Biais	PGCCDBS to organise otolith exchange	The PGCCDBS suggest to set up a small-scale exchange between relevant laboratories. Co-ordinator: Kélig Mahé, France
PGRS	Beaked redfish	Otolith exchange and mini-workshop on otolith reading of redfish	Small-scale otolith exchange	An international exchange will be conducted in 2011 and coordinated by Norway.
WKDEEP	All	WKDEEP recommends to carry out age validation studies for all species assessed in WKDEEP. For some of the shorter-lived species (e.g. tusk, greater silver smelt, greater forkbeard) techniques such as marginal increment analysis or length-modal analysis may be appropriate, while for longer lived species radiometric techniques (e.g. lead-radium) that have been refined in recent years for species such as orange roughy, could be applied.	PGCCDBS to recommend workshop.	The PGCCDBS suggest to set up a general methodology workshop on age estimation of deep water fish (see WKAMDEEP proposal, Annex 11).
WKDEEP	Silver smelt	An age calibration exercise (otolith exchanges and workshops) is needed, between the national institutes that are reading greater silver smelt otoliths.	PGCCDBS to recommend exchange/ workshop.	See WKAMDEEP proposal (Annex 11)
WKDEEP	All	Life time growth estimates could be greatly improved by ensuring adequate numbers of small and large (i.e. young and old) fish are sampled, which will improve definition of both ends of the age–length relationship. WKDEEP recommends that age sampling should covers all length range of the species.		PGCCDBS agrees and forward the recommendation to the RCM NA for implementation in the sampling programs.

AWG/WK	Stock	Data problem	How to be addressed/ by whom	PGCCDBS Comments
WKDEEP	Deep-water sharks	Some tentatives were already essayed to age *C. squamosus* and *C. coelolepis* and others are now being tried. Most of the approaches rely on dorsal spines analyses. WKDEEP recommends that a collaborative work between labs needs to be done to: i) critically revise the procedures adopted as well as the results data ii) propose a standardization of methods and methods to assigned ages.	National labs	PGCCDBS acknowledges the lack of valid information on the ageing of sharks, however, as the fishery on these species are non-existing and that the TAC's are zero, the importance of having a workshop seems minimal. However, PGCCDBS highly supports any initiatives for bilateral cooperation between experts on the methodology for age estimation of deep water sharks.
AFWG	NEA haddock	Systematic differences in weight at age when comparing Russian surveys in late autumn and Norwegian surveys in winter. Possibly an age-reading problem.	First, the actual differences should be investigated further, e.g. by region, to exclude other possible sources of error. Second, age reading comparisons should be intensified to investigate and possibly remedy between-reader bias.	Should be followed up bilaterally (IMR Norway, PINRO Russia) and reported to PGCCDBS and AFWG.
AFWG	*Sebastes mentella*	Norwegian and Russian age readings are not properly harmonized for mature fish, especially above age 15	The ICES Workshop on Age Determination of Redfish (WKADR) has reported this problem to be related to not including the proximal zone of the otolith sections when reading and determining the age.	Frequent otolith exchanges between Norway, Russia and others for comparative age readings should be conducted and reported to PGCCDBS and AFWG. An international exchange will be conducted in 2011 and coordinated by Norway.
WGBFAS	Western Baltic cod	Age reading for younger age groups	Parallel reading between countries.	Should be followed up bilaterally (Denmark – Germany) and reported to WGBFAS and PGCCDBS.
WGHMM	Bay of Biscay sole	Need to find out the cause of the discrepancy between French and Belgian weights at age.	Otolith exchange	Should be followed up bilaterally (France, Belgium) and reported to WGHMM and PGCCDBS.

AWG/WK	Stock	Data problem	How to be addressed/ by whom	PGCCDBS Comments
WGANSA	Sardine	Age reading has not been standardized between the VIIIc- IXa stock and outside areas (VII and VIIIa,b).	A workshop in 2011 on sardine age reading is recommended, to standardize age reading methodology and criteria between the different areas.	The Workshop on Age Reading of European Atlantic Sardine (WKARAS), will meet in Lisbon, Portugal, 14-18 Feb 2011 and address these issues.
WGCSE	Anglerfish (L. piscatorius and L. budegassa) in IIa, IIIa, IV and VI & Megrim in IV and VI	There are still uncertainties about the validity of age readings of anglerfish and megrim	Proposals from ageing workshops to solve the problem, e.g., changes in sampling methodologies, or clear advice on future prospect of generating reliable catch-at-age matrices (from age reading perspective).	Otolith exchanges on anglerfish and megrim have been and will be conducted under the PGCCDBS auspices (see section 7.2.1.2.1) and reported back to WGCSE.
Maturity–related issues:				
AWG/WK	**Stock**	**Data problem**	**How to be addressed/ by whom**	**PGCCDBS Comments**
WGHMM	Megrim	WGHMM does not perceive a necessity for a maturity staging workhop for megrim (see WD 6)	PGCCDBS	Agree.
WGBFAS	Baltic flatfish	Inconsistency between the maturity scale for flatfish used for the Baltic International Trawl Survey (BITS) and the recommendations from the Workshop on Sexual Maturity Staging of sole, plaice, dab and flounder (WKMSSPDF) in February 2010. The BITS scale cannot be transferred into the new proposed scale which means that if the new scale is introduced, this would mean a break in the BITS time series maturity for flatfish. It does not have any influence on the fraction mature, as the problem only is related to stages of immature fish.	This issue will be discussed during the WGBIFS meeting in March 2011, in order to clear the problems with the chairs from WKMSSPDF.	Given that it will be addressed during the WGBIFS in March 2011, no action is currently required by PGCCDBS. Three members of the PGCCDBS maturity subgroup will be participating at this meeting.

3.2 Assessment Working Group Contact Person

PGCCDBS (2009) put in place measures identified to improve the effectiveness of the role of the contact person providing feedback to and from assessment groups. For the role to operate effectively, it has proved to be beneficial for the contact person to be closely linked to the relevant assessment group and if possible be involved in the coordination and planning work through PGCCDBS or the RCM's. In most cases,

AWGs and PGCCDBS were in a position to nominate a contact person. Where this has not been done, the contact person must be identified, no later than the first day of the AWG meeting by considering the following criteria.

The contact person should be (ideally):

- An attendee of the relevant assessment group;
- A participant of PGCCDBS or close contact with an attendee of that group;
- A participant of relevant RCM or close contact with attendee of that group.

In order for the contact person to function effectively, PGCCDBS envisage that the role should include the following tasks;

- Contact all stock coordinators (and assessors) that the AWG represents in order to identify issues relevant to PGCCDBS;
- Ensure that all issues relevant to PGCCDBS and RCM's are entered in the table - "Stock Data Problems Related to Data Collection" (Annex 5) and that this is included in the report of the AWG;
- In completing the form, the contact person should, where possible, indicate the course of action that they feel is required in order to address the issues identified;
- Provide feedback from PGCCDBS and RCM's to AWG or Benchmark WK;
- Work in cooperation with ICES secretariat.

The ICES Secretariat should compile the relevant comments from AWGs and forward these to RCMs, PGCCDBS, all ACOM members and the EU Commission. This will allow the RCM to consider the issues directed to them and respond accordingly and informs all countries (including non-EU countries) of data issues. This process serves to advise countries of the issues and is not to be regarded as a specific request, only for information. It will also ensure that in planning for harmonisation and coordination of National Programmes for the coming year, the requirements of AWGs are addressed at the earliest opportunity. The RCMs should then advise PGCCDBS of their actions in addressing relevant issues and indicate where further action is required from PGCCDBS.

Table 3.2. PGCCDBS Data Contact Persons – 2011

Expert Group	Name	E-mail
AFWG	Åge Fotland	aage.fotland@imr.no
HAWG	Lotte Worsøe Clausen	law@aqua.dtu.dk
NWWG	Heino Fock	heino.fock@vti.bund.de
WGBAST	Tapani Pakarinen	tapani.pakarinen@rktl.fi
WGNAS	Ian Russell	ian.russell@cefas.co.uk
WGBFAS	Katja Ringdahl	katja.ringdahl@fiskeriverket.se
WGHMM	Iñaki Quincoces	iquincoces@azti.es
WGCSE	Colm Lordan	clordan@marine.ie
WGNSSK	Alexander Kempf	alexander.kempf@vti.bund.de
NIPAG	Carsten Hvingel	carsten.hvingel@imr.no
WGWIDE	Jens Ulleweit	jens.ulleweit@vti.bund.de
WGANSA	Alexandra Silva (sardine IXa, VIIIc) Beatriz Roel (sardine VIIIab, VII, VI and IV) Lionel Pawlowski (anchovy VII,VI and IV) Leire Ibaibarriaga (anchovy VIII) Fernando Ramos (anchovy Div. IXa) Alberto Murta (horse mackerel IX)	asilva@ipimar.pt beatriz.roel@cefas.co.uk lionel.pawlowski@ifremer.fr libaibarriaga@azti.es fernando.ramos@cd.ieo.es amurta@ipimar.pt
WGDEEP	Leonie Dransfeld	leonie.dransfeld@marine.ie
WGEEL	Allan Walker	alan.walker@cefas.co.uk
WGMIXFISH	Alexander Kempf	alexander.kempf@vti.bund.de
WGEF	Graham Johnston	graham.johnston@marine.ie
SGBYC	Bram Couperus	bram.couperus@wur.nl
WKBENCH	Alexander Kempf	alexander.kempf@vti.bund.de
WKCOD	Alexander Kempf	alexander.kempf@vti.bund.de
WKFLAT	Kelle Moreau	kelle.moreau@ilvo.vlaanderen.be

3.2.1 Age-related requests/comments/issues raised by PGCCDBS contact persons and ICES Expert Groups during 2010

The system of appointing a PGCCDBS contact person within each of the Expert Groups (EG) worked well in relation to requests on age related problems. The majority of the requests were associated with specific problems within a stock, in a specific area, and confined to one or two institutes. The PGCCDBS felt that these are issues which can be more easily resolved between the relevant institutes.

The more general issues raised by the PGCCDBS contact persons in relation to quality of age data, methodology of age estimations etc, call for designated workshops to resolve these issues. The responses from the PGCCDBS to the requests raised are collated for all relevant issues and presented in Section 3.1

4 Identify changes or proposals for changes in data collection, that may have a potential impact on stock assessment, and summarise these changes for consideration by the Assessment Working Groups (ToR c)

ICES stock assessment Working Groups (AWGs) base their assessments primarily on analysis of time-series data on fishery landings, discards, length/age compositions, weights at age and relative abundance indices from surveys or fishery CPUE. Advice is based on analyses ranging from relative survey trends to complex age-structured analytical models which make varying assumptions regarding error structures in data. There are a number of instances where *changes* in quality and amount of input data have impacts on the assessments, for example *changes* in research vessels, sampling gears, and data collection procedures, inclusion of new data from countries that previously did not supply data, revision of historical data sets, or *changes* in the accuracy of reported statistics such as fishery landings. These can lead to adjustments to time-series of biomass, recruitment and fishing mortality, biological reference points and current stock status, and extent of any retrospective bias, depending on how the data *changes* are handled in the assessment procedure. All such *historical changes* in data series should be documented by the national laboratories providing the data, as part of the implementation of the *ICES Quality Assurance Framework*, and information should be provided to stock coordinators on estimated or anticipated *changes* in precision and bias, and the direction of any such *changes*.

There are new possibilities for changes in time-series of data to be induced by the expanding requirements of the EU Data Collection Framework, or by implementing the recommendations made by ICES workshops on ageing, sampling design and data analysis. ICES Expert Groups should be aware of the following potential changes to data sets, and consider the likely effects on stock assessments and projections:

- Improvements in design of fishery sampling schemes leading to persistent changes in data series (e.g. change from ad-hoc schemes with systematic or variable bias to more representative probability-based schemes)
- Deterioration in data quality for individual species or fleets caused by laboratories diverting resources to meet more complex sampling requirements such as metier-based concurrent length sampling. Quota sampling could lead to bias, and reduced precision due to oversampling in metiers that accounts for small component of the total catch. The post-stratification by metiers may also lead to difficulties in reliably estimating precision.
- Expansion of sampling to include fleet sectors previously not sampled or poorly sampled (e.g. collection of discards data from <10m vessels, or use of length frequencies from retained parts of catches sampled at sea)
- Adoption of new procedures for raising sample data to fleet level, or for dealing with missing data.
- Changes in the way otoliths or scales are collected and used, that could lead to persistent changes in age compositions (e.g. weighted vs. unweighted ALKs).
- Adoption of new methods or criteria for ageing, or reduction of biases caused by training and ageing workshops or exchanges.

ICES EGs should where possible make a quantitative evaluation of impacts of any data changes that could significantly impact the assessments and advice, and propose responsive actions for the assessment. This would ideally be a role for the proposed data sub-groups and data workshops proposed in Section 5.2.

4.1 Changes in the EU Data Collection Framework and ICES policy

The requirements of the EU Data Collection Framework (DCF) changed in 2009 (Council Reg. 199/2008, COM Decision 2008/949/EC) and slight changes have occurred in 2010 (COM Decision 2010/93/EU: List of sharks for stock-based sampling). The PGCCDBS comments from last year remain valid and Member States should document changes to national sampling programmes resulting from the new DCF and evaluate their effects on the data series used in stock assessments.

The basis for ICES advice on fish stocks currently changes from the Precautionary Approach (PA) to Maximum Sustainable Yield (MSY), with 2010 being a transitional year. PGCCDBS does not expect this change to alter data collection requirements in the short-term but over time it may be a further driver to improve knowledge for data-poor stocks.

In 2011, a new Memorandum of Understanding (MoU) between ICES and the EU will come into force. A draft MoU was presented to the PG meeting, in particular the list of stocks for recurrent advice (Table 4.1). The PGCCDBS notes that only few stocks have to be added to the DCF implementation rules to address these revised data needs.

Table 4.1 List of stocks in the draft new Memorandum of Understanding between ICES and the EU, indicating the current DCF inclusion and species group.

Species	Eco-Regions / ICES areas	Advice occurrence	Time frame	Included in DCF (Decision 2010/93/EU), species group (G1, G2)
Anchovy	Bay of Biscay and Iberian coast	Yearly	Mid July *NB: preliminary information on the stock size will be delivered by End of June*	G1
Anglerfish *Lophius piscatorius* and *L. budegassa*	Greater North Sea	Yearly	End of June	G1
	Celtic Seas	Yearly	End of June	G1
	Bay of Biscay and Iberian coast	Yearly	End of June	G1
Blue whiting	Greater North Sea	Yearly	October *Widely distributed stocks*	G1
	Celtic Seas			
	Bay of Biscay and Iberian coast			
	Macaronesian region			
Boarfish	Celtic Sea	Yearly	October	No
Brill	Baltic Sea	Yearly	Early June	G2
	Greater North Sea	Yearly	End of June	G2

Species	Eco-Regions / ICES areas	Advice occurrence	Time frame	Included in DCF (Decision 2010/93/EU), species group (G1, G2)
Cod	Baltic Sea	Yearly	Early June	G1
	Greater North Sea	Yearly	End of June	G1
	Celtic Seas	Yearly	End of June	G1
Dab	Baltic Sea	Yearly	Early June	G2
	Greater North Sea	Yearly	End of June	G2
European Eel	Baltic Sea	Yearly	October	G1
	Greater North Sea			
	Celtic Seas			
	Bay of Biscay and Iberian coast			
	Macaronesian region			
Flounder	Baltic Sea	Yearly	Early June	G2
	Greater North Sea	Yearly	End of June	G2
Greenland halibut	Celtic Seas	Yearly	End of June	No
Grey gurnard	Greater North Sea	Yearly	End of June	G2
	Celtic Seas	Yearly	End of June	No (only Div. VIIe)
	Bay of Biscay and Iberian coast	Yearly	End of June	No
	Macaronesian region	Yearly	End of June	No
Haddock	Greater North Sea	Yearly	End of June	G1
	Celtic Seas	Yearly	End of June	G1
Hake	Greater North Sea	Yearly	End of June	G1
	Celtic Seas	Yearly	End of June	G1
	Bay of Biscay and Iberian coast	Yearly	End of June	G1
Herring	Baltic Sea	Yearly	Early June	G1
	Greater North Sea	Yearly	Early June	G1
	Celtic Seas	Yearly	End of June October *Widely distributed stocks*	G1
Horse mackerel *Trachurus sp.*	Greater North Sea	Yearly	October *Widely distributed stocks* *NB: mid July for the Iberian coast*	G2
	Celtic Seas			G2
	Bay of Biscay and Iberian coast			No (Div. XIa missing)
	Macaronesian region			No
Lemon sole	Greater North Sea	Yearly	End of June	G2
Mackerel	Greater North Sea	Yearly	October *Widely distributed stocks*	G1
	Celtic Seas			
	Bay of Biscay and Iberian coast			

Species	Eco-Regions / ICES areas	Advice occurrence	Time frame	Included in DCF (Decision 2010/93/EU), species group (G1, G2)
	Macaronesian region			
Megrim	Greater North Sea	Yearly	End of June	G2
	Celtic Seas	Yearly	End of June	G1
	Bay of Biscay and Iberian coast	Yearly	End of June	G1
Nephrops	Greater North Sea	Yearly or Biennial *NB: depending on stocks, where surveys are available yearly assessment, when not yearly advice based on biennial assessments*	End of June	G1
	Celtic Seas		End of June	G1
	Bay of Biscay and Iberian coast		End of June	G1
Norway pout	Greater North Sea	Biannual	End of June October	G2
	Celtic Seas	Yearly	End of June	G2
Northern shrimp *Pandalus borealis*	Greater North Sea	Yearly	November	G1
Plaice	Baltic Sea	Yearly	Early June	G2
	Greater North Sea	Yearly	End of June	G1
	Celtic Seas	Yearly	End of June	G1
	Bay of Biscay and Iberian coast	Yearly	End of June	G1
Pollack	Greater North Sea	Yearly	End of June	No
	Celtic Seas	Yearly	End of June	G2
	Bay of Biscay and Iberian coast	Yearly	End of June	G2
Red gurnard	Greater North Sea	Yearly	End of June	G2
	Celtic Seas	Yearly	End of June	G2
	Bay of Biscay and Iberian coast	Yearly	End of June	G2
	Macaronesian region	Yearly	End of June	G2
(Striped) Red mullet (*Mullus surmuletus*)	Greater North Sea	Yearly	End of June	G2
	Celtic Seas	Yearly	End of June	G2
	Bay of Biscay and Iberian coast	Yearly	End of June	G2
	Macaronesian region	Yearly	End of June	G2
Redfish *Sebastes mentella* and *S. marinus*	Celtic Seas	Yearly	October	No
Saithe	Greater North Sea	Yearly	End of June	G1
	Celtic Seas	Yearly	End of June	G2

Species	Eco-Regions / ICES areas	Advice occurrence	Time frame	Included in DCF (Decision 2010/93/EU), species group (G1, G2)
Salmon	Baltic Sea	Yearly	Early June	G1
Sandeel	Greater North Sea	Biannual	Early march October *NB: assessment in October, in-year forecast in March the year after*	G2
	Celtic Seas	Yearly	End of June October	No (only Div. VIa: G2)
Sardine	Bay of Biscay and Iberian coast	Yearly	Mid July	G1
Sea Bass	Greater North Sea	Yearly	End June	G2
	Celtic Seas	Yearly	End June	G2
	Bay of Biscay and Iberian coast	Yearly	End June	G2
Sea Trout	Baltic Sea	Yearly	Early June	G2
Sharks Including spurdog, lesser spotted dogfish, catsharks, nursehounds, basking shark, blues hark, threser shark, tope, porbeagle, Portuguese dogfish, leafscale gulper shark kitefine shark	Greater North Sea	Biennial	October	G1
	Celtic Seas	Biennial	October	G1
	Bay of Biscay and Iberian coast	Biennial	October	G1
	Macaronesian region	Biennial	October	G1
Skates and rays	Greater North Sea	Biennial	October	G1
	Celtic Seas	Biennial	October	G1
	Bay of Biscay and Iberian coast	Biennial	October	G1
	Macaronesian region	Biennial	October	G1
Sole	Greater North Sea	Yearly	End of June	G1
	Celtic Seas	Yearly	End of June	G1
	Bay of Biscay and Iberian coast	Yearly	End of June	G1
Sprat	Baltic Sea	Yearly	Early June	G1
	Greater North Sea	Yearly	End of June	G1
	Celtic Seas	Yearly	End of June	No
Turbot	Baltic Sea	Yearly	Early June	G2

Species	Eco-Regions / ICES areas	Advice occurrence	Time frame	Included in DCF (Decision 2010/93/EU), species group (G1, G2)
	Greater North Sea	Yearly	End of June	G2
Whiting	Greater North Sea	Yearly	End of June	G1
	Celtic Seas	Yearly	End of June	G1
	Bay of Biscay and Iberian coast	Yearly	End of June	G2
Witch	Greater North Sea	Yearly	End of June	G2
Deep sea species Including ling, blue ling, tusk, greater silver smelt, greater forkbeard, orange roughy, roundnose grenadier, roughhead grenadier, black scabbardfish, red(blackspot) seabream, greater forkbeard, alfonsinos / golden eye perch., portuguese dogfish, leafscale gulper shark, kitefin shark	Greater North Sea	Biennial	October	G1/G2
	Celtic Seas			G1/G2
	Bay of Biscay and Iberian coast			G1/G2
	Macaronesian region			G1/G2

4.2 Age reading-related issues

4.2.1 Summaries of age reading workshops held in 2010

4.2.1.1 Workshop on Age Reading of Plaice [WKARP]

The Workshop on Age Reading of North Sea (IV) and Skagerrak-Kattegat (IIIa) Plaice [WKARP] (Chair: Loes Bolle, The Netherlands) was held 2-5 November 2010 in IJmuiden, The Netherlands.

Nine countries and 20 readers participated in the exchange. The same nine countries (14 readers) participated in the workshop. The exchange and workshop otolith sets consisted of plaice otoliths from ICES Division IIIa and Sub-area IV. The readers represented a broader geographical range (III, IV, VI & VII stocks). Some laboratories use whole otoliths, while others use transverse sections for plaice ageing. Therefore, both preparation methods were included in the exchange and workshop sets (i.e. different method was used for each otolith of a pair).

Comparison of pair-wise age readings and overall age compositions showed **no bias related to preparation method if the age is less than 10**. A small sample of **10+ otoliths** indicated an **underestimation of age in whole otoliths**. A **larger sample (from different stocks) is required for a better evaluation of preparation methods in older fish** (for different stocks).

To identify and resolve interpretation differences, the results and annotated images from the exchange were discussed during the workshop. Differences in interpretation mainly stemmed from whether or not to expect regular growth patterns, i.e. **whether or not to apply the rule of the thumb that every annulus is wider than the next annulus.** This difference in interpretation was most prominent for **the first annulus**. Growth increment analyses were carried out to examine this issue in more detail, but the differences were not resolved. **Consequently, the agreement between readers did not improve for a new set of otoliths which was read during the workshop**. The majority view is not necessarily the correct way to interpret growth structures in plaice otoliths (for all stocks). **The only way to prove who is right is to carry out validation studies.**

WebGR, the web tool to aid ageing and maturity staging workshops, was used to create an agreed age reference collection with annotations. WebGR was considered to be very useful, but the implementation was hampered because it requires experience in using the tool, which most age readers and coordinators do not have. **WebGR training sessions for age readers and age coordinators are proposed**. It is furthermore **recommended to enlarge the plaice reference collection in WebGR, including both agreed otoliths as well as otoliths subject to interpretation differences**.

The group also reviewed calibration work done so far, collated information on national procedures, created an international age reading manual and formulated target/threshold statistics and follow-up actions.

In general, **regular workshops (at a 3-5 year interval)** are recommended. The next workshop is **proposed for 2013, following a large-scale exchange**. The goal is to **pursue the unresolved issues** of the 2010 workshop and to maintain and further enhance international calibration and cooperation between age readers for plaice stocks in ICES Sub-areas III, IV, VI and VII.

Table 4.2.1.1 Main results of plaice otolith exchange and workshop.

	ICES area IV		ICES area IIIa	
EXCHANGE	***sections***	whole	sections	***whole***
# otoliths (modal age 0-10)	112	112	92	96
# experienced readers	5	8	5	8
agreement	***88%***	84%	73%	***76%***
APE	***4%***	6%	9%	***6%***
WORKSHOP	sections	***whole***	sections	***whole***
# otoliths (modal age 0-10)	51	51	47	41
# experienced readers	6	6	6	6
agreement	75%	***82%***	76%	***76%***
APE	9%	***5%***	8%	***9%***

PGCCDBS recommends a new workshop should only be carried out when validation studies have been conducted. PGCCDBS strongly recommends that these studies will be carried out. France have data on the validation of the first annulus by the use of daily increments in the Eastern Channel.

4.2.1.2 Workshop on Age Determination of Salmon [WKADS]

A Workshop on Age Determination of Salmon (WKADS) was held in Galway, Ireland, 18-20 January 2011. The meeting was chaired by Jonathan White, Ireland, attended by 26 people from six countries representing eight laboratories. **Recommendations included standardising digital scale reading, compilation of a digital image reference collection, detailing of characteristics and reference points, itemising scale marks and issues in their separation.** Approaches to future sample and data collection to address questions of changing life histories and proposals for future data analyses were also made.

The meeting began with presentations detailing reasons for scale reading and the procedures of different laboratories, a theoretical review and practical demonstrations. Notable variation was found in the approaches taken by different laboratories. The most prevalent issues were presented and discussed in working sessions to reach consensus on how they should be addressed and the necessary steps to provide further information about them.

The ICES Cooperative Research Report "No. 188 Atlantic Salmon Scale Reading Guidelines" (Anon., 1984) was found to still be a primary reference point. As such its definitions were adopted, though technology has moved forward enabling greater detailing in measurements and image storage. Groups in the working session detailed:

- The procedure of digital scale reading being adopted by the Celtic Sea Trout Project was credible for reading salmon scales and should be adopted.
- A digital image reference collection was compiled to include recognised scale features and age groups.
- Scale spawning marks and erosion marks, commonly recognised as being difficult to recognise were detailed.
- Scales from farm escapees and wild salmon were noted as being more complex to distinguish than in the past. Revealing marks were listed and should include morphology.
- Reference points on scales important for accurate calculation of growth periods with digital apparatus were listed.
- Approaches to data analyses being used on the more detailed data sets being collated from digital scale reading were presented and discussed.
- Means of determining changes in growth and life histories from scales were addressed and recommendation for the necessary data collection to determine these made.
- The position of scale collection was found to provide more information if taken from below the adipose fin, further back than recommended in the ICES CRR No. 188 (Anon., 1984). A recommendation for future collection from this position requires consideration, owing to the history of collection. Switching could undermine the continuity of the time series.

- Other recommendations are:
- Smolt scales should be collected from the right hand side of the fish, leaving the left for adult sampling.
- A study into possible scale deformation owing to scale and acetate slide rolling through jewellers roll should be carried out.
- A study into potential differences in circuli number and spacing on scales taken from the 1984 recommended scale collection location against the highlighted improved scale collection location below the adipose fin should be carried out.
- A protocol for Inter-lab calibration/ quality control should be established. In the first instance attendees offered their services for an informal policy of 'open checking and comparison'. At a future date a formal policy of sample exchange and checking should be formulated.
- Circuli number and inter-circuli distances should be measured according to standard locations and detailed in a common data format.
- The relationships in the ICES CRR No. 188 (Anon., 1984) concerning back calculated lengths are tending not to hold true on a growing frequency as returning salmon are becoming smaller. These relationships need to be readdressed.

PGCCDBS supports these recommendations.

4.2.1.3 Workshop on Age Reading of Mackerel [WKARMAC]

The overall result of the mackerel exchange and workshop exercise is that there are significant variations in age estimates between readers. Low precision and large relative bias between readers were found, and the older ages (from age 6) were particularly difficult to reach agreement upon.

The workshop, held 1-5 November 2011 in Lowestoft, UK-England, achieved quite a lot in terms of ironing out, through discussion and calibration, some of the major problems in ageing otoliths of mackerel. The group reached agreement on the definition of a set of ageing guidelines, which was tested during a post-workshop exchange. The criteria that provided the desired increase in agreement between readers were easy to follow. Out of 248 otoliths, 85 otoliths had complete agreement (34%). Of the nine readers who read all samples, **the agreement with the modal age ranged from 71.7% to 85.1%.**

A collection of agreed-age otoliths was started at the workshop, using the few agreed otoliths from the exchange. The reference collection was expanded considerably through an exchange of otolith images performed immediately after WKARMAC. Additionally, the collection of agreed-age otoliths should not stand alone, but be a part of a larger compilation of data on 'typical' otoliths for the species and area, in which typical distances between age structures, edge development over season and general growth curves for mackerel are represented across its area of existence.

The existence of otoliths from the Norwegian mark-recapture experiments is potentially the "golden stones" and could iron out many subjective assumptions relating to the age estimation of mackerel from this area (and potentially other areas). It is of utmost importance that the dimensions and availability of such material is clarified

and that efforts are made to reach agreement on potential availability for coordinated validation studies.

WKARMAC recommends that efforts are put into an analysis of acceptable variance around the estimated proportions at age for mackerel. The overall agreement in all previous workshops and WKARMAC was never more than around 70% and it is doubtful whether it is possible to reach higher levels of agreement for the older part of the mackerel population. WKARMAC has reconfirmed the validity of the age estimations up to age 4 using the existing methodology. The validated range of ages would without doubt be increased dramatically if the recommendations concerning studies of the otolith morphology (particular the otolith edge and the known-age otoliths held by Norway) are followed.

Table 4.2.1.3 Level of agreement by mackerel age-groupings in part I and II. Note that there were no otoliths of 5 and 6 winter rings. Agreement was calculated as a weighted mean, with the weight of 1/n, where n was the number of otoliths of the given age. This was to give each age equal weight.

Age (winter rings)	Part I	Part II	Part II (readers from I)
2-4	79 %	72 %	79 %
7	32 %	26 %	36 %
8-9	22 %	18 %	24 %
10-11	23 %	12 %	19 %
12+	5 %	4 %	9 %

PGCCDBS supports these recommendations and suggests the use of a standard grading system by the reader of his/her own readings (e.g. high, medium, low) be considered during the WKNARC as a standard that could be applied in all age calibration exchanges and/or WKs.

4.2.1.4 Workshop on Age Reading of Dab [WKARDAB]

The first otolith exchange of dab (*Limanda limanda*) took place between 2009 and 2010 with the participation of 12 age readers from 7 countries (Germany, Belgium, Denmark, The Netherlands, Ireland, France and UK-England). This workshop was coordinated by Ulrich Damm (Germany). The exchange collection consisted of digital images (reflected and transmitted light) and whole otoliths from 160 fish from the North Sea collected during all seasons (January, April, July and November) of 2008 (40 fish per quarter). The mean precision of age estimates for individual fish were: CV = 12.0%, percent agreement to modal age: 79.3%. There were variations in precision of age estimates between individual fish, with CVs ranging from 0 to 49% and percent agreement ranging from 45 to 100%.

The Workshop on Age Reading of Dab (*Limanda limanda)* was held in Hamburg, Germany, 17-20 November 2010.

The sources of bias were:

- Disagreement in the identification of the first annual ring; On some otoliths, there is a first ring with a specific shape which is considered as a false ring
- Disagreement in the identification of few rings closed to the edge during the third quarter;
- Confusion with the hyaline zone (one reader) and opaque zone as growth rings;
- Differences in the light used (transmitted and reflected),
- A source of misinterpretation is the occurrence of split rings. Some of the translucent annuli can consist of several thinner translucent bands that can be misinterpreted as true annuli, which leads to overestimation of fish age. These bands can be identified as being thinner than true annuli and with less distance between them.

PGCCDBS requests that the final report with recommendations is forwarded to the next PGCCDBS meeting for consideration.

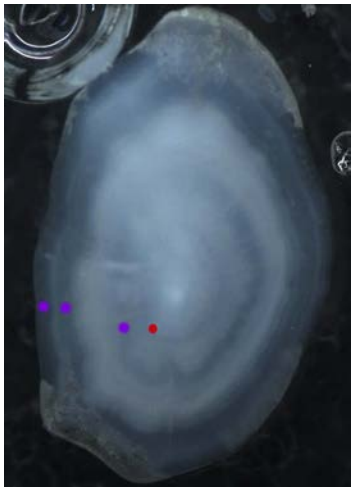

Figure 4.2.1.4: Observation of the growth rings (purple spots) and the false ring (red spot) close to the nucleus of a dab (*Limanda limanda*) otolith.

4.2.2 Summaries of otolith exchanges carried out in 2010

4.2.2.1 North Sea sole

A North Sea sole exchange has been conducted, coordinated by Mark Etherton (UK-England). The exchange consists of 100 pictures of otoliths. So far, there are results for six readers from five countries. Two countries still want to contribute the age estimations of at least three readers in total. Preliminary overall weighted mean of the CV is 0.147 (0.076-0.182) and the **preliminary overall weighted mean of the percentage agreement is 70.2%** (42.0-87.0%).

The PGCCDBS recommends that all coordinators adhere to the guidelines of exchanges and workshops. It is important to note that these guidelines have been updated in the PGCCDBS 2011 and will be made available on the European Age Readers Forum (see section 4.2.4).

4.2.2.2 North Sea cod

The North Sea cod otolith exchange 2009-2010 was co-ordinated by Hans Høie (Norway), followed up by Sigbjørn Mehl (Norway) and Hildegunn Mjanger (Norway). Nine countries and 17 readers participated in the exchange. The exchange otolith set consisted of cod otoliths from ICES Divisions IVa and IVb. Some laboratories use broken otoliths, while others use transverse sections for ageing. Therefore, both preparation methods were included in the exchange set (i.e. different method was used for each otolith of a pair, also, both halves of the broken otolith were included in exchange), but the institutes only received the sets according to the method they use.

The **overall percentage agreement** for this exchange was **66% (35-100%)** and the **overall CV was 14.7% (0-32%),** which is not satisfactory. **On the positive side, of the 120 otoliths in the sample set, 28 were read with at least 80% agreement and four readers from the group achieved approximately 90% agreement with the modal age for the group.** It should be noted that not all readers read all otoliths. If the two readers with no previous experience reading otoliths of North Sea cod, but long experience reading Northeast Arctic cod are left out in the analyses, the average percentage agreement increases to 72%, while the CV is reduced to 12.1%.

Overestimation of ages was previously a big problem when interpreting ages of North Sea cod, but this seems to have improved in the present reading. However, a relatively higher percentage of inter-reader bias was found now than previously, as well as for each reading compared to modal age.

This may be due to a change of readers participating in the exchange, only nine of the seventeen readers also participated in 2005/2006.

There were less signs of bias between readers from some institutes. This suggests that there is good agreement between readers who possibly interpret age readings in much the same way probably because of similar training received. However, the relative bias between the readers was larger during the present reading.

There do not seem to be any clear differences between otoliths sampled in ICES Divisions IVa and IVb.

The preparation methods did not seem to have a huge impact on the performance of the readers in this exchange. Many readers feel that it is easier for readers who are familiar with the broken method to read sectioned otoliths than it would be if the situation were reversed.

The results suggest that

- **more workshops are needed to standardize the age reading between laboratories.**
- **the guidelines and manuals developed during the previous workshop (ICES 2008) have not yet had the intended effect on the quality of the age reading. It should be investigated why this is the case,** in order to improve the guidelines and manuals and/or the implementation of them at the different laboratories.

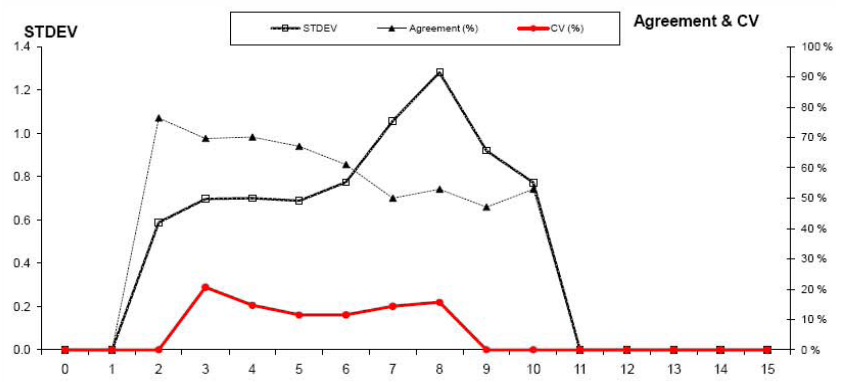

Figure 2 The coefficient of variation (CV%), percent agreement and the standard deviation (STDEV) are plotted against MODAL age.
CV is much less age dependent than the standard deviation (STDEV) and the percent agreement. CV is therefore a better index for the precision in age reading. Problems in age reading are indicated by relatively high CV's at age.

PGCCDBS recommends that the workshop coordinator re-analyses these exchange results according the PGCCDBS guidelines 2011 and restricts the data to those age readers contributing data to the stock assessments, and then from these results evaluate the need for a workshop.

In the mean time, the coordinator might like to circulate the agreed age reading criteria again, and request that all age readers adhere to these criteria.

PGCCDBS suggests that a small scale exchange could be circulated to cement the age reading criteria in the minds of the age readers, as was very effectively done in the WKARMAC 2010.

4.2.2.3 Eel

An eel otolith exchange was conducted as preparation of WKAREA2. The exchange consisted of 100 pictures of *Anguilla anguilla* otoliths and 50 pictures of *A. rostrata* otoliths. The age estimation protocol to be used was established at a previous meeting. The pictures are on a website to which each reader can connect and that stores the readings in a connected database. **So far, there are no results yet**, as the deadline for readings was set to the end of Feb. 2011. The workshop will take place in the Cemagref institute (France), 22-24 March 2011.

4.2.2.4 Sardine

A sardine otolith exchange took place between September and December 2010 with the participation of seven readers from four laboratories (IPIMAR, Portugal; IEO, Spain; AZTI, Spain; IFREMER, France). This exchange was coordinated by Eduardo Soares, Isabel Riveiro and Alexandra Silva. A total of 300 otoliths from the 1st and 4th quarters 2008 from five areas (sets), North Bay of Biscay, South Bay of Biscay, Cantabrian Sea, western Portugal and Gulf of Cadiz, were analysed. Readability was good in 63-70% of the otoliths, medium in 27-35% and low in 0-5%, except in the set from western Portugal which showed a lower proportion of good otoliths (47%) and higher proportions of medium (43%) and difficult (10%) otoliths. Surprisingly, otoliths from the Gulf of Cadiz were as clear as those from the northern areas. The average agreement of all readers with the modal age ranged between 73.1% (western Portugal) and 79.2% (Cantabrian Sea). Signs of bias with the modal age were observed in all sets usually for readers with no experience in the area but do not raise serious concern (Figure 4.2.2.4). CVs ranged from 10.9% (southern Bay of Biscay) to

18.1% (western Portugal) and were substantially higher in the Gulf of Cadiz (63.5%). It must be noted that average CVs are unduly influenced by CVs for age 0 otoliths; these were present in all samples and particularly abundant in the Cadiz sample. Inter-reader agreement showed high variability between sets and between readers being always slightly lower than agreement with the modal age. Cases of <50% agreement occurred in all samples but more often in the Gulf of Cadiz, raising some concern about age readings from this area.

PGCCDBS notes that a workshop will take place in 2011 (WKARAS).

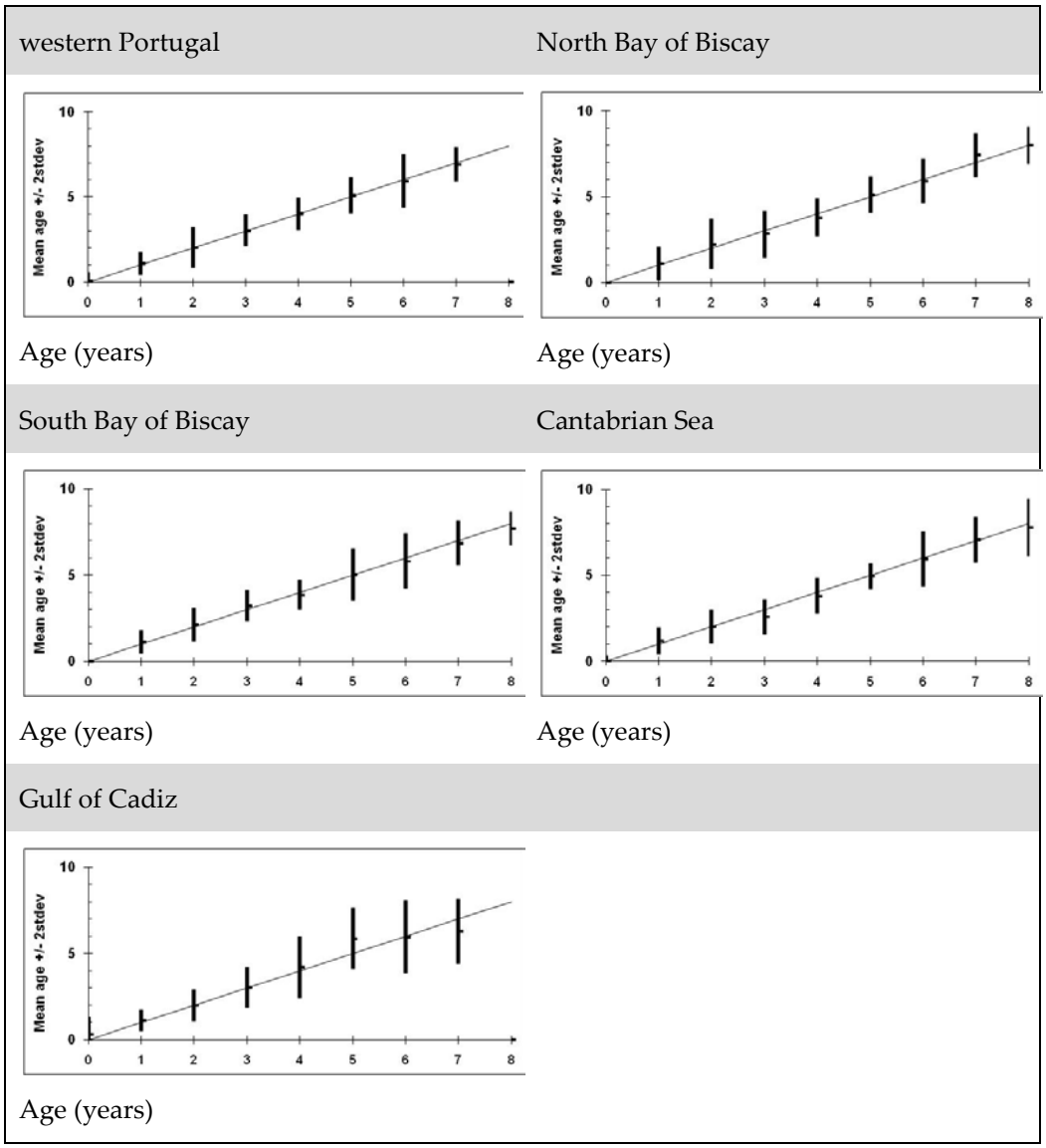

Figure 4.2.2.4: Age bias plots for each sardine otolith set and all readers combined.

4.2.2.5 Blue whiting

The last blue whiting otolith exchange took place in 2004. A new exchange of otoliths took place in 2009-2010 with the participation of 11 countries (Faroe Islands, Ireland, Russia, Portugal, UK, Greece, The Netherlands, Germany, Iceland, Spain, Denmark and Norway). This exchange was coordinated by Sigbjørn Mehl, Åge Høines and

Elna Sælen (IMR, Norway). All readings were received by the co-ordinators to date, except for data from Spain and Denmark.

PGCCDBS recommends that the results of this exchange are reported according to the updated Guidelines for Otolith Exchanges (Annex 9).

4.2.2.6 Megrim

The last exchange and workshop for megrim (*Lepidorhombus whiffiagonis*) occurred in 2004. The 167 otoliths used for the exchange were chosen from the Cefas archive to reflect all length groups by sex and all quarters of the year. This exchange has been coordinated by Mark Etherton (UK-England). An exchange of whole-otolith images took place between October 2010 and January 2011 with the participation of seven readers (CEFAS, UK-England: 2 readers; IEO, Spain: 2 readers; IFREMER, France: 2 readers; AZTI, Spain: 1 reader). The CV ranged from 0.084 to 0.156, with an overall value of 0.104. The percentage agreement of the seven readers compared to the modal age ranged from 45.8% to 77.9% with an overall agreement rate of 69%. This is relatively low and reflects the difficulty of the interpretation of megrim otoliths. The overall agreement rate decreased with increased modal age from 81.6% at age 3 to 47.6% at age 12. The bias values ranged from -0.14 to 0.21. Only two of the readers had a bias value of greater than 0.10 or -0.10. The average percent error (APE) values ranged from 3.9% to 14.8%, with only one reader having a value above 8%. Alternative method of reading (e.g. breaking and burning) should be investigated, especially for ages 6+.

Alternative methods of reading (e.g. breaking and burning) should be investigated, especially for ages 6+. A new exchange using the break-and-burn method should be carried out.

PGCCDBS recommends that all coordinators follow the PGCCDBS Guidelines on otolith exchanges and workshops, ensuring all interested countries are able to participate.

PGCCDBS notes that Portugal will provide data with quality indicators on megrim regarding ALK's for landings and discards to the WGHMM in 2011. However data on *Lepidorhombus whiffiagonis* is quite sparse, as the majority of the catches comprise of *Lepidorhombus boscii.* Currently, *Lepidorhombus whiffiagonis* is not aged in Portugal.

PGCCDBS agrees that a follow-up full-scale exchange is necessary. Any follow up exchange should include both the calcified structures and corresponding images. IFREMER has agreed to co-ordinate this exchange with CEFAS. IFREMER are happy to supply images for the exchange.

4.2.2.7 Tusk

A first otolith exchange of tusk (*Brosme brosme)* took place between June and December 2010. This exchange was coordinated by Gróa Petursdottir and Gudrun Finnbogadottir. The 268 whole otoliths used in this exchange were collected from tusk catches in 2008 in Icelandic waters. Three countries (Faroe Islands: 1 reader, Norway: 2 readers, Iceland: 1 reader) participated. The average agreement of all readers with the modal age was 33.7% and ranged between 0% and 100%. CVs ranged from 0% to 42% with an average of 20.8%. From this collection, a total of 24 images of random otoliths were made. Additionally, 10 otoliths from juveniles from quarter 1 were imaged. 34 images were analysed by four countries (Faroe Islands: 1 reader, Norway: 2 readers, Iceland: 1 reader, France: 4 readers). The average agree-

ment of all readers with the modal age was 37.1% ranged between 25% and 75%. CVs ranged from 15% to 38% with an average of 23.4%. The difference in interpretation between age readers on a set of 268 whole otoliths ranged from 0-10 years with a peak of 3-4 years difference. The difference between age-readers interpretation on the digitised otoliths ranged from 1-12 years.

Difference between age- readers	Number of otoliths non agreeing
0 (agreed age)	1 otolith
1 year difference	13 otoliths
2 years difference	48 otoliths
3 years difference	64 otoliths
4 years difference	71 otoliths
5 years difference	34 otoliths
6 years difference	17 otoliths
7 years difference	9 otoliths
8 years difference	5 otoliths
9 years difference	5 otoliths
10 years difference	1 otolith
Total	**268 otoliths**

Difference in interpretation between 4 readers on 268 whole otoliths.

Difference between age- readers	Number of otoliths non agreeing
1 year difference	2 otoliths
2 years difference	3 otoliths
3 years difference	3 otoliths
4 years difference	4 otoliths
5 years difference	3 otoliths
6 years difference	5 otoliths
7 years difference	2 otoliths
8 years difference	4 otoliths
9 years difference	3 otoliths
10 years difference	1 otoliths
11 years difference	2 otoliths
12 years difference	1 otolith
Total	**33 otoliths**

Difference in interpretation between 8 readers on 33 digitised otoliths.

PGCCDBS notes that tusk will be studied during WKAMDEEP in 2012 (see Annex 11).

4.2.3 Inclusion of outputs from workshops in the assessment work

During the PGCCDBS meeting in 2010, it was suggested to incorporate the outcome of an age reading workshop into a test stock to be able to incorporate a known bias estimate in stock assessment.

The **Western Baltic cod stock** was chosen which presently is run with a stochastic State-space Assessment Model (the SAM model). In 2010, a small-scale otolith exchange was set up between the two main contributors of the catch, Germany and Denmark. A standard otolith Excel spread sheet was conducted from the seven readers and the output was a matrix with model age and divans from the readers.

Table 4.2.3 Age sample bias.

	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7
Age 1	220	50	0	0	0	0	0
Age 2	64	475	213	1	0	0	0
Age 3	0	23	83	13	0	0	0
Age 4	0	0	1	14	5	0	0
Age 5	0	0	0	4	16	0	0
Age 6	0	0	0	0	0	1	0
Age 7	0	0	0	0	1	1	3

This matrix was incorporated in the assessment model as known uncertainties in the catch matrix. The result of the new runs showed that the model was improved when 10% on the information from the bias matrix was introduced. However, when more than 10% of the information was introduced in the model, some age group disappeared in some years and some was enlarged a lot and the model broke down. This is probably due to the fact that one age reading exchange in 2010 is used to recalculate the "true" catch age back in time, and in this time frame (time series start in 1970), other age readers and other problems could be causing the problems. For this reason, an age-bias matrix should be incorporated in different time periods – every time a new age reading workshop or exchange has been carried out the matrix should be incorporated for a certain time period.

4.2.4 European Age Readers Forum (EARF)

PGCCDBS established the European Age Readers Forum (EARF) in response to feedback received from those engaged in age reading across Europe. The objective was to establish a "one-stop shop" for all those involved in age reading. It was thought that the forum would provide an important resource for training of new age readers, as well as providing opportunities for sharing and discussing existing age reading manuals, establishing standard operating procedures and standardising preparation and interpretation methods. The forum was initially established as a Google Group, but was subsequently migrated to a more secure Sharepoint site. At the moment, the forum includes the following information:

- The contact details and a mailing list of age reading coordinators as well as those engaged in age reading of fish species in the various European laboratories.
- A calendar of upcoming workshops and also the PGCCDBS meeting details.
- A link to the PGCCDBS documents repository.
- The EFAN Reports
- PGCCDBS guidelines for otolith exchanges and workshops.

The Sharepoint has been established for two years now but has not been used by age readers, which makes evaluating its usefulness impossible at this stage. It would appear that most people have forgotten their user name and passwords and this is one of the reasons age readers have not logged on in some time. It was concluded that it is important at this stage to encourage participation from age readers and more importantly from age-reading coordinators in order to ensure a future for the EARF.

To do this, it has been agreed to run the brill and turbot otolith exchange through the EARF, as a way of encouraging age readers to log in to the forum, for information they cannot access elsewhere. In the mean time, the subgroup dealing with ToRs b and c within PGCCDBS will start some threads of discussion on topics of particular interest at the moment to the wider age reading community. The philosophy is that once age readers log in and see what else the forum has to offer, they will be more likely to continue to visit the forum and eventually contribute to the creation of an online age readers forum.

Actions for 2011:

- Annemie Zenner (Belgium) has agreed to conduct the turbot and brill otolith exchange via the EARF. This is due to commence in February/March 2011 with the issuing of invitations to participate.
- Progress on establishing the utility of the EARF will be tracked, and this will be reported to the WKNARC meeting in September 2011, by Gráinne Ní Chonchúir (Ireland).
- Request the ICES Secretariat to re-issue login details during February 2011 to all those identified on the PGCCDBS age reader contacts list 2011.
- The EARF will also include a link to the WebGR software on the site to help enhance the utility of both. Images can be exchanged and discussed in WebGR and the age reading criteria, manuals, information on image grabbing, advances in technology etc. can be can be discussed and exchanged on the forum.
- It was also suggested to include a literature section with titles for relevant books on age reading topics, as well as references to historic methodological reports which would also be of interest. A good example of this is a recent e-mail discussion regarding ageing of whiting, where one person involved in the discussion highlighted that the information required already exists and the "new" method had already been tested 20 years ago. In this way, the EARF will help preserving the "institutional memory" of the age reading community and ensure that this information is not lost when an individual leaves a lab.
- Ensure all members of the EARF SharePoint are aware that they can be alerted to updates on the site by activating the e-mail notification system. Alerts should also be specific by topics, i.e. ageing of cod, so people can receive alerts when new information in uploaded on the forum on specific topics of interest to them.
- Details of the location and ownership of otolith reference collections of both annotated agreed age images and calcified structures should be housed on the forum.
- The forum should be monitored for frequently asked questions (FAQs) and should respond to demand for different kinds of information.

4.2.5 Harmonized methodology of age estimation procedures

The Regional Co-ordination Meeting for the North Atlantic (RCM NA) in 2010 was supporting the idea of this study, provided that a small number of case studies are deeply scrutinised, in coherence with PGCCDBS guidelines and requirements (added value for the existing otolith exchange protocols and ageing workshops). Hence, RCM NA recommended that PGCCDBS should review this proposal.

The Liaison Meeting 2010 comment was: Should be evaluated by the PGCCDBS and the age-reader coordinator forum. The LM support this proposal.

The PGCCDBS supports this action which should be finalised at WKNARC and should then be put forward to RCM NA 2011.

4.2.6 Changes made to the PGCCDBS Guidelines for Otolith Exchanges and Workshops

Some updates have been made to the PGCCDBS Guidelines on exchanges and workshops to incorporate additional direction to coordinators (see Annexes 9 and 10). These updated exchange and workshop guidelines will be uploaded onto the European Age Readers Forum (EARF, see section 4.2.4). Also a checklist for coordinators of exchanges and age calibration workshops has been developed and included to aid coordinators in the task of ensuring that both the exchanges and workshops are run according to best practice guidelines as agreed by PGCCDBS.

4.3 Maturity-related issues

4.3.1 Maturity Staging Workshops carried out in 2010

4.3.1.1 Workshop on Sexual Maturity Staging of sole, plaice, dab and flounder [WKMSSPDF]

The Workshop on Sexual Maturity Staging of sole, plaice, dab and flounder met in Ijmuiden, Netherlands 22-26 February 2010. The workshop was not expected to report until late in 2010 but participants of the workshop had been able to present the outcome to PGCCDBS 2010 and all relevant matters were discussed there. An extended summary from WKMSSPDF and PGCCDBS comments to their recommendations can be read in last year's PGCCDBS report (ICES 2010a).

4.3.1.2 Workshop on Estimation of Maturity Ogive in Norwegian Spring Spawning Herring [WKHERMAT]

The Workshop on Estimation of Maturity Ogive in Norwegian Spring Spawning Herring was held in Bergen (Norway), 1-3 March 2010 (ICES 2010d).

Data on Norwegian spring spawning herring maturity ogives from three different sources were presented and discussions on strengths and weaknesses of the different data sources took up most of the time.

The three different data sources were considered:

a) maturity ogive used in assessment,

b) survey data on maturity ogive from the Ecosystem survey in May and

c) back-calculated maturity ogive using Gulland's method.

In addition, data on the maturity cycle in Norwegian spring spawning herring were presented and guidelines for sampling of maturity data were discussed in accordance with PGCCDBS.

The Norwegian spring spawning herring maturity matrix used by ICES goes back to 1907. Documentation on the source of information and the justification of changes is almost absent and the lack of documentation is a general problem in this data set. The data cannot be reproduced because the sources are unknown and most changes, which have been made in the past, are not explained.

The May survey may potentially provide data to construct updated maturity ogives. The survey indicates that most (but not all) herring in the Norwegian Sea are mature and most (but not all) herring in the Barents Sea are immature. However, the time series is short and some potential problems were discovered. The deviation of a maturity ogive from the survey data compared to back-calculations appeared to be problematic. There appear to be differences in the catchability in the survey between the Norwegian Sea (where most of the mature fish is distributed) and the Barents Sea (where most of the immature fish is found). This needs to be addressed further before data from the survey can be used for maturity ogive estimations.

The back-calculation data set indicates that maturation of large year classes is slower than for others. This applies to a lesser extend to the 2002 year class. However, the estimates for this year class are suggesting that at least a correction needs to be considered in the maturation assumed for this year class in the assessment by ICES. WKHERMAT considered the data set derived by back calculation as a suitable potential candidate for use in the assessment because it is conceived in a consistent way over the whole period and can meet standards required in a quality-controlled process. However, the back calculation estimates cannot be used for recent years. Since the surveys do not provide suitable data now, assumptions have to be made for recent year classes.

A comparison of the SSB derived from the ICES WG matrix of maturity data and the back calculation data was done. Although there are sometimes large differences in the maturity-at-age data between the data sets, the trends in SSB from both data sets are very similar. There appear only differences in a few short periods where the strong year classes enter the spawning stock.

These contribute a large amount to the SSB and the different values used at age 3, 4 and 5 in both sets cause the difference.

WKHERMAT recommends WGWIDE to reconsider the maturity values used for the 2002-year class in the assessment.

Rationale:

The maturity ogive for large 2002 year-class was treated differently than other year-classes in the assessment largely based on data from the May surveys. WKHERMAT compared estimates of maturity ogives based on the May survey for the 2002 year class with neighbouring year-classes. It was shown that estimates of maturity at age 4 from the May survey are high also for the neighbouring year-classes and it is likely that the May survey overestimate maturity at age 4. Back-calculation of maturity at age 4 for the 2002 year-class is much lower (0.3) than the values based on surveys. WKHERMAT therefore concluded that the adjustments of maturity at age for the 2002 year-class is not justified and recommends that they be reconsidered by WGWIDE.

WKHERMAT recommends WGWIDE to consider the potential use of the back-calculated maturity ogive as an alternative to the historical ogive presently used by WGWIDE.

Rationale:
The back calculation data set indicates that maturation of large year classes is slower than for others. This applies to a lesser extent to the 2002 year class. However, the estimates for this year class are suggesting that at least a correction needs to be considered in the maturation assumed for this year class in the assessment by ICES. WKHERMAT considered the data set derived by back calculation as a suitable potential candidate for use in the assessment because it is conceived in a consistent way over the whole period and can meet standards required in a quality-controlled process. However, the back calculation estimates cannot be used for recent years. Since the surveys do not provide suitable data now, assumptions have to be made for recent year classes.

Other WKHERMAT recommendations:

- Increase the number of hauls sampled in the May survey to insure that young age classes are well represented (addressed to the WGNAPES).
- Improve methods of acoustic registration and trawling during the May survey in order to sample representatively for all age-classes so that appropriate weightings of maturity data from each area can be obtained (addressed to the WGNAPES).
- Participation in WKMSHS to be held in Copenhagen, Denmark on 20-23 June 2011

4.3.1.3 Outcomes from the Workshop on Sexual Maturity Staging of Cephalopods [WKMSCEPH]

The Workshop on Sexual Maturity Staging of Cephalopods was held in Livorno, Italy, 8-11 November 2010 (ICES 2010e).

The main goal of the WKMSCEPH was to review the maturity scales currently in use and to agree on the adoption of common scales, which should provide a biological background consistent with the objectives of DCF. Actually, different scales are frequently adopted for the same species and, even when the same scale is adopted, discrepancies among different laboratories and even within scientists of the same laboratory may occur. The workshop was carried out in three sessions: Octopoda (*Octopus vulgaris, Eledone cirrhosa, Eledone moschata*), Teuthida (*Loligo vulgaris*, *Loligo forbesii, Illex coindetii, Todaropsis eblanae*) and Sepiida (*Sepia officinalis*). In each working session, specimens of the species under consideration were used to perform a calibration exercise in order to point out possible discrepancies in the definition of maturity stages and to reach a common agreement on the new scales proposed.

The identification and macroscopic classification of maturity stages can play a key-role in the assessment of fish resources, and therefore, the urgent need of improving the quality of these estimates by means of reliable information on the maturity parameters has been universally recognized. The workshop on maturity staging had the aim to agree on the adoption of common scales based on the standardization of maturity defining criteria; as a general conclusion, it is possible to affirm that this goal and all the expectations of the TOR's were fulfilled.

Through the analysis of the MEDITS maturity scales and of those in use in the different laboratories, the direct observation of the samples' gonads and of the macroscopic

and microscopic pictures, a thorough discussion arose, and brought to the definition of the new scales. The calibration exercise was very useful for identifying sources of discrepancies and as a test for the agreed scales. The collection of pictures at macroscopic and microscopic levels was instrumental in solving interpretation's problems and could be used afterwards in every laboratory for ease of reference. Histology proved to be an essential key to support the macroscopic identification and the gonad-somatic and Hayashi indices were recognized to be important tools to clarify doubts.

After a plenary discussion based on the working documents presented, on the macroscopic and microscopic descriptions of the gonads and on the calibration exercises, all the participants agreed to split the MEDITS maturity scale, currently in use into three scales, one for each taxonomic group under consideration. The decision was mainly based on the fact that a maturity scale should accurately describe the stages precisely, avoiding any ambiguity, and this goal is difficult to achieve if the three orders (*Octopoda*, *Teuthida* and *Sepiida*) are kept together. However, it was also taken into consideration the recommendation of maintaining the new scales as similar as possible to the existing ones, in order to avoid the impact on maturity historical series. Therefore, the new maturity scales proposed maintain the same number of stages of the MEDITS scales currently in use (1, 2a, 2b, 3a, 3b), but consider males and females separately, thus allowing a more extensive and thorough description of the characteristics of each stage at a macroscopic level. The MEDITS maturity scale has been split into three scales, one for each order. Moreover, all the WKMSCEPH participants agreed that the main aim of using the macroscopic assignments is mainly to estimate the maturity ogives and the timing of the spawning season.

A collection of pictures at macroscopic and microscopic levels was organized before the WKMSCEPH; its use, instrumental in solving interpretation's problems, is highly recommended for ease of reference. Histology proved to be an essential key to support the macroscopic identification and its use should be extended. Conversion tables between the scales currently in use in the different laboratories and the proposed WKMSCEPH maturity scales were established, providing a common tool for exchanging data and scientific information. In order to verify the suitability of the new scales and to discuss the potential problems that might arise, it is highly desirable that workshops of this kind be periodically organized. Furthermore, the maturity ogive estimation is a point that still requires a discussion and a thorough investigation of an appropriate strategy and implementation methods. It is envisaged that this issue will be addressed in a workshop that is proposed for 2012 (WKMATCH, see Annex 11).

The WKMSCEPH makes the following **recommendations**:

a) The application of the proposed scales (both on fresh and frozen specimens) by all laboratories is highly advised, in order to check their suitability.

b) It is also recommended that potential discrepancies in maturity staging between scientists of the same laboratory and within laboratories be investigated. Therefore, calibration exercises with fresh and/or frozen specimens should be carried out regularly.

c) The collection of both macroscopic and microscopic photos should be increased and directed to a higher number of species of concern. There should be an exchange of them between institutes in order to calibrate the maturity identifications.

d) More histology studies should be done to validate the macroscopic maturity key, as histology is an important tool to achieve a consensus on maturity stage description/classification.

e) Histological analyses from different structures, such as oviductal and nidamental glands, are also desirable.

f) Histology should be carried out only on fresh specimens.

A general agreement on the cephalopod size measure is mandatory. Generally, the dorsal mantle length represents the standard measure. Actually, some institutes collect the dorsal mantle length data, others the ventral mantle length data, probably due to a misleading figure in the MEDITS Instructions Manual. A discussion on this point in the next MEDITS meeting is highly recommended.

4.3.1.4 Workshop on Sexual Maturity Staging of Elasmobranchs [WKMSEL]

Although no presentation was available for PGCCDBS to consider, a summary report was available and considered by PGMED.

4.3.2 Incorporation of maturity data in stock assessment

Following the meeting of WGCHAIRS 2011, PGCCDBS were asked to give advice on the best way to incorporate newly collected maturity data into assessment. It was recognized that Assessment Working Groups may not have the relevant experience to make decisions on the use of recently collected maturity data, particularly when fluctuation on maturity ogives may vary over a short period. It was agreed that this matter could be addressed by a workshop (as recommended by FRESH) that is proposed for 2012 (WKMATCH, see Annex 11) where the attendees will include the previous chairs of maturity workshops, supported by invited experts. A suitable Term of Reference to address this issue will be incorporated into the workshop proposal.

4.3.3 COST-FRESH Network

The COST Action on Fish Reproduction and Fisheries (FRESH, http:// www.freshcost.org) is currently working on the production of the *Handbook of applied fisheries reproductive biology for stock assessment and management*. The main objective of the Handbook is to provide practical knowledge for studying fish reproductive biology with the aim of implementation in stock assessment and management. The handbook will be structured in seven chapters that compile fundamental aspects to be considered on fish reproductive biology studies that can be implemented in stock assessments and management:

i) general overview of fish reproductive biology,

ii) data collection and statistics for reproductive biology,

iii) maturity,

iv) egg production,

v) sperm production;

vi) elasmobranches reproductive potential and

vii) Reproductive terminology.

FRESH foresee that the chapter dealing with fish maturation is of interest of PGCCDBS as it will describe methods and protocols to estimate maturity ogive to be used in stock assessment with the aim of standardizing maturity staging criteria in a

range of species covering different reproductive strategies. The handbook is scheduled to be finished by the end of 2012.

FRESH is currently evaluating the impact of sex-separated maturity ogives for stocks, where ogives are available: Baltic cod, North Sea plaice, Northeast Arctic cod, Northern hake. Results for these studies will be presented at the next FRESH conference in May 2011 and later reported to PGCCDBS.

FRESH has agreed on its March 2010 meeting to report to PGCCDBS about the status of maturity information for the different stocks in ICES waters, providing recommendations on which maturity workshops will be necessary in the future for all types of fish species, i.e. not only viviparous or hermaphrodites. All regulated stocks, hermaphrodite species and commercial unregulated stocks, have been revised. FRESH concluded there is not enough data on these species/stocks to conduct specific Workshops.

However, it is strongly recommend that the routine data collection on maturity follows the current ICES (PGCCDBS and WKMOG) guidelines and future FRESH guidelines. These ought to be followed also during in-house workshops, in order to assess quality of data being collected.

Finally, FRESH recommends the organization of a Workshop of chairs of previous maturity workshops in order to discuss experience, enhance consistency in the developed methods and develop protocols for quality control and tools to analyze error and bias. This recommendation has been taken up by PGCCDBS by proposing WKMATCH (see Annex 11).

4.3.4 Review of PGCCDBS Guidelines for Maturity Workshops during the 2011 PGCCDBS meeting

The group carried out a brief review of the Guidelines for Maturity Workshops and ascertained that no further clarification or additions were required at present. However, with a proposal to hold a workshop (WKMATCH) where previous chairs of maturity workshops (and invited experts) would meet, it was agreed that this was an opportune time to carry out a more meaningful review. This matter will be included as a ToR in the proposal for the Workshop.

4.4 Age-reading- and maturity-related issues

4.4.1 NESPMAN project

The project "NESPMAN - Improving the knowledge of the biology and the fisheries of the new species for management" (contract MARE/2008/10) ended mid-2010.

The NESPMAN (New Species for Management) project is meant to improve the knowledge of the biology and the fisheries of the new species for management. Apart from highly priced turbot, brill, striped red mullet and sea bass, these 12 species comprise also 3 gurnard species and 4 flatfishes. The report presents information for these 12 species that are becoming increasingly important for fisheries in NW Europe, partly due to the generally poor state of some of the main commercial fish species.

The information presented in the report is based on analyses of data from research vessel surveys, landings statistics, data from on board observers, market sampling programmes and from biological sampling. Some economical analyses have been carried out as well. Through this project a better insight is gained in aspects such as distribution of the species, length and sometimes age composition of the catches, growth and maturity, ageing, stock ID etc.

The results of the NESPMAN project was presented at, and used by, the ICES Working Group on the Assessment of New Species (WGNEW) at its 2010 meeting. During this meeting, the basis was laid to formulate ICES advice on fisheries for the NEW species to the European Commission.

The final NESPMAN project report can be downloaded here:

http://ec.europa.eu/fisheries/documentation/studies/nespman/index_en.htm

4.4.2 WebGR implementation

During 2010 and early 2011, several workshops and exchanges have used WebGR (http://webgr.azti.es), with varying success, depending on the training that members of these expert groups and lab staff had in using this software and its tools. It is envisaged that a workplan for 2012 will be drafted during 2011 (see section 7.4.5) to further develop WebGR and train more users in order to fully implement this software.

4.5 Workshop on Ecosystem Indicators of Discarding [WKEID]

The workshop (WKEID, 28 Sep – 1 Oct 2010) was initiated by ICES PGCCDBS (2009) in response to a request from DG MARE to build up a time series for the discard indicator included in the EU Data Collection Framework. The main part of the work conducted within the workshop was based on case studies. The case studies were suggested by three of the RCMs. Initially five case studies were identified but due to absence of a formal data call as well as difficulties for countries to compile national data into the COST format for detailed data only one complete case study, trawl fisheries for cod in Eastern Baltic, remained.

Detailed national data was combined into international datasets which constituted the basis of the work. The quality of the accessible discard data was evaluated in an exploratory analysis in which observer coverage, spatial coverage and temporal coverage was investigated. Precision for the obtained yearly estimates on discards weights were analysed on a national and regional basis. The tools developed within

the COST project (FISH\2006\15–lot 2) were used wherever possible. Possible sources of bias were identified on a case study basis for four of the initially defined case studies, using the scorecards developed within ICES WKACCU (2008).

In order to account for the unbalanced design in the international sampling, generalized additive models (GAMs) were used to model variables affecting discard rates. At the trip level the discard rate of cod in the eastern Baltic Sea (i.e. sub-area 25 to 28) is predicted to be influenced by country, year, quarter, and total catch weight. A significant difference between the countries involved in the fisheries was found. Discard rate was larger in quarter 1 and 4, and total catches have a positive effect on discard rate. On a yearly scale the average discard rate estimated by pooling all countries fluctuated without a clear trend around an average value of 0.1 (i.e. 10% of the catches of cod is discarded).

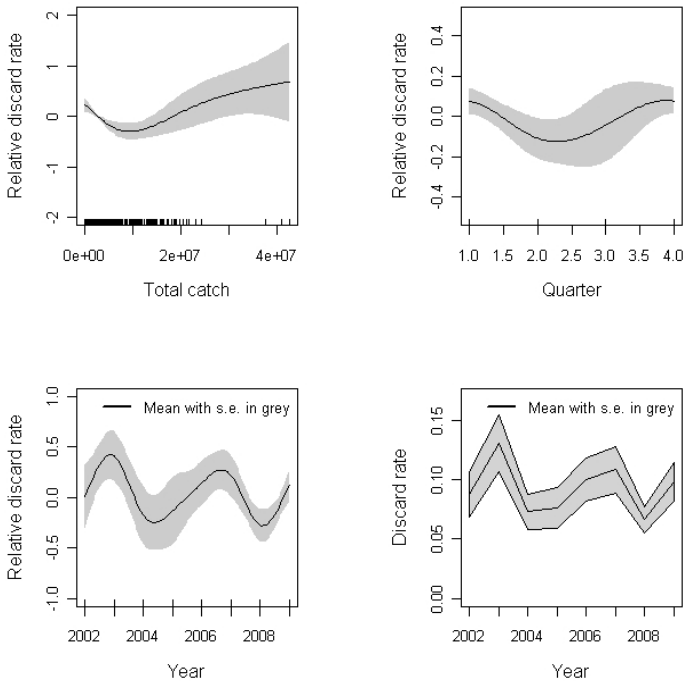

Figure 4.5 showing relative discard rate at trip level based on quarter, catch and year and estimated absolute discard rate.

The final models were able to explain only a small part of the deviance (i.e. less than 30%). This implies that additional factors might account for difference in discard rate and those should be added to the model in future estimations. The method adopted here in modelling the data was able to demonstrate changes in the relative discard rate and the influence on that rate by different factors. The modelling method can therefore demonstrate whether changes have occurred in the discarding behaviour during fishing operations and what might be the causes of those changes. To calculate absolute discard rates, the model was weighted in such as way it describes the fishery. Here, the estimated absolute rates from the model were very similar to those calculated using nationally raised data.

However, it needs to be stressed that this is only one case study. It is not yet possible to determine whether this approach is appropriate to generate absolute discard rates that can be compared across metiers (as in the final DCF discard indicator). The work

done by the workshop could thereby be seen as a starting point for a more systematic work dealing with the different aspects of discard data if a robust indicator on discarding in European fisheries shall be established. It should be noted that discard indicators are developed within the European project BADMINTON and that experiences from this project need to be taken into account. The workshop suffered from unavailable data. Access to data is an absolute prerequisite for any analytical work and need to be assured prior to future attempts to create time series for the DCF discard ecosystem indicator.

4.6 Regional databases- status and further development

The potential benefits of regional databases holding sampling data on a detailed level and transversal data (e.g. landings, effort) on a low aggregated level have been discussed throughout the years in the PGCCDBS and in the RCMs. Regional databases have a potential to increase transparency on how international data sets are compiled enabling the assessment of the overall quality. Storage of all relevant data in central depository give further the possibility for different end-users to assess the overall availability of data and decrease problems with data deficiencies through more centralised transmission processes. But benefits are of cause dependent that countries actually upload data into the database.

In 2010, a workshop "Regional scenarios and roadmap on Regional Database" was organised by the European Commission. During this workshop, needs and perceived benefits of a regional database for different regions and for different modules in the DCF were examined. A strong need for a regional database was expressed by participants from the Baltic (were a regional database already is used) and North Sea regions. For the North Atlantic region, the opinions were divided. Participants from some Member States saw the possibility to improve the quality of data and data management through a regional database while other considered the present situation with national databases satisfactory and saw a risk with increased workload.

The outcome of the workshop was discussed in the different RCMs which, through the Liaison Meeting 2010, recommended the formation of a steering committee for the regional database. As a response, a more informal interim steering group met in February 2011 to work out a proposal for how the regional databases could be managed and to suggest a road map for actions and data uploads the forth coming years. The proposal needs to be agreed by National Correspondents in the different participating EU Member States since there are some financial implications.

The present proposal covers regions (RCM Baltic, RCM NS&EA and RCM NA) and Member States (RCM reports 2010) that have expressed a need and support for a regional database. It does however by no means exclude other Member States, non EU countries or regions that perceive a regional database beneficial.

The proposal includes:

i) identification of the RCMs as the bodies governing content in the database and responsible for development of data processing features within the database from a user perspective,
ii) establishment of a formal steering committee responsible for technical governance, operational and strategic issues,
iii) Composition of the steering committee (host, 3 persons appointed by each participating RCM, non EU countries)
iv) ICES as the database host
v) selection of the existing database FishFrame as platform.

The proposal intrinsically imply that there will be one supra regional database from a technical point of view but that the regional databases will be kept from a content point of view since the RCMs could prioritise differently.

The meeting of the Interim steering group for regional database (2011) further developed road maps on how to put the management system in place during 2011, how to initiate and enable upload of data into the database during 2011 and also agreed on a medium term (2012-2013) goal. This goal is that all participating MS are uploading data sets prioritised (by RCMs) to the RDB in order to enable better regional planning of sampling and provide to input to the DCF revision process.

5 Report on the implementation of the Quality Assurance Framework (QAF) into stock assessments and advise on the further development of InterCatch (ToR d)

5.1 ICES WGCHAIRS request on a template for reporting on assessment input data quality

Background

PGCCDBS was requested by WGCHAIRS 2011 to develop some templates for reporting on quality of input data for stock assessments. The request appears to be mainly for information to assist the work of ICES assessment Review Groups. This would imply a need for easily comprehended overviews of how data quality has varied over time. A range of such templates would be needed according to the nature of the data (e.g. landings; discards quantities; length or age compositions).

Some information on data quality is supplied annually by assessment working groups (AWGs), usually in the form of tables showing national sampling coverage and intensity (number of samples and numbers of fish measured and aged) for the most recent year of data. Some AWGs also provide time series of sampling intensity. Statements of data quality problems (e.g. missing data) are usually embedded in the text of the AWG report. In general, the AWGs and the Review Groups do not have the information available to properly evaluate how sampling coverage and intensity, or accuracy of data or parameters, have varied over time. Suitable summaries tend not to be provided in sufficient detail in either the AWG reports or Stock Annexes.

Time series of data quality metrics could be provided in the form of precision values (relative standard errors of catch at age, mean length, etc.); precision indicators (effective sample sizes; nos. trips sampled etc.), bias values (estimates of bias; feasible ranges for variables such as landings or parameters such as M), or bias indicators (WKACCU: ICES, 2008; WKPRECISE: ICES, 2009). Such metrics would be particularly useful to AWGs as they could be used directly in assessments, for example as inputs to a statistical model, as weightings for individual data series, or for exploring the uncertainties in an assessment using bootstrapping or sensitivity analyses. If available, they would also inform the assessment review process.

Developing time-series of precision and bias values is, however, extremely complex due to the propagation of errors through multi-stage sampling for length/age or discards at the national fleet level and then through the aggregation across fleets and countries (Fig. 5.1.1). Unless quality metrics are available for all countries, and are derived using equivalent methods, it may not be possible to generate reliable information for the combined data. It may prove impossible to compute standard errors or effective sample sizes, either because the sampling schemes are not probability based or because the necessary data are simply not available for all the countries or fleets. Standard errors for age compositions may be unreliable if age and length data are not from the same fishing trips (WKPRECISE: ICES, 2009). The COST tools are also not flexible enough at present to cope with all the variations of data collected by different countries. In extreme cases, there may be almost no documentation of how data were compiled in the early years of the time series, and it may only be possible to give crude qualitative statements about data quality. Until these problems are resolved, PGCCDBS suggests that data quality templates for assessment Review Groups should be based around informative summaries of sampling coverage and intensity, and should include relative standard errors (RSE) or bias estimates only where the

standard errors and bias indicators can be reliably estimated and combined across countries and/or fleets.

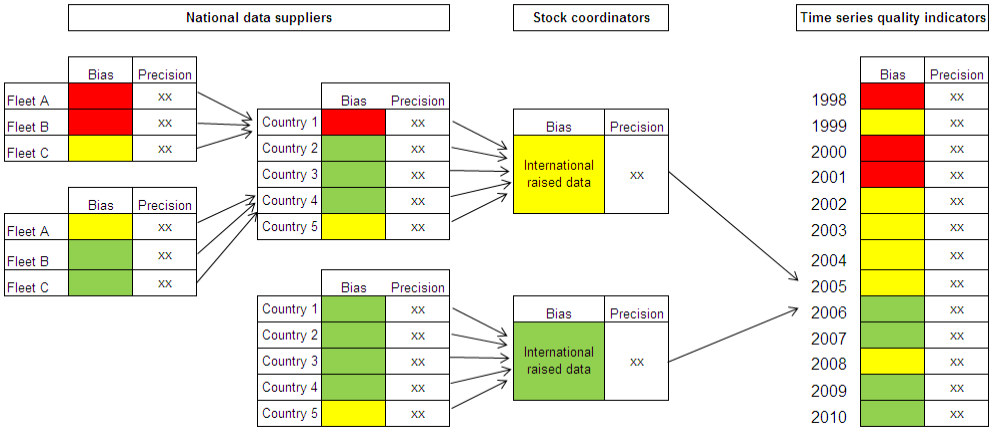

Fig. 5.1.1 Compilation of fishery sampling data into time series of international data, with re-evaluation of bias and precision indicators at each step. Colours = example use of WKACCU scorecard traffic lights (ICES, 2009).

Proposed data quality templates

PGCCDBS recommends that AWGs develop and maintain a series of tables summarising time-series of annual sampling coverage and intensity for estimating discards and length / age compositions of catches, including (where possible) estimates of precision and information on known or potential biases. Methods of imputing missing data should be summarised. The annually updated tables should be a standard part of each Stock Annex. Since effective sample sizes are likely to be much closer to the numbers of sampled trips rather than the numbers of fish measured or aged, it is most important that numbers of sampled fishing trips are provided. Numbers of fish measured or aged are uninformative on their own as a measure of data quality. For age-based assessments, good information on the sampling for age is very important. A suggested format for the tables is provided by PGCCDBS (Table. 5.1.1).

If WKACCU scorecard data can be derived historically, it could be possible to give an indication of how bias has varied with time (e.g. Fig. 5.1.1). This may only be possible in a few cases. More qualitative indicators should be included using text notes. Sampling intensity (e.g. nos. of trips) over time should be shown at a minimum sufficient level of disaggregation relevant to the sampling design, for example for fleet sectors or general gear types, but not in so much detail as to make the information difficult to present and interpret. As it is not unusual for individual countries or fleet sectors to have missing data over all or some years, it is important to have information on how values for the missing data are imputed.

PGCCDBS also recommends that AWGs adopt a more standardised approach to reporting national sampling achievements for the most recent data year, containing all the elements needed to evaluate sampling coverage and intensity in relation to fleet activities, and including WKACCU bias indicators where possible. A suggested format for the tables is provided by PGCCDBS (Table. 5.1.2). For more detailed evaluations, the table could be compiled for individual gear types.

Table updates could be facilitated by the existence of an international, regional data base, provided it is possible to implement the data raising procedures from the national through to the international data sets. As different countries will have different sampling designs, or even different designs in different time periods, automating the raising procedures would be very complex. Populating such a database with historical sampling data and associated meta-data will prove challenging.

More detailed evaluation of data quality

A more thorough evaluation of data quality would be needed when compiling data for benchmark assessments or reviewing data for new species. This would require more comprehensive information on the sampling achieved by individual countries, and an evaluation of the adequacy of the underlying sampling design. This level of data quality reporting may be too voluminous for inclusion in AWG reports or even in the Stock Annexes. Two approaches are:

1) Development of software to provide the necessary analysis of sampling data and metadata held in a regional database (if available)

2) Specifying a standard format for individual countries to supply data and to report on sampling activities, coverage and intensity for the most recent year (annual stock files), including data quality indicators.

The national annual stock files submitted to assessment working groups should include the following types of information for commercial catch sampling for individual stocks (in addition to any survey or CPUE data):

1) Description of the on-shore and at-sea multi-stage sampling schemes including definition of sampling frames, stratification schemes, primary and lower-level sampling units, and sample selection schemes. This will include a description of how fish are selected for length and age sampling (e.g. random or length-stratified sampling for otoliths, or whether length and age samples are collected from the same or different trips etc.).

2) Description of methods for data raising from sampled trips, methods of estimating precision, and methods for imputing missing data (e.g. strata with no sampling, or trips and length classes with no corresponding age samples).

3) Summary table of sampling achievements comprising a list of all sampling frames and sampling strata for shore-based and at-sea sampling, together with the landings and numbers of fishing trips in each, the number of trips sampled for length and age, and numbers measured and aged. If there is a specific need for post-stratification to obtain estimates for domains of interest (e.g. to Level-6 metiers), the sampling achievement in relation to fleet activities should be also specified as this level of disaggregation. (This level of reporting sampling achievements is similar to annual DCF reporting).

4) Graphical presentation of sampling coverage (as provided by COST software or equivalent):

i) Distribution maps of fleet landings or effort in relation to on-shore and at-sea sampling (e.g. Fig. 5.1.2)

ii) Proportional plots of sampling in relation to the landings by quarter, harbour, size groups etc (e.g. Fig. 5.1.3-5.1.5)

5) Full description of known or expected bias in data collection schemes (e.g. due to non-response in selection of vessels for sampling; bias in reported

landings or effort due to misreporting), and how this has been accounted for in any estimates. Use of WKACCU scorecard to indicate bias. Suggestions of feasible ranges for bias in estimates.

6) Tabulation of estimated numbers landed and discarded at length and/or age (and associated weights at age), and total estimated discard and landed catch weights, by quarter and fleet segment, as required for input to international data compilation (for example using INTERCATCH). Where possible, relative standard errors and effective sample sizes should be tabulated.

Table 5.1.1 Suggested formats for documenting international sampling coverage and intensity over the full time period of data available for use in stock assessment. Figures are fictitious. RSE = relative standard error.

(a) Fleet activity data and discards estimates.

SPECIES:	**COD**
Stock area	**ICES xxxx**

Fleet No. trips

	Country A				Country B				TOTAL
Year	Towed gears	Fixed nets	Other	Notes	Towed gears	Fixed nets	Other	Notes	all gears
1990	2125	1506	234	Estimated; unknow n bias	4025	2005	120	Logbooks; probable underestimate	10015
1991	1900	1406	270		4120	2400	109		10205
1992	2005	1009	300		3970	1666	139		9089
…	…	…	…	…	…	…	…	…	…
2005	1900	1230	346	Logbook census; minimal bias	2056	2104	159	Logbook census; minimal bias	7795
2006	1800	1467	402		2305	2002	204		8180
2007	1500	1189	320		2200	2302	198		7709
2008	1485	1008	316		1962	2960	187		7918
2009	1068	1136	205		1733	3250	128		7520

Landings (tonnes)

	Country A				Country B				TOTAL
Year	Towed gears	Fixed nets	Other	Notes	Towed gears	Fixed nets	Other	Notes	all gears
1990	1700	2259	70	Estimated; unknow n bias	8050	1404	24	Logbooks; probable underestimate	13507
1991	1876	2113	80		8007	1322	35		13433
1992	1604	1514	90		7940	1166	28		12342
…	…	…	…	…	…	…	…	…	…
2005	1520	1845	104	Logbook census; minimal bias	4112	1473	32	Logbook census; minimal bias	9085
2006	1440	2201	121		4610	1401	41		9813
2007	1200	1784	96		4400	1611	40		9131
2008	1188	1512	95		3924	2072	37		8828
2009	854	1704	62		3466	2275	26		8387

Greyed cell = no on-shore sampling for length/age

Discards (tonnes)

	Country A						Country B						TOTAL	
	Towed gears		Fixed nets		Other (i)		Towed gears (ii)		Fixed nets (iii)		Other (iii)		all gears	
Year	tonnes	RSE	tonnes	RSE	tonnes	RSE	tonnes	RSE	tonnes	RSE	tonnes	RSE	tonnes	RSE
1990	800	0.6	300	0.7	**20**		**4076**		120	1.1	5	0.9	5321	0.4
1991	1020	0.5	700	0.6	**22**		**4054**		**113**		**7**		5916	0.4
1992	750	0.5	430	0.8	**25**		**4020**		**100**		**6**		5331	0.4
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
2005	900	0.4	320	0.6	**29**		1020	0.5	178	0.8	29	1.2	2476	0.3
2006	600	0.4	680	0.7	**34**		1998	0.7	560	0.7	50	0.9	3922	0.4
2007	587	0.3	309	0.5	**27**		3260	0.8	209	0.5	10	1.2	4402	0.6
2008	750	0.5	340	0.4	**26**		3060	0.4	420	0.6	30	1.3	4626	0.3
2009	375	0.3	521	0.4	**17**		1048	0.5	570	0.7	26	0.9	2557	0.3

Key: Greyed cell = no at-sea sampling (discards are imputed using following rules (i) - (iii))

Notes: (i) Country A towed and fixed gears annual discard rate applied to Other gears

(ii) Country B Discard rate for towed gears in 2005 - 2009 applied to 1991- 1993

(iii) Country B Discard rate for 1990 fixed & other applied to same gears in 1991 & 1992

RSE for total discards = value for combined sampled fleets

Table 5.1.1 contd.

(b) Sampling coverage and intensity for length and age compositions. Additional columns could be added to total across gears and/or countries.

At-sea sampling coverage (discards & retained)

Numbers = Total sampled trips; No trips with cod length samples (number with age samples in parenthesis)
(Bias indicator: use supporting text, and/or add WKACCU traffic lights colour to cells)

	Country A						Country B					
	Towed gears		Fixed nets		Other gears		Towed gears		Fixed nets		Other gears	
Year	Total trips sampled	No. trips with cod samples	Total trips sampled	No. trips with cod samples	Total trips sampled	No. trips with cod samples	Total trips sampled	No. trips with cod samples	Total trips sampled	No. trips with cod samples	Total trips sampled	No. trips with cod samples
1990	12	6 (6)	14	12 (12)	(i)		(ii)		6	5 (0)	1	0 (0)
1991	10	2 (2)	10	9 (7)	(i)		(ii)		(iii)		(iv)	
1992	15	5 (5)	9	6 (6)	(i)		(ii)		(iii)		(iv)	
…	…	…	…	…	…	…	…	…	…	…	…	…
2005	20	10 (10)	34	30 (27)	(i)		34	20	32	26 (12)	4	3 (0)
2006	23	14 (12)	38	32 (30)	(i)		36	26	30	22 (15)	5	2 (0)
2007	22	13 (10)	42	36 (30)	(i)		30	20	34	30 (28)	3	1 (0)
2008	21	19 (19)	40	38 (32)	(i)		29	22	29	29 (29)	6	1 (0)
2009	23	22 (20)	36	35 (35)	(i)		32	25	36	32 (28)	7	3 (0)

Supporting text:
Sampling designs (e.g. reference fleet; probability sampling; ad-hoc sampling)
Methods of imputation of age compositions for missing years / countries (i), (ii) etc.

Shore based sampling

Numbers = No. cod samples (nos. trips sampled at sea and/or on shore)
(Bias indicator: use supporting text, and/or add WKACCU traffic lights colour to cells)

	Country A						Country B					
	Towed gears		Fixed nets		Other gears		Towed gears		Fixed nets		Other gears	
Year	Trips sampled for length	Trips sampled for age	Trips sampled for length	Trips sampled for age	Trips sampled for length	Trips sampled for age	Trips sampled for length	Trips sampled for age	Trips sampled for length	Trips sampled for age	Trips sampled for length	Trips sampled for age
1990	30	10	14	12	(i)		(ii)		6	5	1	0
1991	35	20	10	9	(i)		(ii)		(iii)		(iv)	
1992	28	15	9	6	(i)		(ii)		(iii)		(iv)	
…	…	…	…	…	…	…	…	…	…	…	…	…
2005	40	40	52	52	12	0	60	40	28	14	0	0
2006	45	45	55	55	12	0	72	38	25	13	0	0
2007	48	48	60	60	15	0	58	43	23	19	1	0
2008	39	39	70	70	9	0	69	33	19	21	2	0
2009	50	50	65	65	10	0	67	27	24	20	0	0

Supporting text:
How age and length samples are linked;
Methods of imputation of age compositions for missing years / countries (i), (ii) etc.

(c) Precision (relative standard error) of estimated total international catch at age (retained and discarded), and effective sample size. Precision of estimated mean length in the catches is given as an additional indicator.

Age / length compositions: relative standard errors for total international catches

	RSE by Age class								
Year	1	2	3	4	5	6	7+	Effective sample size for age	RSE: mean length in catch
1990	(i)	(i)	(i)	(i)	(i)	(i)	(i)	(ii)	0.4
1991	(i)	(i)	(i)	(i)	(i)	(i)	(i)	(ii)	0.5
1992	(i)	(i)	(i)	(i)	(i)	(i)	(i)	(ii)	0.5
…	…	…	…	…	…	…	…		…
2005	0.9	0.6	0.3	0.3	0.4	0.7	1.0	140	0.2
2006	1.2	0.5	0.2	0.4	0.5	0.5	1.1	152	0.3
2007	0.8	0.5	0.2	0.3	0.4	0.6	0.9	155	0.2
2008	0.7	0.4	0.2	0.2	0.5	0.5	0.8	140	0.1
2009	0.8	0.4	0.2	0.3	0.4	0.7	0.9	170	0.2

Supporting text:

(i) description (e.g. not computable)
(ii) description (e.g. not computable)

Table 5.1.2 Suggested example of a detailed summary of sampling coverage, intensity and bias indicators (WKACCU traffic lights) for a single year.

SAMPLING COVERAGE FOR LENGTH AND AGE

STOCK:		YEAR:	

Nation	Quarter	Fleet activity		Samples													
				On-shore sampling						At-sea sampling						Notes	Imputation rules for missing data
		Landed catch (Tonnes)	Total number of fishing trips	Number of harbour visits	No. landings sampled for length	Number of landings sampled for otoliths	% of trips sampled for otoliths	Total number of otoliths collected	WKACCU bias score	No. trips sampled for length	Number of trips sampled for otoliths	% of trips sampled for otoliths	Otoliths from discards (D) and/or retained (R) ?	Total number of otoliths collected	WKACCU bias score		
Country A	1	4000	20	10	10	10	50	200		5	5	25	D & R	100			
	2	200	1	1	1	1	100	20		0	0	0	D & R	0		Good coverage of trips and numbers of otoliths.	Quarter 1 age compositions applied to Quarter 2; Quarter 4 age compositions applied to Quarter 3.
	3	100	1	0	0	0	0	0		0	0	0	D & R	0			
	4	10000	50	20	10	10	20	400		10	10	20	D & R	200			
total		**14300**	**72**	**31**	**21**	**21**	**29**	**620**		**15**	**15**	**21**		**300**			
Country B	1	10	1	1	1	0	0	0		0	0	0		0			
	2	20	0	0	0	0	0	0		0	0	0		0		No sampling but small catches and trip nos.	Age compositions from all other countries combined applied to country B
	3	300	2	1	1	0	0	0		0	0	0		0			
	4	20	0	0	0	0	0	0		0	0	0		0			
total		**350**	**3**	**2**	**2**	**0**	**0**	**0**		**0**	**0**	**0**		**0**			
Country C	1	30000	150	34	50	40	27	1500		20	20	13	D & R	200			
	2	20000	100	25	30	30	30	1000		20	20	20	D & R	200		Good coverage of trips and numbers of otoliths;	
	3	1000	5	0	0	0	0	50		1	1	20	D & R	10			
	4	40000	200	24	35	30	15	2000		20	20	10	D & R	200			
total		**91000**	**455**	**83**	**115**	**100**	**22**	**4550**		**61**	**61**	**13**		**610**			
Country D	1	10000	50	1	3	0	0	0		1	0	0		0			
	2	8000	40	3	6	0	0	0		2	1	3	D	20		Large catches but very little sampling	Age compositions from all other countries combined applied to country D
	3	7000	35	2	4	0	0	0		0	0	0		0			
	4	15000	75	1	1	0	0	0		1	0	0		0			
total		**40000**	**200**	**7**	**14**	**0**	**0**	**0**		**4**	**1**	**1**		**20**			
Country E	1	25000	250	20	45	5	2	225		20	10	4	D	100			
	2	12000	120	22	40	10	8	200		20	15	13	D	100		Good coverage of trips but small numbers of otoliths; risk of bias in sampling design.	
	3	10000	100	25	38	8	8	190		19	10	10	D	95			
	4	30000	300	18	40	7	2	200		23	10	3	D	115			
total		**77000**	**770**	**85**	**163**	**30**	**4**	**815**		**82**	**45**	**6**		**410**			

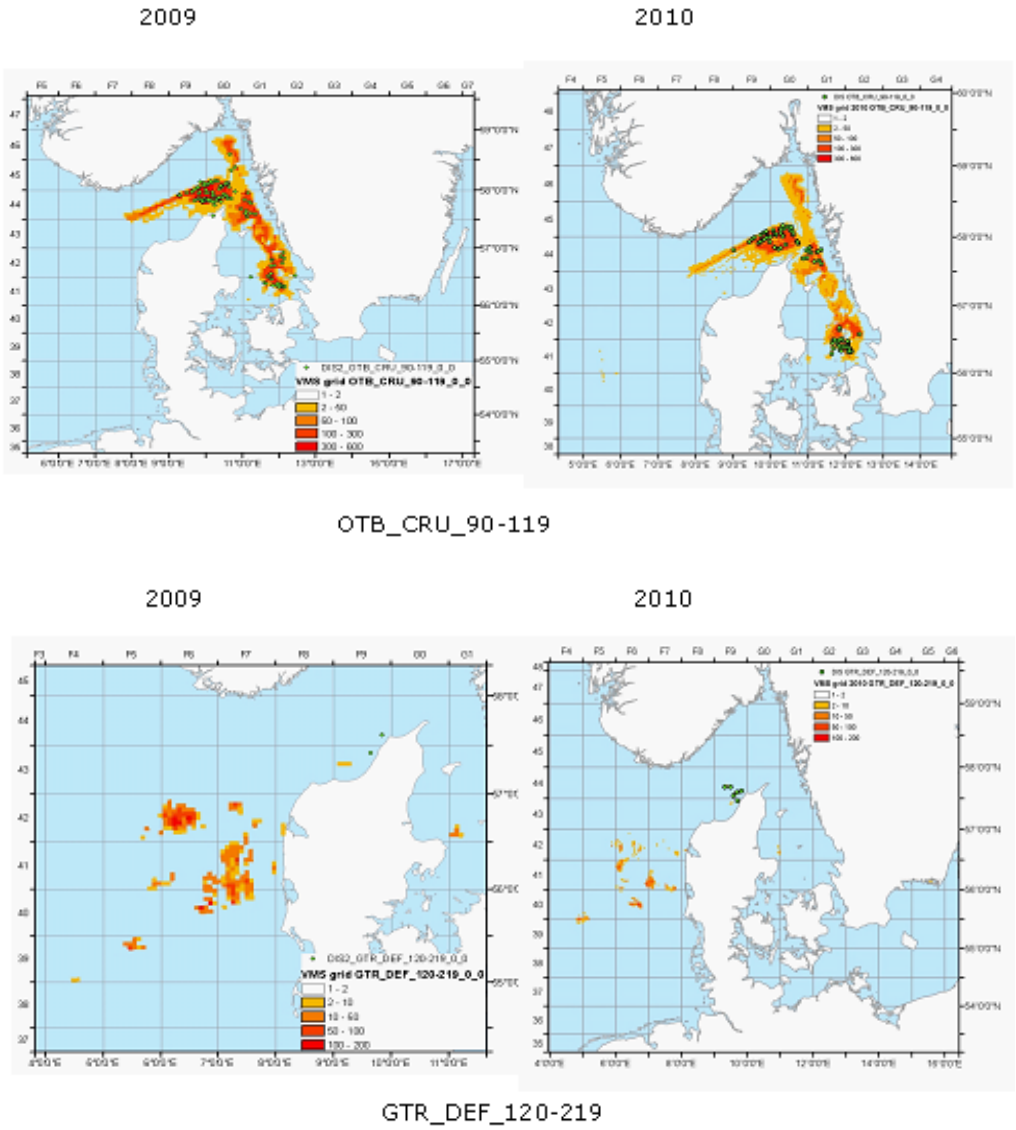

Fig. 5.1.2 Example of distribution maps of VMS vessel tracks and observer trips showing good (above) spatial coverage and poor spatial coverage (below).

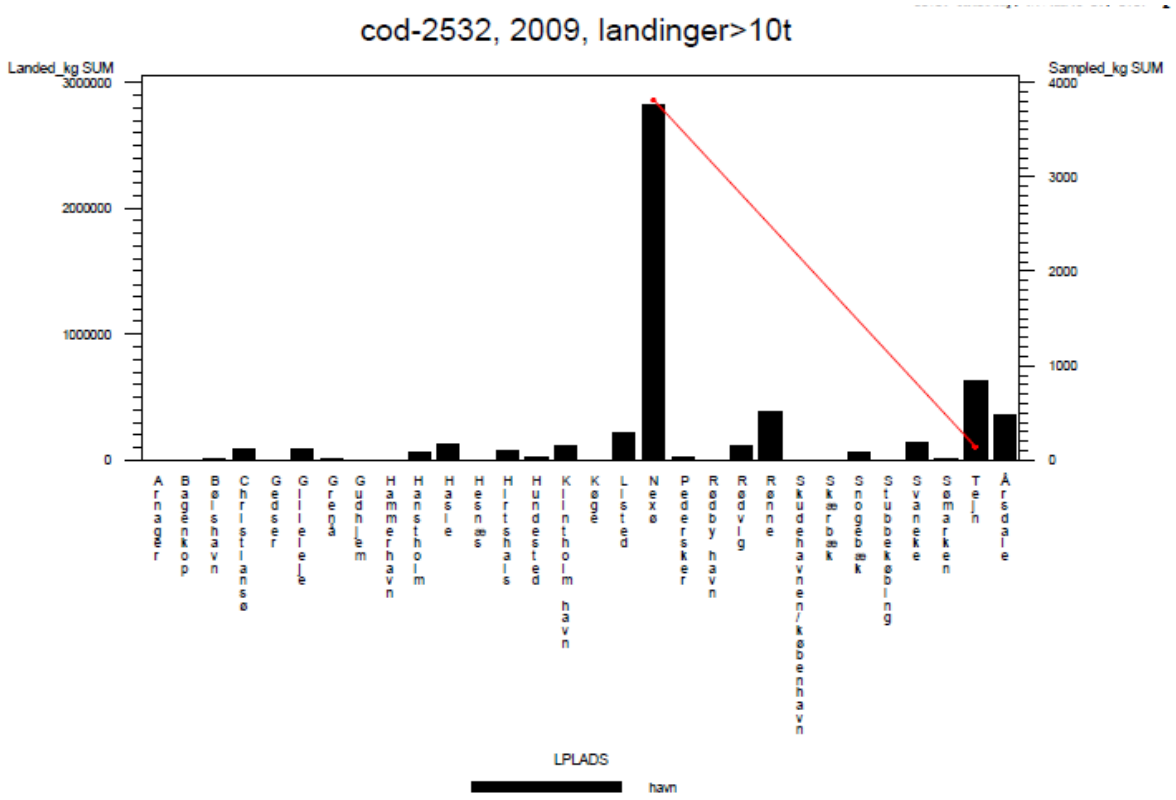

Fig. 5.1.3 Example showing how sampling effort for cod in 2009 varied between ports in comparison with fleet landings. The weight of catch sampled is shown by the red line, and the landings by port are shown by the vertical bars (in this case only two of the harbours were sampled).

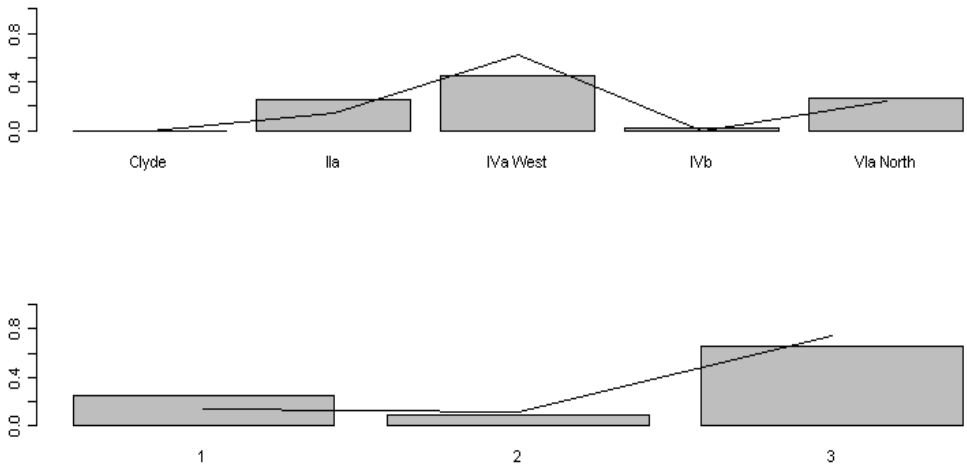

Fig. 5.1.4 Example showing how the relative distribution of sampling effort for herring (lines) compared with the relative distribution of fishery landings (bars) by stock area (upper plot), and quarter (lower plot).

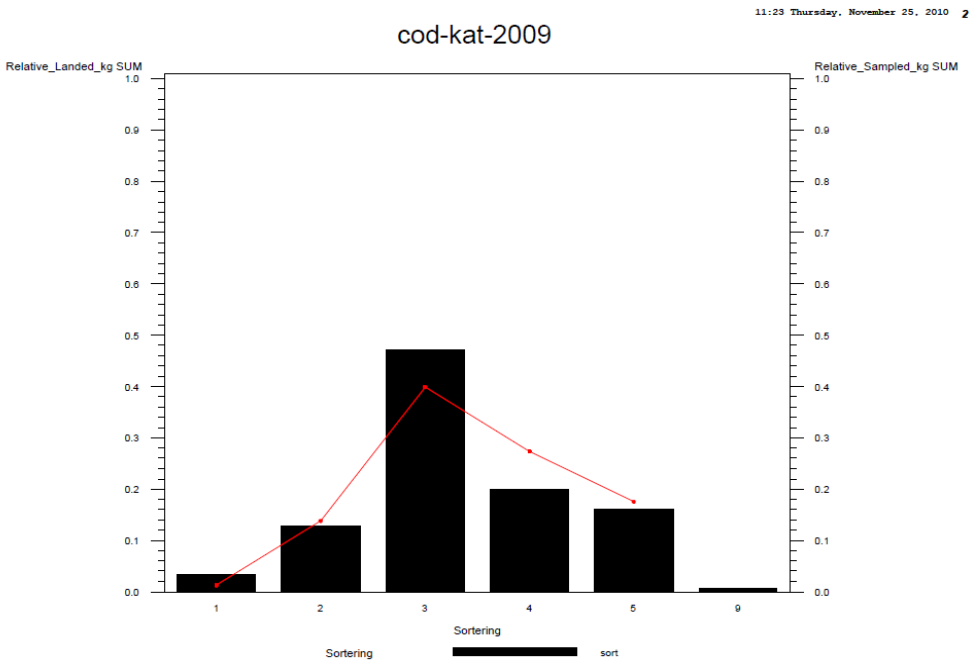

Fig. 5.1.5 Example showing how the relative distribution of sampling effort for Kattegat cod in 2009 (red line) compared with the relative distribution of fishery landings by market size category (bars).

5.2 Improving the provision of quality-assured data to ICES assessment working groups and other end-users.

The DCF has established a detailed programme of fishery and survey data collection and also supports a wide range of coordination, planning and quality assurance activities including PGCCDBS, PGMED and associated workshops. The value of this effort on data collection is only fully realised if all the relevant data sets or parameter estimates are available in time for use by ICES Expert Groups and other end users, complete with the appropriate data quality metrics. The process for provision of assessments and advice follows a series of steps from data collection, through to the production of data sets, biological parameters and quality indicators and ultimately to ICES Assessment Working Groups (AWGs) and other end users (Fig. 5.2).

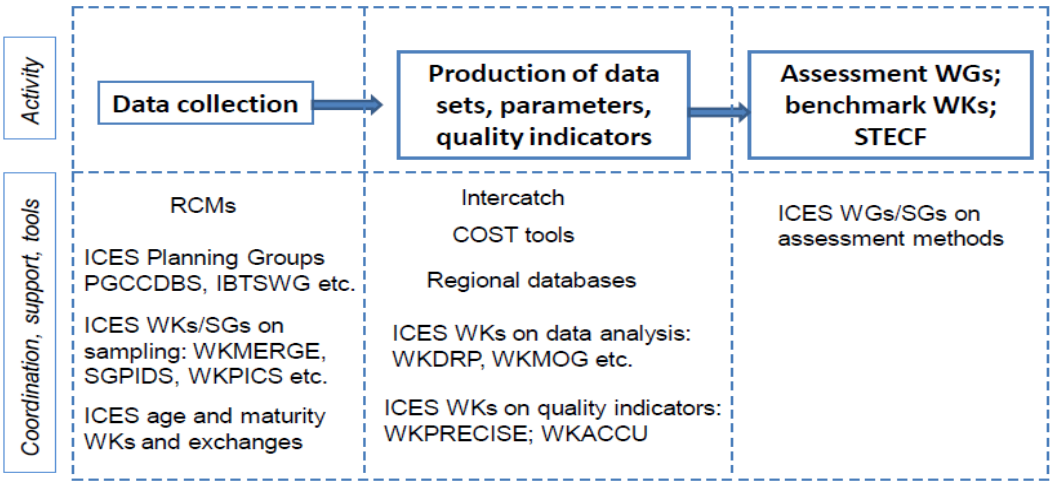

Fig. 5.2 Stages in the provision of stock assessments and advice, with examples of coordination groups, support workshops and tools.

Considerable effort and expense is directed to the collection of basic data and to bodies such as Regional Coordination Meetings, ICES planning groups such as PGCCDBS and associated workshops and study groups that provide international coordination and support for data collection and harmonisation of methods. Support is also provided for the analysis of basic data to provide processed data sets, biological parameter estimates and evaluation of data quality, through ICES workshops and the development of software tools and databases. The supply of data sets to AWGs currently involves national data suppliers transmitting data files to stock coordinators who compile the data at an international level and then update the assessment input data files. If the stock coordinator and the primary stock assessor work in the same laboratory, they will work closely in the lead up to the AWG. Although the stock coordinators work to well defined deadlines, set by their own labs and additionally by the AWGs, they have no control over the supply of data from national laboratories or fishery departments. Problems can arise due to late or non-delivery of data, delivery of data in an inappropriate format, and provision of data sets with poor documentation of the underlying sampling schemes or any usable information on current and past data quality. This in turn can lead to recommendations coming back from AWGs to PGCCDBS or other planning groups to address data supply and quality issues, which is an inefficient process for which outcomes are difficult to track.

The existing system may remain adequate for annual updates to data files that have already been subject to quality assurance and peer review, provided the supply of data is guaranteed. However, stock coordinators and associated stock assessors, who are already working under pressure in their home laboratories due to AWG time schedules, are now faced with a ramping up of requirements to implement the recommendations from ICES workshops on data analysis, to use software such as Intercatch, and to use new approaches such as the COST tools to provide quality indicators which are part of the ICES Quality Assurance Framework (QAF). It may be difficult for stock coordinators to evaluate if analysis methods as implemented in COST are applicable for the specific catch data collection programs used to create inputs to stock assessments. In addition, benchmark assessments and establishment of new data sets for new species require many choices to be made in selection of data, evaluation of data quality and methods for processing data into usable data sets including statistical modelling approaches. It is no longer possible to expect these responsibilities to be carried by individuals working independently and with little control over data supply. Neither is it possible to conduct the necessary compilation and review of data during a single day at the start of a benchmark assessment workshop. In order for ICES to demonstrate that fishery management advice is based on the best available, quality-assured and peer-reviewed data according to the QAF, the PGCCDBS recommends a complete revision of the way in which AWGs manage their data compilation and evaluation.

The most important initial steps in building a strong bridge between data collection and processed data sets and parameter estimates used in stock assessments are:

- The establishment of collective Terms of Reference and responsibilities for provision of data sets, biological parameters and quality indicators;
- Clear statements of the detailed needs and timelines for data processing and analysis. (This is particularly important for the compilation and evaluation of existing and new data sets or biological parameter estimates for benchmark assessments or for new species, but applies also to annual data updates.)
- Identifying people with the necessary knowledge and skills sets in relation to the stocks, fisheries and analysis methods, and developing a system for efficient collaboration.

The production of data sets and biological parameters, and the associated scientific analysis, are incorporated in the DCF module on "data use" and hence are eligible for DCF funding. The Commission is currently reviewing the transmission of processed data collected with DCF funds, and the feedback from the end users. The PGCCDBS invites ACOM and the Commission to consider the following proposals to improve data transmission and implementation of the ICES QAF for ICES assessment working groups. PGCCDBS recommends that:

- Each AWG identifies a data sub-group to address the collation of data for a scheduled benchmark assessment or to build data sets for new MoU species. The group could include national data experts on the stocks, fisheries and sampling surveys and analysis methods (including the stock coordinators), AWG member(s) with knowledge of the assessment needs, the AWG-PGCCDBS contact person and appropriate experts in statistics and modelling. The data sub-group would work largely by correspondence during the year, and should be coordinated by an experienced member of

the AWG. The composition of the sub-group may be fluid depending on stocks being covered.

- The AWG develops a clear set of ToRs for the data sub-group covering (i) the provision of data sets and quality indicators for annual update assessments; (ii) the development and evaluation of new data sets, or revision of old data sets, as required for impending benchmark assessments or to establish the basis for future benchmark assessments.
- The AWG establishes a clear annual work programme for the data sub-group, with individual responsibilities and deadlines for delivery and processing of data sets and analysis of data to provide inputs for assessments. A procedure for AWG chairs to monitor progress should be established. A major issue to be resolved is how to guarantee the supply of all primary data by the required deadlines. For example, the AWGs, stock coordinators and national data submitters have no control over the supply of fishery data from national government fishery departments, and this can be a major issue for data processing.
- A Data Workshop should be scheduled sufficiently in advance of a benchmark assessment workshop to review and agree on data sets and biological parameters to be used for the species to be benchmarked. These Workshops should be open to stakeholders so that new information from the fishing industry (e.g. fishery-science partnership survey series) can be reviewed. Inputs to the workshops should be Working Documents compiled by designated groups of individuals from the data sub-group, addressing specific parts of the ToRs. The outcome of the Data Workshop should be the agreed data sets, parameters, quality metrics and supporting documentation of data collection schemes, analysis methods and choices made. Where possible, the Workshop should provide quality metrics (e.g. relative standard errors (RSE), effective sample sizes, age error matrices, feasible parameter ranges, bias estimates) that can be input to assessment models or used for characterising the uncertainty in assessments and projections. There is considerable experience in the establishment and operation of Data Workshops in the US that should be drawn upon in developing the ICES equivalents (e.g. see http://www.sefsc.noaa.gov/sedar/) A suggested form of ToRs for a benchmark assessment Data Workshop, and associated tasks, is given below, drawing on ToRs from SEDAR data workshops. These should be adapted according to the stocks being assessed. There will be an important role for the proposed regional data bases in facilitating the compilation of data sets.
- PGCCDBS, in liaison with WGCHAIRS, should develop guidelines and standards for Data Workshops and associated intersessional work. This will ensure that the body of knowledge developed through PGDDBS and associated workshops and study groups, and the requirements of the ICES Quality Assurance Framework, is fully integrated into the Data Workshop process.
- There should be a clearly established route for feeding back recommendations to RCMs and the Commission to help develop future data collection programmes.

The need to radically improve the process of developing and evaluating data sets for stock assessment and other end uses, and to ensure that the European Commission and Member States are achieving the greatest value for money in the DCF programme, is urgent and must be addressed immediately. It is important to ensure that sufficient and high quality data for stock assessments are provided, and that new data collection requirements (if budgets and staff resources do not rise accordingly) do not jeopardize the quality of the key input data to assessments.

PGCCDBS recommends that the Data Workshop proposal is considered at the earliest opportunity by the Commission and ACOM to ensure it is adequately covered within the MoU and meets current needs, and that ICES develops a strategy to ensure that all forthcoming AWGs start to put the proposals into practice. ACOM is invited to consider how the scheme can best be implemented to improve the supply of data to AWGs, whilst avoiding any duplication of effort across AWGs and ensuring that the process leads to improved efficiencies and not imposing unreasonable additional demands on national laboratories and ICES AWGs. The annual data processing burden is already high due to the AWGs and benchmark workshops being compressed into a relatively short period of the year.

Example of possible generic Terms of Reference and associated tasks (in italics) for Data Workshops in support of benchmark assessments:

1) Review stock structure and unit stock definitions and consider if changes to existing definitions are required.

2) Review and recommend life history parameters (e.g. growth parameters, maturity ogives, fecundity, natural mortality), for use in assessments. *Review, discuss, and tabulate available life history information. Provide appropriate models to describe growth, maturation, and fecundity by age, sex, or length as applicable. Provide a written description of the sampling programs providing life history information, and develop bias and precision indicators to determine the adequacy of available life-history information for conducting stock assessments. Document the nature and magnitude of errors in age reading and maturity identification based on outcomes of ICES QA workshops and exchanges.*

3) Develop time-series of commercial and recreational fishery catch estimates, including both retained and discarded catch, with associated measures or indicators of bias and precision. *Provide maps of fishery effort and harvest, by fleet sector where appropriate. Describe the sources of data on landings and discards, and any sampling schemes and raising procedures for estimating catches from non-census data. Evaluate biases in catch estimation schemes over time, including using the WKACCU score card approach where possible. Describe any procedures adopted to correct for bias, for example due to non-response in vessel selection schemes. Describe any methods of imputation of missing values and their impact on estimates. For non-census data, provide estimates or indicators of precision in landings and discards estimates, and tabulate achieved sampling rates (e.g. numbers of discard sampling trips by year, area and fleet sector, in relation to total fleet activity).*

4) Estimate the length and age distributions of fishery landings and discards if feasible, with associated measures or indicators of bias and precision. *Provide a written description of the shore-based and at-sea sampling programs and the methods of raising data and estimating length and age compositions at the national and international scale. Evaluate the adequacy of the sampling schemes in terms of bias over the time series (WKACCU scorecard approach and tabular /*

graphical presentation of sampling coverage) and in terms of precision where this can be estimated. Tabulate achieved national annual sampling rates in terms of numbers of trips sampled for length and age, and/or effective sample sizes (not just numbers of fish measured or aged). Describe any methods of imputation of missing values and their impact on estimates. Evaluate the internal consistency of catch-at-age data sets in terms of consistent tracking of year classes.

5) Develop recommendations for addressing fishery selectivity (pattern of catchability at length or age) in the assessment model. *Review existing information on selectivity characteristics of the main types of fishing gears used for the assessed stock, including inferences on relative selectivity from available length and age composition information.*

6) Recommend values for discard mortality rates, where appropriate, and indicate the range of uncertainty in values. *Review available research and published literature on discard mortality rates. Where supported by data or comparisons with similar stocks studies elsewhere, recommend discard mortality rates and range of uncertainty. Include thorough rationale for recommended discard mortality rates. Provided justification for any recommendations that deviate from the range of discard mortality provided in available research and published literature.*

7) Review all available and relevant fishery dependent and independent data sources on fish abundance, and recommend which series are considered adequate and reliable for use in stock assessments. Provide measures or indicators of bias and precision over the time series.

(i) For fishery-independent surveys: Document all surveys evaluated, addressing objectives, methods, coverage, sampling intensity, and other relevant characteristics. Provide maps of survey coverage. Evaluate the suitability of the survey for the species being assessed, in terms of known aspects of fish behaviour and vertical-horizontal distribution in relation to gear design and survey coverage. Evaluate the potential for changes in catchability over time due to changes in vessels, fishing gear and methods, and survey timing and coverage, including documentation of any calibration factors applied following vessel or gear changes. Describe the methods for data selection (e.g. stations or strata used for indices, or selection of tows according to time of day). Describe the methods of analysis, including derivation of indices by sex, maturity, length or age class. Provide measures of precision and indicators of bias. For age-based indices, evaluate internal consistency of age compositions and correlations between surveys.

(ii) For fishery-dependent data: Document all fishery CPUE series evaluated, addressing fleet sectors, fishing gears, target species, coverage, and regulatory measures affecting fleet behaviour. Evaluate the suitability of the CPUE fleet for the species being assessed, in terms of known aspects of fish behaviour and vertical-horizontal distribution in relation to gear design and fleet coverage. Evaluate the potential for changes in catchability over time due to changes in vessels, fishing gear and methods, or spatio-temporal activities. Document the methods and rationale for any factors to correct for changes in fishing efficiency, and feasible ranges for time-trends in efficiency. Describe the methods for data selection (e.g. sub-setting of fishery trips according to vessel size, time, area, gear or species composition). Provide maps of coverage of the selected vessels. Describe methods of analysis of CPUE data including any statistical modelling carried out. Provide measures of precision and indicators of bias over the time series. For age-based CPUE indices, evaluate internal consistency of age compositions and correlations

between CPUE series and surveys, and the extent to which age compositions are independent of the total catch at age matrix.

8) Review progress on existing recommendations for research to develop and improve the input data and parameters for assessments, and develop and prioritise new proposals.

9) Develop a spreadsheet of assessment model input data that reflects the decisions and recommendations of the Data Workshop. Review and approve the contents of the input spreadsheet by <date>.

10) No later than <date>, prepare the Data Workshop report providing complete documentation of workshop actions and decisions. Develop a list of tasks to be completed following the workshop

5.3 InterCatch – status and further development

The use of InterCatch is increasing but still is too low. Not all assessment working groups use InterCatch today because the tool is not sufficient in preparing the necessary input data for stock assessment. It is nevertheless important to use InterCatch as a documentation of national input data even if these are stored in the InterCatch database at an aggregated and final level. It is often much easier to find and access data which are stored in a central database compared with data stored in individual persons laptops.

Another reason for not using InterCatch is said to be that the stock coordinators do not have enough time and that national catch data are not delivered in the InterCatch format. The general view that data should be made available to stock co-ordinators is widely accepted but is rarely possible - the 4-week deadline will always be a problem. We need a clear message from ICES/WG chairs, 'insisting' that InterCatch is used and that data submitters must upload their nations data onto InterCatch in addition to sending using traditional methods, and that stock co-ordinators must use the system for their aggregation. Stock co-ordinators need to be able to view the data that they will be using, and draw attention upon all the explanatory comments/messages that often accompany the data. It is then much easier to spot anomalies and problems in the data and get them resolved – rather than blindly use data on InterCatch. Viewing of available national data on InterCatch is not easy, nor is it easily possible to see what data may be 'missing'.

This year all assessment reports should include a short InterCatch section. This should include the 'Table of Use and Acceptance of InterCatch' and a short part that describes the use and challenges in more details.

The following additional functionalities have recently been implemented in InterCatch:

- Revision manual editing of age or length data
- Import and export of Tuning fleets, maturity and WEST (weight-at-age in the stock)
- Multiple misreported catches can be aggregated to one area
- New weighting algorithm 'weighting by numbers at age' for calculation of unsampled catches.
- Discard calculation for unreported discards (ongoing)

There are, as mentioned above, still important tasks to be done with InterCatch before all stock coordinators have got the tool they need. The priorities of the listed functionalities below are not the most important, but the most urgent tasks are:

- Include age-length keys
- Splitting of same species in the same area but belonging to two different stocks like NSAS herring and WBSS herring in IIIa
- Allow catches to be imported at both statistical rectangles area level and at a higher area level like division or subdivision
- Quality indicators, e.g., estimation of accuracy – this needs to be better defined

National or regional databases and COST-like tools should be further developed to include the ability to compile assessment input data according to adopted ICES statistical concepts (ref. WKACCU, WKPRECISE and WKMERGE; ICES 2010b) and export data to InterCatch format.

5.4 Further development and wider use of the Common "Open Source" Tool (COST) for assessing the accuracy of the biological data and parameters estimates collected for stock assessment purposes

The initial objectives of the COST project (July 2007 – July 2009) were to

1. Develop validated methods to investigate and estimate parameters for

   a) discards volume,

   b) length and age structure of catches and landings,

   c) biological parameters such as growth, maturity and sex-ratio.

2. Where appropriate, the estimates were calculated according to one out of a fixed number of agreed raising procedures, based on the methods already developed by some institutes.

3. Develop simulation analysis to validate the methods implemented and investigate optimal sampling intensity to achieve a target precision.

These objectives were globally met during the project, if only the availability of robust methods for investigation and estimation of the parameters as stipulated in point 1 above, is regarded. Given the fact that this was the first project of this kind, the fixed number of agreed procedures (point 2) used were those described in the ICES precision workshops held in 2004 and 2005, and the development of the simulation package (point 3) ended the work within the project, without having the time to use this package for validating the methods.

In April 2010, a training workshop (ICES WKCOST; ICES 2010c) was held in Nantes for the international community. The workshop gathered a significant number of experts from almost all EU countries, and allowed to have a first feedback on the use of the tool and compiled some suggestions for further development. A number of suggestions, not controversial and easy to implement, were taken into account and the COST libraries were updated some weeks after the workshop. These changes are (i) the inclusion of all the precision calculation within the raising methods, (ii) the possibility to use the multinomial model to fill the gaps in the Age Length-Keys, and (iii) the addition of options in the delta method for data exploration.

Among the participants, it was a consensus that **the help files and user manual needed to be improved and that error messages should be more explicit**, if COST was to be more widely use. It was reported that only a new project could deeply review these documents and packages. For improving the tool, it was also recommended to continue the development related to the

- Extension of the Bayesian package to other sampling strategies;
- Estimation of mean length at age and precision:
- Maintenance of the mailing list;
- Making the tool more user friendly;
- Creation of a FAQ section;
- Thorough validation of the proposed precision methods;
- Inclusion of survey data and calculation of abundance indexes.

A new project should also be the occasion to

- evaluate the recommendations of the recent ICES WKPRECISE and WKMERGE workshops, as regards the use of sampling frames, probability sampling estimates and methods for merging strata;
- take into account more agreed sampling strategies;
- develop mapping possibilities for all regions of the world (today only ICES and GFCM area are available);
- extend the scope of the tool to other modules of the DCF (surveys, economic data, …);

The idea of a database linked to COST is often the object of discussion, as more and more experts/institutes are making use of the data exchange format developed jointly with the Fishframe experts. This idea is fully relevant, and will impose itself in the short future when developing Regional DataBases, but **developing COST** further **and developing a database using the COST tools should be done in two independent projects**.

The question whether developing COST further should be done through a project or through another means is also relevant, knowing that such a tool needs long term development, maintenance and an active help desk in order to fully address the needs of a broad use all over Europe. See also section 7.4.4 on proposed steps for further development of COST.

6 Review available methods and equipment to improve the data collection from fisheries. Report on the effectiveness of self sampling programmes versus traditional observer programmes (ToR e)

6.1 Collection of Fisheries Data

In 2011, the PGCCDBS has been asked to review progress and investigate new initiatives taken up by the institutes.

There is an urgent need to develop systems, hardware and software, which would make data collection easier and more automated to achieve high quality information and reduce the cost of sampling. While all countries have a need to find new efficient systems, all fisheries research institutes would benefit from a coordinated initiative for developing a common solution in order to reduce the development and production costs. Furthermore, a more automated method would reduce the sampling costs, minimize manual data entry into data bases, improve the data quality assurance and reduce time spent on data cross-checking.

Therefore, the PG would like to encourage any initiative to develop electronic facilities for collecting data e.g. length and weight measurements.

The requirements for electronic measuring systems are different depending on the sampling site – on land or on board vessels at sea.

However, before even starting the development of new fancy techniques for sampling of biological data, the challenge just getting hold of the fish for sampling were raised. It is apparently a general problem in all countries where the increased speed in the landing/unloading process, where the fish are transported away from the landing site immediately after sale has decreased the time available for sampling catches. Also, on many markets the practice of stacking boxes high or covering them with plastic decreased sampling opportunities. EU MS have increasing and serious difficulties in obtaining correct data to comply with current DCF requirements. Even though there is a legal framework (Council Regulation 199/2008 article 10) for having access to landing sites some EU MS's do not live up to the legislation and is not enforced.

In order to get an up-to-date status of methodologies and electronic facilities used for collecting information on length and weight in the different countries an overview was produced in PGCCDBS 2010 (ICES 2010a) and updated within the PGCCDBS meeting in 2011 (Table 6.1). The table also gives an overview of accessibility to VMS and logbook data. A "YES" for accessibility of logbook and VMS data in the table don not necessarily mean that the data are achievable in real time. In fact, most countries don't have the information in real time. Compared with the information given in last year's table, no major changes could be found regarding use of technical equipment. Most of the fisheries research institutes are still using pen and paper to record the biological information (length and weight) either at sea or market sampling. Semi automatic/automatic methods are used in some countries, particularly, on research vessels. These methods include electronic measuring boards, electronic caliper for crustaceans, digital image analyzer for length measurement of shrimps and electronic data capture system. However, a few initiatives for developing semi-automatic methods for registering fisheries data have been implemented or are under development

in different countries for example Netherlands, Sweden, and Belgium and the devices are described further in the section below.

As it is given in the table some EU MS, regardless of the legal framework of the Council Regulation 199/2008, still do not have access to VMS and logbook data. When setting up and running data collection schemes it is of outmost importance that real-time information on where the fishery is taken place and which vessels is fishing. Furthermore, the use of VMS and logbook data for the stock assessment work and when providing scientific advice to stakeholders have been found important and ease quality assurance. Therefore, the PGCCDBS stressed that initiatives should be taken in order to make sure all EU MS live up to the DCF legislation.

Therefore, the PGCCDBS recommend that the Commission contact those EU MS where scientists involved in the DCF work do not have ensured access to VMS and logbook data. This would ensure all EU MS live up to the DCF legislation.

Some new inventions developed during the last year were presented to the PG and are described below. These descriptions and the descriptions included in last year's report can be found in the PGCCDBS Document Repository:
http://www.ices.dk/reports/acfm/pgccdbs/PGCCDBSdocrepository.asp

6.1.1 Electronic registration form (NL)

Electronic Registration form for auction based length sampling in The Netherlands

As in any country, length sampling in the auction in The Netherlands is labour intensive, both the sampling itself as well as processing the data when back at the lab. The usual procedure is to go to the auction and while 1 person is measuring fish, another person is registering the measurements on paper. Once back in the lab, the data on paper is entered into a data entry program and forwarded to the data managers for quality checking and import into the national database. By using an electronic registration form, the second step of punching in the numbers is eliminated. The benefit of eliminating this step is twofold, it saves time and a data entry step, thus reducing the risk of data entry errors.

During 2010 a program (named LIBBIE) was designed to replace the paper registration form for length sampling in the auction. The program is simple and straightforward in terms functionality and design to facilitate easy use and minimize processor and battery use. In the 4th quarter of 2010, the program was tested and afterwards released in January 2011. The first experiences with the program were very positive, although some modifications were requested to ease the use even more. These modifications will be done during 2011.

The program was developed in house at IMARES and was written in JAVA. LIBBIE currently runs under Windows XP on a rugged laptop (Panasonic Toughbook) with a touch screen. This laptop has an IP65 qualification for dust and water proofing and a battery life of 8 hours. The screen of this laptop revolves, so the touch screen is accessible when the lid of the laptop is closed. More detailed information is available at:

http://www.panasonic.com/business/toughbook/toughbook-products.asp#/19

While developing the graphical interface of the program, a few requirements were taken into account:

- Fast data entry, both for right handed as well as for left handed colleagues. This resulted in the top-down work direction and the large buttons at the bottom of the second screen.

- Indication of the progress of sampling by showing the total count of the number of fish measured and the last entries, including a tally
- A colour scheme suitable for colour blind colleagues
- Data entry should be possible with gloves when necessary, hence the large buttons on the screen

The first screen of the program facilitates the entry of sample characteristics, e.g. name of the harbour, name of the sampler, date and registration number of the vessel. After selecting the relevant input, the species to be sampled is selected as well as the market category and the data input starts in the second screen.

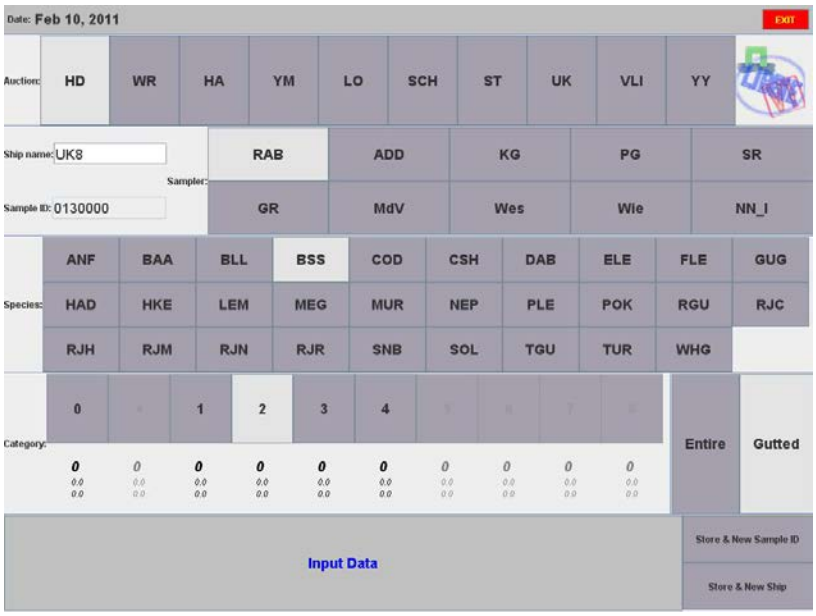

Figure 6.1.1.1 First screen LIBBIE

Within the second screen, the actual data entry takes place by pressing buttons representing length classes. These buttons are dynamic, the length classes shown are related to the expected classes within a category. In case the length of a fish exceeds the predefined lengths, a keyboard can be brought up to the screen for manual input of the length. Also the total weight of the fish measured is recorded as well as the total weight landed by the vessel in that category. The number of fish sampled, the last length entered as well as a tally of the length distribution is shown.

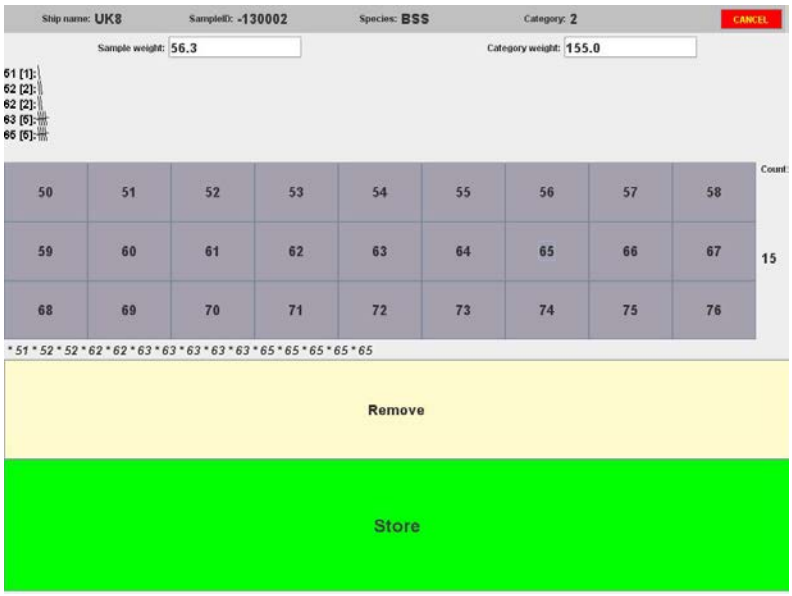

Figure 6.1.1.2 Second screen LIBBIE

After sampling, the data is stored in an exchange file suitable for use in the main data entry program in use by The Netherlands, as well as for importing data into the national database after quality checks.

When the sampling crew returns to the lab, the laptop is connected to the network and the files stored on the laptop are transferred to the central storage. A security system produces a background file to enable data retrieval in case the transfer fails or when the program crashes. A number of file integrity checks are done during the transfer and the samples are given a unique sample id based on species and sequence number of the sample. The sampling crew receives an email showing the number of samples processed during the sampling session. The file is then processed following the routine procedures that were already established.

6.1.2 Electronic registration form (SWE)

SBF in Sweden is currently working on the development of an electronic recording form to ease the data collection procedure in sampling. The "toughbook" is an electronic touch screen adjusted for working in harsh environments (water / dust resistant and IP 65 classified), battery supported, easy to carry and possible to work wearing wet gloves. There will also be connections for balance and GPS information for automatic recording.

The idea of the touch screen is to replace the use of pen and paper for registration of haul information, length measurements and biological parameters onboard small research vessels and sampling onboard commercial vessels. Data collected during sampling will easily be transferred to the national database coming back to the institute. Depending on the type of data (haul/ length measurements/ biological sampling) the screen will be designed differently and only the necessary buttons for recording will be shown.

The photo above is giving a general idea of the functionality of the toughbook and it´s not showing the developed registration form.

The development has just started and Sweden is hoping to have the equipment ready for testing in early summer 2011.

Hardware:

Panasonic Toughbook, a fully rugged field tablet

- touch screen – suitable for working with gloves
- water / dust, low temperature resistant, (IP 65),
- battery operated (6h)
- weight; 1.5 kg, size of screen 10.4"

For more details, look at: http://www.panasonic.com/business/toughbook

The overview of existing devises shows that there are several systems in use to ease the process of collecting fisheries data and is now a matter of passing on the information.

The PGCCDBS recommends that the information about existing devices will be passed on to the staff at the different fisheries institutes. Also, to speed up the process of implementing new techniques, the PG recommends that relevant devices should be presented / demonstrated in working groups attended by persons involved in sampling, for example the IBTSWG (March 2011) and SGPIDS (June 2011). Maria Hansson (Sweden) will inform the chair of IBTS about the recommendation from PG and a few presentations could be given about this matter. Edwin van Helmond chair of SGPIDS will take care of the session within the meeting in June. Furthermore, the PG recommends to set up a session were available devices could be demonstrated during the ICES Annual Science Conference in 2011 as well as at the PGCCDB meeting in 2012.

In order to take the development of automatic electronic equipment for recording fisheries data at ports and on board vessels to a higher level, there is a need to involve new expertise from other businesses, and also to establish a forum, participated by field sampling staff and IT-developers, engineers, in which new ideas and new techniques can be discussed and suggested. No clear suggestion on how such a forum could be set up was concluded. In the meantime, a list of general necessities was set up in order to be able to approach companies, universities to start the process of involving other expertise.

Necessities:

- The equipment must be capable of recording a variety of parameters such as catch data and biological data (species, length, weight, maturity etc)
- Light weight
- Portable
- Robust
- Waterproof
- Be capable of working in unstable conditions
- Must work on both AC and DC power
- Easily mountable
- Must have a touch screen *
- Must be capable of solo or multi person use
- Capability to download data directly to pc
- Be able to be used by right or left handed staff

* alternative equipment would be acceptable. The touch screen system is mentioned as this is the technology being pursued by institutes at the moment.

Notes on extra requirements

* The system should be relatively inexpensive

*A wireless facility would be necessary. For example, the system should have the capacity to receive a GPS signal which would automatically record the ships' position (the GPS would be bought separately 'off the shelf')

*The system would be easier to maintain if the different parts of the system were separate. For example, the touchpad would not be integrated into the board and the power pack would be detachable

*The battery pack should have the capacity to stay powered for around 12 hours, if possible, with a recharge time of 2-4 hours.

*Wires connecting the 'parts' may not be necessary – the French system trialled in 2009-10 worked via bluetooth and mobile phone

The system should be developed using Open Source Code.

6.2 Report on the outcome, recommendation and future actions from relevant conferences in Copenhagen, Galway and Oostend in 2010

Table 6.2 summarizes innovative methods and technologies for the collection of biological data and monitoring of fisheries. Information was collected through review of conference presentations: Fisheries Dependent Information (FDI) in Galway Ireland,

August 2010 (www.marine.ie/fisherydependentdata/) and from the presentations made for the PGCCDBS in Vienna, Austria, February 2011 and in Lisbon; Portugal, March 2010. The FDI conference in Galway hosted a theme session on Technologies for monitoring and data collection (Session 1). Presentations related to the methods described in Table 6.2 are uploaded to the PGCCDBS share point: http://groupnet.ices.dk/PGCCDBS2011.

6.2.1 Review of the Workshop on Fully Documented Fishery, held in Copenhagen, Denmark, March 2010

Trial studies using electronic monitoring systems (sensor and CCTV camera recordings) to document fishing operations and catches have been carried out in Denmark, Sweden and in Scotland in 2008 and 2009. In January 2010 the EU Commission and Norway agreed, that a scheme based on CQM (catch quota management) could be implemented in 2010.

The experiences obtained during the fully documented fishery trials indicate that the electronic monitoring systems could support a management system based on total catches (landings as well as discards). However, further work is needed to develop the technology and methodology to provide an effective monitoring system to support the introduction of a catch quota management system. To encourage further work on the development of catch quota management systems in Europe the National Institute for Aquatic Resources, Technical University of Denmark and the Danish Ministry for Food, Agriculture and Fisheries invited the fishing industry, fishers, fisheries scientist, fisheries inspectors, fisheries managers and data base developer and managers for a workshop on fully document fisheries and the use of electronic monitoring technology. There were 75 participants from 10 countries.

The aim of the workshop was to:

- Establish a common understanding of fully documented fisheries and define the information needs required to support them.
- Examine the operational requirements of electronic monitoring program and its applicability for various fishery needs such as stock assessment, biological sampling (i.e., in a reference fleet context), research and compliance monitoring.
- Examine approaches for cost effective control and "intelligent control" based on compilation of electronic data in relation to fisheries behaviour in order to establish advanced risk based control methods.
- Define other relevant consequences and perspectives of a management system based on full catch documentation.

The workshop was organized in a way where a number of presentations were presented followed up by discussions in four breakout groups with the following topics: i) Electronic monitoring system data and the use in stock assessment and fisheries research, ii) Electronic monitoring and the use for compliance monitoring purposes iii) Operational requirements involved with the use of electronic monitoring and iv) Catch quotas versus landing quotas and related management implications.

Conclusions of the workshop

More accurate catch figures (landings and discards) made available when carrying out stock assessment and advisory work would without any doubt improve the quality and precision of the advice. Furthermore, as detailed data on where and when the

fishing activity has taken place is available the data can be used when carrying out ecosystem advice. At present the electronic monitoring (EM) data cannot be used for biological data collection.

The WS participating fishery inspectors expressed that the use of EM data would increase the efficiency in control and enforcement and decrease the administrative burden for fishers in the context of the obligations for fishers to manually report their fishing activities in logbooks but also when it comes to hailing and pre-notification. It was stressed that there is a need for integration between the EM system and the electronic logbook. The use of EM-systems can contribute to more efficient control and enforcement by providing the control system with new information, especially about what is really happening at sea. This can lead to more efficient sea surveillance and also a better risk based control system for sea inspections carried out with patrol vessels. The fishery inspectors expressed that EM system will not lead to a total reduction of sea inspections via patrol vessels. The reason for this is that control and enforcement of the technical regulations must be made at sea and not via cameras or at shore. But it can be questioned whether a management system with catch quotas really demands for technical regulations such as mesh size.

It was also realized that the power of the consumer will increase with higher demands for legally caught fish and fish from sustainable stocks. This creates needs for traceability systems and the information created with an EM system creates value to such systems.

Operational program success is achieved easier if EM program aims and goals have been clarified from the very beginning. The land based part of the program should be ready before collecting data (training of staff, definition of sampling scheme, definition of fishing event, etc.). This includes both the field service and data analysis components. Communication/feedback between skipper/crew and user is a key element to resolution of various issues and thereby can ensure that the whole EM system is performing optimally (camera views/angles, working procedures on deck during catch handling, etc.).

It was realized that the ability of EM for independent determination of catch quantity (weight) is limited but the technology can be useful to corroborate vessel records of catch volume, species composition and level of discards.

In relation to the question of catch quotas vs. landing quotas within the framework of relative stability (i.e. a system whereby Member States are consistently allocated the same proportion of particular stocks.) it was not discussed in details. Nonetheless, it was expressed that it is an important issue if the basic principle of relative stability is abandoned altogether.

It was agreed by all that the EM system must be driven by incentives in order to avoid compliance issues. However, history has made it apparent that most systems can be tampered with. The EM system has proven to be very robust at sea, but malfunctions can happen and these must e.g. be fixed before leaving port, as is the case with the VMS system. Therefore there must be rules connected with EM and consequences for breaking them.

When control and compliance issues are dealt with efficiently, EM could be a great advantage for fishers in public relations and in the establishment of trust in relation to consumers, managers and NGO's.

6.2.2 Review of the First International Conference on the Collection and Interpretation of Fishery Dependent Data, *Underpinning policy, management and science*, held in Galway, Ireland, August 2010.

The overall goal of the conference was to bring together managers, scientists and representatives of the fishing sector to consider contemporary issues relating to fishery dependent information in the ecosystem context. The conference was also successful in soliciting participation from, and support for, scientists from several developing countries. There were 210 delegates from 30 countries.

During the conference four key note presentations were made. Following each keynote, concurrent sessions were held:

- The role of technology, data collection, and management in mitigating IUU fishing activity. Analyzing rare occurrences in fishery-dependent datasets.
- Technologies for monitoring and data collection.
- Fishery management and policy issues relevant to fishery dependent information.
- Data quality, evaluation and control: traditional and novel collection methods.
- Data quality, evaluation and control: data collection through observers and self-sampling by fishermen.
- Application of fisher knowledge to scientific assessments and fishery management (2 sessions)

When summarizing the conference some highlights should be mentioned:

When dealing with fishery dependent data and the relation between the fishing industry and the fisheries science community one could ask the question whether the scientists should ask fishermen for information or should scientists ask fishers what services they need for sustainable fisheries?

During the conference it was often stressed that fishers and communities as well as policy makers, managers and scientists should be involved in setting goals and defining data needs and improved communication among industry, policy-makers, managers and other stakeholders is of great importance. Furthermore, there is a need to convey long term benefits to industry in providing data to address sustainability goals.

Small-scale, artisanal and recreational fisheries have unique management and data collection challenges which require careful consideration.

Economists and social scientists have a significant role in many of the issues considered during the conference, including provision of integrated policy advice and evaluating the effectiveness of regulatory measures. Greater participation from these disciplines should be encouraged in future FDI conferences.

Impressive technological innovation and development of analytical tools has enabled and enhanced data collection and interpretation. There is a need to properly link information requirements with appropriate technologies. Advanced technology is not always the answer – sometimes basic tools like notebooks and pencils are all that is necessary. Data integration and management will continue to be challenging and emphasis should be placed on solutions where data quality and management is in

focus. It was stressed that information needs should be properly identified and satisfied before implementation of new policies and programmes.

Challenges associated with analysis and interpretation of conventional and unconventional data are significant and great progress has been made in many areas but appropriate and effective use of unconventional data/information is still uncommon.

The conveners and some key participants met in Bergen, Norway, 4-6 January 2011 to evaluate the conference, and develop recommendations for future conferences of this type. Some of their conclusions were:

- Future conferences should focus on the broad themes identified above (Inclusivity, Technology, Data Quality, Analysis and Use).
- The focus on use of fishery dependent data to provide advice to policy-makers should also receive particular attention at the next conference.
- Interaction between scientist, policy makers and fishers needs to be emphasized at the next conference and that special efforts should be taken to involve managers, policy makers, fishers, industry representatives, and other stakeholders.
- Increased participation by social scientists and economists.
- Attracting scientists and managers from developing countries should be a priority for future conferences.
- Follow up conferences of this type should be held at approximately three-year intervals. A proposal for the next conference will be submitted to SCICOM for consideration at their May, 2011 meeting. The venue will be in Europe or North America and the initial plan is to hold the conference in 2013.

6.2.3 Review of the symposium 'Improved Fisheries and Science Partnerships as policy drivers?', Oostend, Belgium, November 2010

The aim of this symposium was to stimulate exchange between fishermen, policy makers, stakeholders in fisheries sector and researchers at all levels and in all fisheries disciplines that relate to fishermen-scientist partnerships and evaluate how it will impact on the reform of the Common Fisheries Policy.

Scientists and the fisheries sector often hold a different view and opinion regarding the fisheries and environmental management. Especially when it comes to ecosystem protection issues, a lively tension is present between the fisheries sector, scientists and policy makers.

Five themes were organized in the symposium:

- Data collection and stock assessments in a joint venture;
- Joint Forces to improve selectivity and reducing discards;
- Improved integrated advisory process;
- Self-management: the way forward;
- Communication between science and industry: the key to success.

Main outcomes of symposium

Many examples of how cooperation between scientists and fishermen could be coupled in fishery management. Self-management is one of the ways to improve fishermen's' participation in both decision making on when and what to fish and data collection from fishery sector.

Collaboration between stakeholders and scientists already exists. However, there is a necessity to improve transparency of scientific advice, to use data from industry more effective as current models of stock assessment do not involve such data. On other hand, scientists also want to know what kind of results other stakeholders are expecting from them. In general, it is a need that scientific advices must be understandable for all stakeholder groups.

It was found important that regional and other relevant meetings such as i.e. the RAC meeting must involve all stakeholder groups.

Prior to implementation of any elements (QMS, discard ban, etc.) of fishery management it is necessary to find out if these elements are applicable to all species and types of fishery and to know how it will affect existing fishery control system, what changes can be expected and if it's cost effective.

To reduce gear impact on ecosystem further investigations in gear design should be encouraged and continued.

Finally, prior to the establishment of any action plans in fishery management stakeholders have to communicate. Miscommunication leads to mistrust between partners.

Table 6.1. Review of methods in use for length measurement, weighing of fish and access to VMS and Logbook data by country. (RV= Research vessel, SS= Sea sampling; M/H = Market / Harbour sampling)

Country	Traditional length measure-ment using pen and			Semi automatic /automatic method			Short explaination of the semi / automatic method (i.e electronic measuring board)			Data transported directly to the database			Access to VMS data (Y/N)	Access to Logbook data (Y/N)
	RV	SS	M /	RV	SS	M /	RV	SS	M / H	RV	SS	M /		
Belgium	Y	Y	N	Y	N	Y	Electronic measuring board (Scantrol) Digital analyse image for shrimps - Length measuring	Electronic measuring board (Scantrol) for the catch and partially for discards	Electronic measuring board (Scantrol)	Y	N	Y	Y	Y
Bulgaria	Y	Y	Y	N	N	N	NA	NA	NA	N	N	N	Y	Y
Cyprus														
Denmark	Y	Y	Y	N	Y	N	NA	Electronic caliper stored in portable media and exported to the Nacional Database	NA	N	Y	N	Y	Y
Estonia	Y	Y	Y	N	N	N	NA	NA	NA	N	N	N	Y	Y
Finland	Y	NA	N	N	NA	Y	NA	NA	Length and weight data recording electronic measuring boards connected to scale	N	NA	Y	N	N
France	Y	Y	Y	Y	Y	Y	Electronic measuring board (NKE) and electronic caliper for crustaceans	Electronic measuring board (NKE) and electronic caliper for crustaceans	Electronic measuring board (NKE) and electronic caliper for crustaceans	Y	Y	Y	Y	Y
Germany	Y	Y	Y	Y*	N	Y*	Electronic measuring board - tested on some Baltic sea surveys	NA	Electronic measuring board - tested on some Baltic sea surveys	N	N	N	Y	Y
Greece	Y	Y	Y	Y	Y	Y	Electronic caliper for crustaceans	Electronic caliper for crustaceans	Electronic caliper for crustaceans	N	N	N	Y	N
Ireland	N	Y	Y	Y	Y	Y	Electronic Data Capture (EDC) System Electronic measuring boards uploading L/W, sex, maturity data directly to central database	Digital calipers for Nephrops. Electronic measuring boards.	Digital calipers for Nephrops. Electronic measuring boards.	Y	Y	Y	Y	Y
Italy	Y	Y	Y	N	Y	Y	NA	Tape recorder	Tape recorder	N	N	N	Y	Y
Latvia	Y	Y	Y	N	N	N	NA	NA	NA	N	N	N	Y	Y
Lithuania	Y	Y	Y	N	Y	N	NA	Digital voice recorder	NA	N	N	N	Y	Y
Malta	Y	Y	Y	Y	Y	N	Electronic caliper for crustaceans	Electronic caliper for crustaceans	NA	N	N	N	Y	Y
Norway	N	Y	Y	Y	Y	N	Electronic measuring board (Scantrol and Marel scales) in a network	Electronic measuring board (Scantrol Fishmeter) for reference fleet and inspectors	NA	N	N	N	Y	Y
Poland	Y	Y	Y	N	N	N	NA	NA	NA	Y	N	N	Y	Y
Portugal	Y	Y	Y	Y	Y	Y	Electronic caliper for crustaceans Electronic measuring board (only DOP/Uac)	Digital/Tape Recorder Electronic caliper for crustaceans	Digital/Tape Recorder Electronic caliper for crustaceans FishMetrics(experimental, only DOP/Uac)	N	N	N	Y	Y
Spain	Y	Y	Y	N	Y	Y	NA	MP3 Recorders	MP3 Recorders	N	N	N	N	N
Sweden	Y	Y	Y	Y*	N	Y*	*Same surveys electronic measuring board (scantrol) is used	NA	*Same samples worked up using electronic measured board. Nephrops and shrimp measurement using electronic caliper	Y	N	N	Y	Y
The Netherlands	Y	Y	Y	N	N	Y			Electronic Registration Form	N	N	N	Y	Y
UK England	Y	Y	Y	Y	N	N	Cefas Electronic Measuring Board (CEMB)	CEMB (under development)	CEMB (under development) Elec. data recording for Nephrops catch Elec. Data capture for scallop (size, weight, image)	Y	Y	Y	Y	Y
UK Scotland	Y	Y	Y	N	N	Y	Electronic calipers only for sampling Nephrops	Electronic calipers only for sampling Nephrops	For sampling of Nephrops, length measurements, and sex are also recorded on PDP's linked to electronic calipers	N	N	Y	Y	Y

Table 6.2. Innovative methods and technologies for the collection of biological data and monitoring of fisheries presented in conferences and workgroups in 2010 by institute/company, country and fishery.

Country	Institute/company	Contact person	methods	fishery	costs	information
Canada	Archipelago Marine Research (ARM)	Howard McElderry (howardm@archipelago.ca)	Electronic Monitoring; cctv image, GPS. Catch Quota Management (CQM).	Hook& line, British Colombia.		www.archipelago.ca
Denmark	DTU Aqua	Jørgen Dalskov (jd@aqua.dtu.dk)	Electronic Monitoring; cctv image, GPS. Catch Quota Management (CQM).	Cod fishery,North Sea and Skagerrak.	Installation / vessel: 10,200 euro Running cost/ yr / vessel: 4,500 euro	www.aqua.dtu.dk
EU	JRC EC	Eoin Mac Aoidh (eoin.mac-aoidh@jrc.ec.europa.eu)	FishPopTrace; genetic tools to support control & enforcement.	Commercial fisheries in EU waters		https://fishproptrace.jrc.ec.europa.eu
France	IRD	Francios Gerlotto (francios.gerlotto@ird.fr)	Commercial acoustic data	Pelagic trawlers, Chilean Jack Mackerel, South Pacific Ocean.		
Germany	Johan Heinrich von Thünen Institute	Christopher Zimmermann (christopherzimmermann@vti.bund.de)	Electronic Monitoring; cctv image, GPS. Catch Quota Management (CQM).	Bottom trawlers, Baltic sea and North sea		
Netherlands	IMARES	Sieto Verver (sieto.verver@wur.nl)	LIBBIE; electronic registration form, data recording	Market/harbour sampling		
Netherlands	VisNed / IMARES	Conny Loonstra (c.loonstra@visned.nl), Edwin van Helmond (Edwin.vanhelmond@wur.nl)	Electronic Monitoring; cctv image, GPS. Catch Quota Management (CQM).	Cod fishery, North Sea		

Country	Institute/company	Contact person	methods	fishery	costs	information
Norway	Scantrol	Darren Hammersland-White (darrenwhite12@gmail.com)	FishMeter; electronic fish length measurement tool.	Laboratory and research vessels.		www.scantrol.no
Scotland	MarineScotland/SWFPA	Rui Catarino (R.Catarino@MARLAB.AC.UK), Mike Park (mikeswfpa@aol.com)	Electronic Monitoring; cctv image, GPS. Conservation Credits.	Bottom trawlers		www.marlab.co.uk
South Africa	OLfish - OLRAC	Amos Barkai (olfish@olrac.com)	On board data logging and management tool. Touch-pad and software.	Ground fish, Gulf of Mexico.		www.olfish.com
Sweden	Swedish Board of Fish-ery	Anders Svensson (anders.svensson@fiskeriverket.se)	Electronic Registration Form, data recording	Market/harbour sampling and commercial vessels (at sea).		
Sweden	Swedish Board of Fish-ery	Hans Nilsson (hans.nilsson@fiskeriverket.se)	Electronic Monitoring; cctv image, GPS. Catch Quota Management (CQM).	Nephrops fish-ery, Kattegat		
UK	CEFAS	Richard Ayers (richard.ayers@cefas.co.uk)	Electronic Data Capture (EDC) system; electronic fish length measurement tool.	Laboratory, research vessels and commercial fishing vessels.		
USA	NOAA	James Nance (james.m.nance@noaa.gov)	Electronic logbook, GPS.	Shrimp fishery, Gulf of Mexico.		
USA	NOAA	Steve Barbeaux (steve.barbeaux@noaa.gov)	Commercial acoustic data	Alaska Pollock fish-ery, Eastern Bering Sea.		

7 Agree a workplan for 2011 for further developing and finalising standards and best practices for sampling commercial fisheries (ToR f)

7.1 Methodology-related issues

PGCCDBS was requested by WGCHAIRS 2011 to develop templates for reporting on quality of input data for stock assessments. Suggested formats for documenting international sampling coverage and intensity are given in the report (see section 5.1). These templates should be tested and discussed by assessment WGs and ACOM during 2011.

It is important to ensure that sufficient and high quality data for stock assessments are provided, and that new data collection requirements (if budgets and staff resources do not rise accordingly) do not jeopardize the quality of the key input data to assessments. PGCCDBS recommends that the Data Workshop proposal is considered at the earliest opportunity by the Commission and ACOM to ensure it is adequately covered within the MoU and meets current needs, and that ICES develops a strategy to ensure that all forthcoming AWGs start to put the proposals into practice.

PGCCDBS recommends a Second Workshop on practical implementation of statistical sound catch sampling programmes (WKPICS2), see section 5. Justification and Terms of Reference are provided in Annex 11.

A Workshop on Statistical Analysis of Biological Calibration Studies (WKSABCAL) will be carried out in 2013. Justification and Terms of Reference are provided in Annex 11.

The use of VMS and logbook data for the stock assessment work, and when providing scientific advice to stakeholders, have been found important and ease the quality assurance. Therefore, the PGCCDBS stressed that initiatives should be taken in order to make sure that all countries give access to VMS and logbook data.

In order to take the development of automatic electronic equipment for recording fisheries data at ports and on board vessels to a higher level, there is a need to involve new expertise from other businesses, and also to establish a forum, participated by field sampling staff and IT-developers, engineers, in which new ideas and new techniques can be discussed and suggested.

The PGCCDBS recommends that the information about existing data sampling devices will be passed on to the staff at the different fisheries institutes. Also, to speed up the process of implementing new techniques, the PG recommends that relevant devices should be presented and demonstrated in working groups attended by persons involved in sampling,

7.2 Age-related issues

The PGCCDBS reviewed and evaluated the need for exchanges and workshops in relation to age determination put forward from EG held during 2010.

7.2.1 Age calibration exchange programme and workshop planning

PGCCDBS updated the overview of available reports on previous age calibration exchanges and workshops, see Annex 7. The interactive version of this annex is also available in the PGCCDBS repository:

http://www.ices.dk/reports/acfm/pgccdbs/PGCCDBSdocrepository.asp

PGCCDBS updated the Guidelines for Otolith Exchanges (Annex 9) and the Guidelines for Workshops on Age Calibration (Annex 10).

7.2.1.1 Exchanges previously approved – Small Exchanges:

7.2.1.1.1 Brill (*Scophthalmus rhombus*)

The last brill otolith exchange took place in 2005. A small exchange will be carried out in 2011. Annemie Zenner (Belgium) will act as coordinator for the exchange.

7.2.1.1.2 Black spot sea bream (*Pagellus bogaraveo*)

Currently, only two age readers are involved in age reading of black spot sea bream in Sub-area X. Another stock in ICES division IXa, also has annual age readings and the consistency of the age readings between the two areas should be checked. Therefore, a small otolith exchange between all countries that are currently ageing this species, is recommended for 2011. Portugal (DOP) and Spain (Gulf of Cadiz) will participate. Juan Gil Herrera (Spain) will act as coordinator.

7.2.1.1.3 Red mullet (*Mullus surmuletus*) and striped red mullet (*M. barbatus*)

An exchange for a new set of *M. barbatus* otoliths from the Mediterranean should be examined and new sets of *M. surmuletus* otoliths from the Mediterranean, the Gulf of Biscay and the English Channel should be organised, in order to detect differences between areas. PGCCDBS recommends a small exchange in 2011 in order to clarify the ageing in these species and to compare age reading from otoliths and scales (PGMED). Kélig Mahé (France) will act as coordinator.

7.2.1.1.4 North Sea sprat (*Sprattus sprattus*)

The last exchange of otoliths took place in 2002 and a workshop took place in 2004. WKSHORT 2009 is unclear as to whether the age reading of sprat otoliths can be achieved with sufficient accuracy and precision for generation of age structured data. Given that there has not been an age reading comparison for this stock since 2004, the Benchmark Workshop therefore recommended an age reading workshop with the aims of reviewing past work, investigating new techniques for age reading and answering this important and unresolved question. Lotte Worsøe Clausen (Denmark) will act as coordinator for a small exchange in 2011.

7.2.1.1.5 Spanish mackerel (*Scomber japonicus*)

Spanish mackerel is only fished by Spain and Portugal. Spain has only recently started sampling this species and PGCCDBS recommends that Spain sends an age reader to Portugal for age reader inter-calibration. Thereafter, a small exchange is recommended for 2012. Maria Manuel Martins (Portugal) will act as coordinator.

7.2.1.1.6 Sea bass (*Dicentrarchus labrax*) and *Sparidae spp.*

There has never been an exchange of fish scales for age calibration. Several institutes are currently using scales for the routine age reading of species such as sea bass, and sea bream. Scales are used for age determination of Sparidae spp. in the Mediterranean. A comprehensive exchange is recommended to identify if there are any issues with using scales for age determination. The exchange will be organised during 2011. The coordinator will identify which species are currently being read using scales and

will incorporate a maximum of five of these species in the exchange. Kélig Mahé (France) will act as coordinator for the exchange and the potential workshop.

7.2.1.2 Exchanges previously approved – Full Exchanges:

7.2.1.2.1 Angler (*Lophius piscatorius*)

The last angler (*Lophius spp.*) otolith exchange took place in 2001. Landa *et al*. (2008), however, noted that previously used ageing criteria are not accurate. There is ongoing research to establish if a new protocol should be established when using illicia to estimate age. Full exchanges of otoliths and illicia are therefore recommended for 2011, when new ageing criteria are expected. These will be based on *L. piscatorius* only. Jorge Landa (Spain) will act as coordinator. As there will be a Benchmark WK for anglerfish in 2012, ideally the preliminary results from this exchange will be of high importance and if possible should be reported in due time before the WK.

Black-bellied angler (*L. budegassa*)

A black-bellied angler (*L. budegassa*) otolith exchange will take place in the near future.

7.2.1.2.2 Baltic, North Sea and Black Sea turbot (*Psetta maxima*)

The last Turbot exchange took place in 2004, and was followed by the WKART in 2008. WKART 2008 and PGCCDBS 2009 recommended a new exchange. Three sets of samples should be included: from the Baltic, North Sea and Black Sea. Otoliths from the other countries will be required, especially for the Baltic and the Black Sea stocks. A questionnaire will be sent to all institutes with the objective of reviewing which material is available for inclusion in the otolith exchange. Annemie Zenner (Belgium) will act as coordinator for the exchange which will be carried out in 2011.

7.2.1.2.3 Roundnose grenadier (*Coryphaenoides rupestris*)

Another workshop was requested by WKARRG (ICES 2007b), but PGCCDBS recommends that another exchange should be arranged in the first instance in 2011 to address the issues that arose during the previous workshop. Kélig Mahé (France) will act as coordinator.

7.2.1.3 Exchanges proposed for 2011–2012 – Small exchanges:

7.2.1.3.1 Bay of Biscay sole (*Solea solea*)

The WGHMM identified a need to identify the cause of a discrepancy between French and Belgian weights at age. PGCCDBS recommends a small exchange in 2011 in order to clarify this issue and report back to WGHMM. Kélig Mahé (France) will act as coordinator.

7.2.1.3.2 Redfish (*Sebastes mentella*)

Differences in the interpretation of age structures in mature individuals of redfish have been identified by the AFWG. The apparent solution is to adopt a common interpretation of age structures as stated in an agreed ageing manual based on the WKADR results. The PGCCDBS suggests an agreement between the relevant laboratories to re-clarify the age reading criteria and apply those in small scale exchange. Lise Heggebakken (Norway) will act as coordinator.

7.2.1.3.3 Hake (*Merluccius merluccius*)

A small scale otolith exchange with hake otoliths will take place April-May 2011. The aim is to read otoliths with the new age reading method agreed in the previous workshop (WKAEH; ICES, 2010f). The results of this exchange would be the basis to build a transitional error matrix to rebuild historical ALKs. Carmen Piñeiro and Maria Sainza (IEO, Spain) are coordinating this exchange.

7.2.2 Age Calibration Workshop proposals

7.2.2.1 Workshops previously approved:

7.2.2.1.1 European Atlantic sardine (*Sardina pilchardus*)

A workshop in 2011 on sardine age reading was proposed by WGANSA 2009 (ICES 2009c) and is recommended by PGCCDBS, to standardize age reading methodology and criteria between the different areas.

7.2.2.1.2 European and American Eel (*Anguilla Anguilla*, *Anguilla rostrata*)

The Workshop on Age Reading of European and American Eel [WKAREA-2] (Chair: Françoise Daverat, France) will exchange information by correspondence in 2010 and meet in Bordeaux, France in March 2011. Although a workshop on the age reading of European (*Anguilla anguilla*) and American (*Anguilla rostrata*) eels was organised in 2009 [WKAREA, ICES 2009b], there has been a request for another workshop from WGEEL (ICES 2009d). According to the three-step approach (see section 7.2.1), there should first be a new exchange focussing on the issues that could not be solved during the last workshop, before a new workshop can be organised. However, given the solid request from WGEEL, and the conservation status of the species concerned, PGCCDBS considers this a good example of species requiring urgent action, and thus deserving the immediate addressing of the issues concerning age reading in a new workshop. PGCCDBS therefore supports the request for a WKAREA2.

7.2.2.1.3 National Age Reader Coordinators

The Workshop of National Age Reader Coordinators [WKNARC] (Co-Chairs: Kélig Mahé and Willie McCurdy) will take place in Boulogne-sur-Mer (IFREMER) France, in September-October 2011, as a clear need for a forum for national are reading coordinators has been identified.

7.2.2.1.4 Greenland Halibut (*Reinhardtius hippoglossoides*)

The Workshop on Age Reading of Greenland Halibut [WKARGH] (Chairs: Ole Thomas Albert, Norway, and Margaret Treble, Canada), will be established and take place in Vigo, Spain, 14-17 February2011 [already approved by ACOM, resolution 2009/2/ACOM44].

7.2.2.2 Workshops proposed for 2012

As an outcome of the 2011 PGCCDBS recommendations, a number of workshops have been suggested to be established. The full details of these workshop proposals are given in Annex 11.

7.2.2.2.1 Deep Water Species

A Workshop on Age Estimation Methods of Deep Water Species [WKAMDEEP] will be established in 2012.

The necessity of age validation studies for all species assessed in WKDEEP is massive. The stock-assessment is severely hampered by the lack of valid age-structured data and the fact that the agreement in the age-data supplied to the assessment is very low (as seen in previous exchanges).

For some of the shorter-lived species (e.g. tusk, greater silver smelt, greater forkbeard) techniques such as marginal increment analysis or length-modal analysis may be appropriate, while for longer lived species radiometric techniques (e.g. lead-radium) that have been refined in recent years for species such as orange roughy, could be applied. Some institutes have conducted tagging programs which should be applied in order to validate seasonal zones in otoliths.

The aim of the workshop is to identify the state of art of age estimation after validation studies conducted so far.

7.2.2.2.2 Horse mackerel, Mediterranean horse mackerel, blue jack mackerel

The last horse mackerel (*Trachurus trachurus*) age reading workshop was in 2006. PGMed 2011 proposed to expand the scope to Mediterranean horse mackerel (*Trachurus mediterraneus*) and blue jack mackerel (*Trachurus picturatus*) in a new workshop. A draft resolution is given in Annex 11, which will be developed further at the Regional Co-ordination Meeting for the Mediterranean and Black Sea (RCM Med&BS) in May 2011.

7.3 Maturity-related issues

7.3.1 Maturity Workshops previously approved

The following maturity staging workshops that were proposed by PGCCDBS in 2009 and 2010 are due to take place in 2011 & 2012:

7.3.1.1 Workshop on Sexual Maturity Staging of Redfish and Greenland Halibut [WKMSREGH]

The Workshop on Sexual Maturity Staging of Redfish and Greenland Halibut [WKMSREGH], approved by ACOM (resolution 2009/2/ACOM50) is now rescheduled to 12–16 December 2011 in Vigo, chaired by Fran Saborido-Rey*, Spain and Agnes Gundersen, Norway.

7.3.1.2 Workshop on Sexual Maturity Staging of Herring and Sprat [WKMSHS]

The Workshop on Sexual Maturity Staging of Herring and Sprat [WKMSHS] (approved by ACOM, resolution 2009/2/ACOM49) will be held in Copenhagen, Denmark on 20-23 June 2011, chaired by Jonna Tomkiewicz, Denmark and Rikke Hagstrøm, Denmark,

7.3.1.3 Workshop on Sexual Maturity Staging of Cod, Whiting, Haddock, Saithe and other gadoids [WKMSGAD]

The Workshop on Sexual Maturity Staging of Cod, Whiting, Haddock, Saithe and other gadoids [WKMSGAD] (Chairs: Jonna Tomkiewicz, Denmark, and Francesca Vitale, Sweden) will meet in Copenhagen, Denmark, in November 2012 (as follow-up of WKMSCWHS 2007).

7.3.1.4 Workshop on sexual maturity staging of sole, plaice, dab and flounder [WKMSSPDF2]

The Workshop on sexual maturity staging of sole, plaice, dab and flounder [WKMSSPDF2] (Chairs: Ingeborg de Boois and Cindy van Damme, The Netherlands) will meet in Oostende, Belgium, 9-13 January 2012.

7.3.1.5 Workshop on Sexual Maturity Staging of Turbot and Brill [WKMSTB]

The Workshop on Sexual Maturity Staging of Turbot and Brill [WKMSTB], chaired by Ingeborg de Boois and Cindy van Damme, The Netherlands, will meet in IJmuiden, The Netherlands, 5-9 March 2012.

7.3.2 Maturity Workshop proposals

PGCCDBS is of the view that before considering the need for follow up workshops, it is important that an evaluation exercise is completed in assessing the outcomes of implementing the proposals from the original workshop. To define whether a workshop is necessary, it is recommended to do a calibration exercise.

For species where maturity data already exists and discrepancies have been found among laboratories, there is a clear need for workshops on maturity staging. To aid planning of these workshops, PGCCDBS used tables describing maturity sampling which were developed by RCM NS&EA and RCM NA and adopted by RCM Baltic (Annex 8). PGCCDBS acknowledges this work and recommends that RCM NS&EA and RCM NA and RCM Baltic continue to maintain and update these maturity sampling tables.

No new maturity staging workshops were proposed, but the following maturity-related workshop is proposed by PGCCDBS to take place in 2012:

7.3.2.1 Workshop for maturity workshop chairs [WKMATCH]

A workshop for maturity workshop chairs [WKMATCH] is recommended to incorporate lessons learned from previous maturity staging workshops into future workshops. It is envisaged that chairs of previous maturity workshops will attend and that identified experts will be invited. Justification and Terms of Reference are provided in Annex 11.

7.3.2.2 Follow-up Workshop to WKMSC (crustaceans):

During PGCCDBS 2010, it was recommended that the need for, and details of, a new workshop should be considered in PGMED and PGCCDBS 2011. Information and comments provided to PGMED confirmed that there was no need for a further workshop at this stage. PGCCDBS noted that although the initial meeting was well attended, countries sampling crustacean in northern waters were not well represented. Given that such workshops are not likely to occur on a regular basis, each nation should give serious consideration about participating in future maturity workshops.

7.4 Intersession work

The group has recommended the following tasks for intersession work until the next PG meeting:

7.4.1 Update Annex 9 (of last year's report) by ICES stock and extend to maturity workshops

PGCCDBS recognizes the importance of having an overview of the previous age reading exchanges and workshops that took place in the past. This information is available in Annex 7.

PGCCDBS notes that, previously, similar information was provided by species/area defined under Appendix VII of DCF Decision 2008/949/EC and 2010/93/EU (e.g. Annex 8 of PGCCDBS 2010 report (ICES 2010)). This information is no longer provided in this year's report to avoid repetition in with Annex 7.

PGCCDBS will carry out intersession work on the preparation of a new version of this annex where the information is available by ICES stock. The web-links to age reading exchange and workshop reports will still be available. PGCCBDS considers that the information present in Annex 7 is relevant for planning future work under the PGCCDBS and also as an overview for stock coordinators of previous ageing calibration work available, either as exchange or workshops.

PGCCDBS recommends that similar information is also available for maturity staging workshops.

William McCurdy (UK) and Cristina Morgado (ICES Secretariat) will be responsible for the preparation of the new version of Annex 7 and for a similar version for maturity calibration exercises. The ICES Secretariat will also be responsible to extract the respective information of each stock and forward to the respective assessment working group chairs.

The final draft of this new version table should be available to the PGCCDBS chairs for comments by mid-November. The final table should be available for the WGCHAIRS meeting in 2012, and be available under the PGCCDBS repository.

7.4.2 Compile the percentage agreement of recent age reading workshops

Stock coordinators should be aware of the precision, and if possible accuracy, of the age readings used for stock assessment. PGCCDBS recommends to compile in a single table, the average percentage agreement (APE) of stock assessment readers (i.e. readers providing age data for stock assessment) from recent exchanges and workshops. The outlook of this information should be similar to the intersession work on the update of Annex 7. Annemie Zenner (Belgium) will be responsible for the compilation of this information. The ICES Secretariat will be responsible to extract the respective information of each stock and forward to the respective assessment working group chairs.

The final draft of this compilation should be available before the WKNARC. The final table should be available for the WGCHAIRS 2012.

7.4.3 Study proposal – Age Determination and Maturity Staging of species not previously subjected to biological sampling for analytical assessments

A proposal for a call-for-tender was put forward during the PGCCDBS meeting in 2009, and supported by this group. The construction of the call-for-tender was decided to be postponed to 2010 after the PGCCDBS meeting in 2009 as a small-scale project (*MARE 2008/10: Lot 4: Improving the knowledge of the biology and the fisheries of the new species for management [NESPMAN]*) was already running at that time, mainly dealing with basic data collection of parameters necessary for assessment. NESP-

MAN has now finished and the results were discussed in WGNEW 2010 and evaluated regarding their use in the advisory process in 2011.

The PG acknowledges the need for a genuine procedure on how to handle 'virgin' populations in terms of biological sampling for analytical assessments, and decided to modify the draft call-for-tender discussed during the PGCCDBS meeting in 2009. This proposal was put forward to the DCF Liaison Meeting 2010, asking for inclusion of the proposal in the EC Work Programme 2011 or 2012.

Following the comments of the Liaison Meeting, PGCCDBS 2011 further fine-tuned the proposal, making the species list shorter, identifying appropriate areas per species and defining work packages.

Title: Age Determination and Maturity Staging of species not previously subjected to biological sampling for analytical assessments.

Duration: 18 months

Objective: The new DCF generates the need for biological information on species not previously subjected to biological sampling, in order to establish parameters for application in analytical assessments. The development of a methodological protocol on how to handle a new species, laying out a general procedure to achieve sound parameters for analytical assessment is highly warranted to enable the community to be proactive when alerted of a new stock appearing in the fishery.

When handling a new stock, a 'toolbox' needs to be consulted, encompassing baselines on ageing procedures, growth parameters, sex-ratio, age at maturity, spawning time, and potential stock identification structures.

Based on existing validation techniques and further development of applied methodology, ageing and maturity staging techniques must be developed and these should be stated in agreed manuals through a network of excellence. The manuals will then form the general protocol (the 'toolbox') that subsequently will be used in selected case-study stocks to test the applicability of the protocol and achieve sound parameters for analytical assessment for the particular stocks.

PGCCDBS 2011 used the following criteria for the selection of species for this project-proposal:

1) No previous internationally co-ordinated work has been done with respect to age determination and maturity staging for these species, but the required biological material and some experience (and view on potential problems) is already available in at least one national institute (all species).

2) The species are included in the MoU between ICES and the EC (all species except tub gurnard and John Dory) OR were included in the NESPMAN-project but not subject to age determination and maturity staging studies (tub gurnard and John Dory).

3) No ICES-advice was given for these species before 2011.

No elasmobranch and deepwater species were included in the proposal since these are subject to specific research by dedicated expert groups making separate requests and recommendations.

Species/area-combinations were selected on the basis of:

4) Species/area-combinations for which advice is requested by the EC for the first time under the MoU 2011 (all species except tub gurnard and John Dory),

5) extended with areas not in the MoU where the selected species occur, and where current or potential future fisheries for these species exist. A good spatial coverage of the DCF-area was developed this way.

Following these criteria, PGCCDBS 2011 identified the following species/area-combinations as the most appropriate for this project-proposal.

- Pollack (*Pollachius pollachius*) (MoU 2011 in all three areas)
    - Greater North Sea
    - Celtic Seas
    - Bay of Biscay and Iberian Coast
- Grey gurnard (*Eutrigla gurnardus*) (MoU 2011 in first four areas / NESP-MAN)
    - Greater North Sea
    - Celtic Seas
    - Bay of Biscay and Iberian Coast
    - Azores
    - Mediterranean
- Red gurnard (*Aspitrigla cuculus*) (MoU in first four areas / NESPMAN)
    - Greater North Sea
    - Celtic Seas
    - Bay of Biscay and Iberian Coast
    - Azores
    - Madeira and Canary Islands
    - Mediterranean
- Tub gurnard (*Chelidonichthys lucernus*) (NESPMAN)
    - Greater North Sea
- Boarfish (*Capros aper*) (MoU 2011 in first two areas)
    - Celtic Seas
    - Bay of Biscay and Iberian Coast
    - Azores
    - Madeira and Canary Islands
    - Mediterranean
- John Dory (*Zeus faber*) (NESPMAN)
    - Greater North Sea
    - Celtic Seas
    - Bay of Biscay and Iberian Coast
    - Madeira and Canary Islands
    - Mediterranean

- Lemon sole (*Microstomus kitt*) (MoU 2011 in first area / NESPMAN)
    - Greater North Sea
    - Celtic Seas
- Witch flounder (*Glyptocephalus cynoglossus*) (MoU 2011 / NESPMAN)
    - Greater North Sea
- Ballan wrasse (*Labrus bergylta*)
    - Greater North Sea
    - Celtic Seas
    - Bay of Biscay and Iberian Coast

Workpackages:

Work Package 1. Stock Identity and Age Determination Material

The objective for WP1 is to compile an inventory of available CS for the selected species through various channels. The WP will collate otoliths and other calcified structures from material already in store at national laboratories; port sampling; fish auction sampling (buying fish) and concurrent sampling on already decided scientific cruises. Then all available material will be the basis for WP 3 for the selected species. As much as possible otoliths will be taken from the same specimens as gonads (WP2.1)

Work Package 2. Maturity Staging Material

WP 2.1. To collect a sufficient amount of gonads (ovaries and testes) for the selected species in each proposed area. This collection should consider temporal variation, i.e. sexual cycle of each species, so the collection of material will be distributed along the year to determine the optimal sampling period, normally the spawning period. In the case of males, the majority of the collected data will be based on macroscopic determination of maturity, although a limited number of testes will be collected for histological analysis for the maturity ogive validation.
Ovaries of females will be regularly collected and stored in formaldehyde. Macroscopic determination will always be recorded.
WP 2.2. Histological analyses of the selected males and all females will be conducted in this WP. Only histology produces accurate maturity staging, and this will be the basis for WP4. Considering the use of this methodology, it is important that institutes with relevant skills on histology and microscopic determination of maturity are being involved here.

Work Package 3. Revision and validation of methodology for Stock Identity and Age Determination

WP 3.1 Compile inventory of age determination practices used in different institutes, and compare results obtained from different methodologies.
WP3.2 Review and summarise stock identity literature using CS and genetic information for the selected species.
WP3.3 Validate age determination and stock identity methodologies applying available methods such as known-age CS if available, otolith microstructure analysis of

marginal increments, otolith shape and modelling exercises (length distributions, otolith weight distributions, etc.)

Work Package 4. Revision and validation of methodology for Maturity Staging

WP 4.1. Review of maturity staging protocols and methods developed in latest years in the context of ICES Workshops and the COST Action Fish Reproduction and Fisheries.
WP 4.2. Microscopic determination of maturity, ovarian developmental stage and definition of key periods of sexual cycle, particularly spawning.
WP 4.3. Definition of optimal sampling strategy for maturity on the selected species based on the results on WP 4.1 and WP 4.2

Work Package 5. Collation of the 'Toolbox'

The final work package will synthesise the results from WP 3 and WP 4 in terms of what biological information that is deemed necessary to subject a species to an analytical assessment and the recommended methodology to achieve such knowledge when dealing with a 'virgin' species. The 'Toolbox' will be in the shape of a roadmap guiding any new species through the necessary analyses in order to uncover the biological parameters of the species in question.

Expected results

The expected outcome of the Study is a 'Toolbox' encompassing a roadmap based on existing validation techniques and further development of applied methodology for ageing and maturity staging techniques. These will be stated in agreed manuals through a network of excellence. The manuals will then form the general protocol (the 'toolbox') that subsequently can be used in order to achieve sound parameters for analytical assessment on any stock not previously subjected to an analytical assessment. The 'Toolbox' will be available to the public through the upload of the documents in selected document repository (please refer to section B.12).
The results of the project should allow to managers to implement basic regulations based on sound biological information of currently unregulated species. This will reduce the risk of over-exploitation in species where their status is ignored.
Also it is expected to produce an optimal sampling scheme that will ease the collection of key biological information for the future implementation of analytical assessment for these species.

Dissemination of results

The results from the Study will be disseminated through various channels providing information to stakeholders (the EC, the Science community, the Fishery Industry):
The National Correspondents in the DCF system will be informed on the Study progress by a News Letter every 6 months of the duration of the Study.
Specific species information will be reported in ICES Working Documents and presented to the relevant Expert Groups within the ICES system and more broadly at the ICES Annual Science Conference. For the Mediterranean stocks, relevant GFCM expert groups will be addressed. If so evaluated by the participating partners, peer-

review papers will be produced on relevant parts of the Work Packages, however, this is not a success criterion for the Study.
Finally the 'Toolbox' will be made fully available on the internet by uploading the Final Scientific Report in a selected document repository which will provide a DOI (digital object identifier). In this way, the results are always available for the entire scientific community.

7.4.4 Common Open Source Tool (COST) – Further development

The further development of COST (see section 5.4) is currently being discussed among the original consortium members and software users.

7.4.5 WebGR – Further development

The further development of WebGR (see section 4.4.2) is currently being discussed among the original consortium members and software users.

7.4.6 A reference book in catch sampling

The PGCCDBS considers it beneficial to collate the findings from the series of workshop (WKACCU, WKPRECISE, WKMERGE, WKPICS 1-3) into a reference book as this at present time is missing. This book should contain documentations and estimators for the basic statistics and how it is should be implemented in the assessment. It is considered beneficial that the case-studies included for the WKPICS 1-3 workshop be of general interest, with sufficient documentation to serve as examples in a planned text-book on design and analysis of catch-sampling programs. A book would further enable to attract experts to the WKPICS 1-3 workshops which is crucial for a good outcome. A book will however require funding and the means for this need to be investigated.

8 References

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Annexes

Annex 1: List of participants

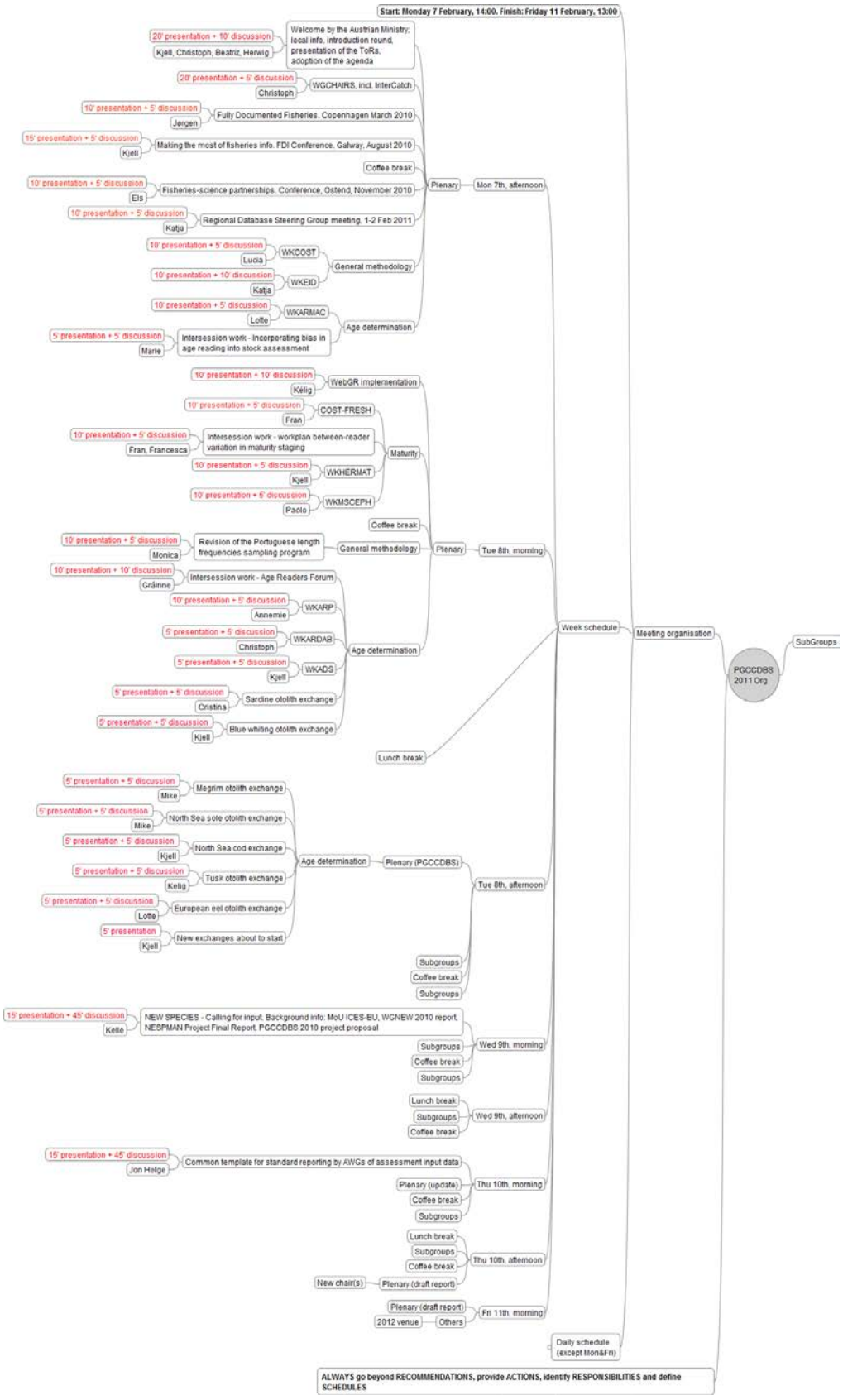
Name	Address	Phone/Fax	Email
Mike Armstrong	Centre for Environment, Fisheries and Aquaculture Science (CEFAS) Lowestoft Laboratory Pakefield Road NR33 0HT Lowestoft Suffolk United Kingdom	Phone +44 1502 524362 Fax +44 1502 524511	mike.armstrong@cefas.co.uk
Margaret Bell	Marine Scotland Science Marine Laboratory Aberdeen P.O. Box 101 AB11 9DB Aberdeen United Kingdom	Phone +44 1224 295409 Fax +44 1224 295511	bellma@marlab.ac.uk
Ulrich Berth	Johann Heinrich von Thünen-Institute, Fisheries Institute for Baltic Sea Fisheries Alter Hafen Süd 2 D-18069 Rostock Germany	Phone +49 381 81161-28 Fax +49 381 81161-99	ulrich.berth@vti.bund.de
Antonio Cervantes	European Commission Directorate for Maritime Affairs and Fisheries rue de la Loi B-1049 Brussels Belgium	Phone +32 22 965162 Fax +32 22 950351	antonio.cervantes@ec.europa.eu
Lotte Worsøe Clausen	DTU Aqua - National Institute of Aquatic Resources Section for Fisheries Advice Charlottenlund Slot Jægersborg Alle 1 DK-2920 Charlottenlund Denmark	Phone +45 21362804 Fax +45 33963333	law@aqua.dtu.dk
Gráinne Ní Chonchúir	Marine Institute Rinville Oranmore Co. Galway Ireland	Phone +353 91387200 Fax +353 91387201	grainne.nichonchuir@marine.ie
Kenny Coull	Marine Scotland Science Marine Laboratory Aberdeen P.O. Box 101 AB11 9DB Aberdeen United Kingdom	Phone +44 1224 295399 Fax +44 1224 295511	coullka@marlab.ac.uk
Jørgen Dalskov	DTU Aqua - National Institute of Aquatic Resources Section for Fisheries Advice Charlottenlund Slot Jægersborg Alle 1 DK-2920 Charlottenlund Denmark	Phone +45 35883380 Fax +45 33 96 33 33	jd@aqua.dtu.dk
Christian Dintheer	IFREMER Nantes Centre P.O. Box 21105 44311 Nantes Cédex 03 France	Phone +33 240374239 Fax +33 240374213	christian.dintheer@ifremer.fr
Jon Elson	Centre for Environment, Fisheries and Aquaculture Science (CEFAS) Lowestoft Laboratory Pakefield Road	Phone +44 1 502 524 243 Fax +44 1 502 524511	jon.elson@cefas.co.uk

Name	Address	Phone/Fax	Email
	NR33 0HT Lowestoft Suffolk United Kingdom		
Mónica Felício	INRB - IPIMAR Avenida de Brasilia 1449-006 Lisbon Portugal	Phone +351 229396940 Fax +351 229375647	mfelicio@ipimar.pt
Wlodzimierz Grygiel	Sea Fisheries Institute in Gdynia ul. Kollataja 1 81-332 Gdynia Poland	Phone +48 58 7356270 Fax +48 58 7356110	wlodzimierz.grygiel@mir.gdynia.pl
Ryszard Grzebielec	Sea Fisheries Institute in Gdynia ul. Kollataja 1 81-332 Gdynia Poland	Phone +48 58 735 6226 Fax +48 58 7356110	ryszard.grzebielec@mir.gdynia.pl
Maria Hansson	Swedish Board of Fisheries Institute of Marine Research, Lysekil P.O. Box 4 453 21 Lysekil Sweden	Phone +46 523 18713 Fax +46 523 13977	maria.hansson@fiskeriverket.se
Edwin van Helmond	IMARES P.O. Box 68 1970 AB IJmuiden Netherlands	Phone +31 317487171 Fax +31 317487326	edwin.vanhelmond@wur.nl
Georgs Kornilovs	Institute for Food Safety, Animal Health and Environment (BIOR) 8 Daugavgrivas Str. Fish Resources Research Department 1048 Riga Latvia	Phone +371 676 76027 Fax +371 676 26946	georgs.kornilovs@bior.gov.lv
Ari Leskelä	Finnish Game and Fisheries Research Institute Joensuu Game and Fisheries Research Yliopistokatu 6 FI-80100 Joensuu Finland	Phone +358 205 751 404 Fax +358 205 751 409	ari.leskela@rktl.fi
Kélig Mahé	IFREMER Centre Manche Mer du Nord P.O. Box 699 62321 Boulogne-sur-Mer, Cedex France	Phone +33 321 995602 Fax +33 321 995601	kelig.mahe@ifremer.fr
William McCurdy	Agri-Food and Biosciences Institute (AFBI), Fisheries and Aquatic Ecosystems Branch 18a Newforge Lane BT9 5PX Belfast United Kingdom	Phone +44 28 90 255513 Fax +44 28 90 2550044	willie.mccurdy@afbini.gov.uk
Kelle Moreau	Institute for Agricultural and Fisheries Research (ILVO) Ankerstraat 1 8400 Oostende Belgium	Phone +32 59 569830 Fax +32 59 330629	kelle.moreau@ilvo.vlaanderen.be
Cristina Morgado	International Council for the Exploration of the Sea H. C. Andersens Boulevard 44-46 1553 Copenhagen V	Phone +45 33 38 67 21 Fax +45 33 63 42 15	cristina@ices.dk

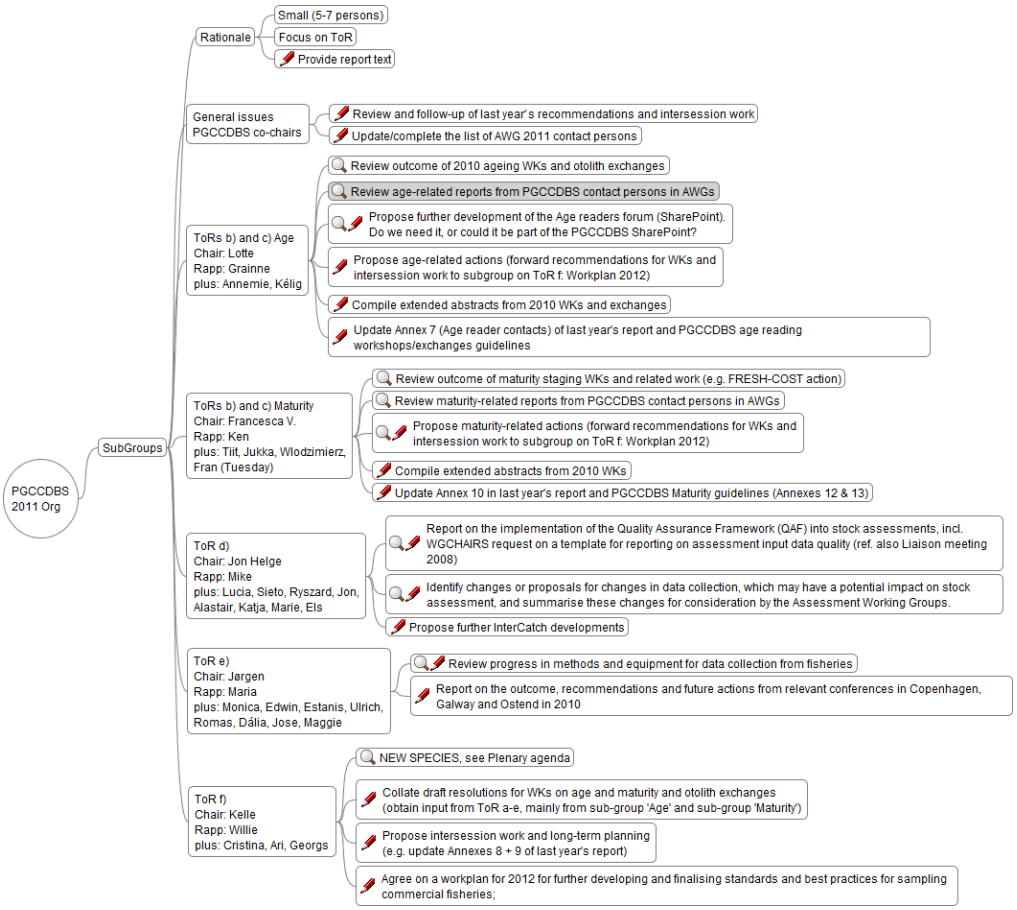
Name	Address	Phone/Fax	Email
	Denmark		
Estanis Mugerza	AZTI-Tecnalia AZTI Sukarrieta Txatxarramendi ugartea z/g E-48395 Sukarrieta (Bizkaia) Spain	Phone +34 94 6574000	emugerza@azti.es
Kjell Nedreaas Chair	Institute of Marine Research P.O. Box 1870 Nordne 5817 Bergen Norway	Phone +47 55 238671 Fax +47 55 238687	kjell.nedreaas@imr.no
Jukka Pönni	Finnish Game and Fisheries Research Institute Kotka Unit Sapokankatu 2 48100 Kotka Finland	Phone +358 205 751 894 Fax +358 205 751 891	jukka.ponni@rktl.fi
Alastair Pout	Marine Scotland P.O. Box 101 AB11 9DB Aberdeen United Kingdom	Phone +44 1224 295507 Fax +44 1224 295533	a.pout@marlab.ac.uk
Tiit Raid	Estonian Marine Institute University of Tartu 14 Mäealuse Street 12618 Tallinn Estonia	Phone +372 671 8953 Fax +372 671 8900	tiit.raid@gmail.com
Herwig Ranner	European Commission Directorate for Maritime Afffairs and Fisheries rue de la Loi 1040 Brussels Belgium	Phone +32 22999805	herwig.ranner@ec.europa.eu
Dália Reis	University of the Azores Department of Oceanography and Fisheries Rva Prof. Doutor Frederico Machado PT-9901 862 Horta Portugal	Phone +351 292 207800 Fax +351 292 200411	dreis@uac.pt
Katja Ringdahl	Swedish Board of Fisheries Institute of Marine Research, Lysekil P.O. Box 4 453 21 Lysekil Sweden	Phone +46 523 18 753 Fax +46 523 13977	katja.ringdahl@fiskeriverket.se
Jose Rodriguez Gutierrez	Centro Oceanográfico de Santander Instituto Español de Oceanografía (IEO) Promontorio de San Martín s/n 39005 Santander (Cantabria) Spain	Phone +34 942 291716 Fax +34 942 275072	jose.rodriguez@st.ieo.es
Fran Saborido-Rey (part time)	Institut de Ciències del Mar - CSIC Instituto de Investigaciones Marinas de Vigo Eduardo Cabello 6 36208 Vigo (Pontevedra) Spain	Phone +34 986 214466 Fax +34 986 292762	fran@iim.csic.es
Romas Statkus	Fisheries Service under the Ministry of Agriculture 108 Smiltynes pl 1	Phone + 370 46 391122 Fax + 370 46 391104	romas.statkus@zuv.lt

Name	Address	Phone/Fax	Email
	91001 Klaipeda Lithuania		
Marie Storr-Paulsen	DTU Aqua - National Institute of Aquatic Resources Section for Fisheries Advice Charlottenlund Slot Jægersborg Alle 1 DK-2920 Charlottenlund Denmark	Phone +45 3588 3442 Fax +45 3396 3333	msp@aqua.dtu.dk
Christoph Stransky Chair	Johann Heinrich von Thünen-Institute, Federal Research Institute for Rural Areas, Forestry and Fisheries Institute for Sea Fisheries Palmaille 9 D-22767 Hamburg Germany	Phone +49 40 38905228 Fax +49 40 38905263	christoph.stransky@vti.bund.de
Els Torreele	Institute for Agricultural and Fisheries Research (ILVO) Ankerstraat 1 8400 Oostende Belgium	Phone +32 59 569833 Fax +32 59 330629	els.torreele@ilvo.vlaanderen.be
Sieto Verver	Wageningen IMARES P.O. Box 68 1970 AB IJmuiden Netherlands	Phone +31 317 487045 Fax +31 317 487326	sieto.verver@wur.nl
Francesca Vitale	Swedish Board of Fisheries Institute of Marine Research, Lysekil P.O. Box 4 453 21 Lysekil Sweden	Phone +46 523 18738	francesca.vitale@fiskeriverket.se
Jon Helge Vølstad	Institute of Marine Research P.O. Box 1870 Nordne 5817 Bergen Norway	Phone +47 55 238411 Fax +47 55 235393	jon.helge.voelstad@imr.no
Lucia Zarauz	AZTI-Tecnalia AZTI Sukarrieta Txatxarramendi ugartea z/g E-48395 Sukarrieta (Bizkaia) Spain	Phone +34 94 6029400	lzarauz@azti.es
Annemie Zenner	Institute for Agricultural and Fisheries Research (ILVO) Ankerstraat 1 8400 Oostende Belgium	Phone +32 59569823 Fax +32 59 330629	annemie.zenner@ilvo.vlaanderen.be

Annex 2: Agenda



Annex 3: Sub-groups



Annex 4: PGCCDBS terms of reference for the next meeting

2011/x/ACOMxx. The **Planning Group on Commercial Catches, Discards and Biological Sampling** [PGCCDBS] (Co-Chairs: Mike Armstrong, UK, and Gráinne Ni Chonchuir, Ireland) will meet in Rome, Italy, 30 January – 3 February 2012, to:

a) Review last year's PGCCDBS recommendations and responsive actions taken.

b) Review the outcomes of workshops, study groups, exchange schemes and other intersession work related to sampling design, collection, interpretation and quality assurance of data on stock-related biological variables (age and growth; maturity and fecundity; sex ratio).

c) Review the outcomes of workshops, study groups and other intersession work related to sampling design, collection, interpretation and quality assurance of data on fleet/métier related variables (discards estimates and length/age compositions of landings and discards).

d) Respond to data issues reported by Assessment Working Group contact persons by providing advice on suitable actions and responsibilities for those actions.

e) Report on the implementation of the Quality Assurance Framework (QAF) by ICES Expert Groups, and make recommendations for further development of the QAF and procedures for ensuring its full implementation in stock assessments and associated advice.

f) Review and present practical examples of progress in developing enabling technologies and equipment for data collection from fisheries.

PGCCDBS will report by 9 March 2012 for the attention of ACOM.

Supporting Information

Priority:	**Essential**
Scientific justification:	The Planning Group and workshops are proposed in response to the EC-ICES MoU that requests ICES to provide support for the Data Collection Framework (DCF; EC Reg. 199/2008 and 665/2008, Decisions 2008/949/EC and 2010/93/EU). PGCCDBS is the ICES forum for planning and co-ordination of collection of data for stock assessment purposes; it coordinates and initiates the development of methods and adopts sampling standards and guidelines. Many activities in this group are closely linked to the activities of the EU DCF and DG MARE is a member of PGCCDBS to ensure proper coordination with the DCF activities. Stock assessment requires data covering the total removal from the fish stocks and the PG serves as a forum for coordination with non-EU member countries where appropriate. The PG shall develop and approve standards for best sampling practices within its remits and for fisheries in the ICES area. The implementation of these practices is discussed regionally and implemented nationally. The PG coordinates initiatives for workshops and other activities to address specific problems. The success of the workshops requires a substantial amount of preparatory work in the laboratories. This preparatory work is the responsibility of the national laboratories. ICES have been informed that this work is included in the national annual DCF work plans.

Priority:	**Essential**
	Under ToR b) and c), recommendations for further work should be compiled and a workplan for 2013 should be agreed. Under ToR c), a suitable format for reporting information from age workshops and exchanges on likely errors in age composition data to the Assessment Working Groups should be developed. ToR d) includes the following tasks: - Develop a summary overview of the types of data problems reported by the AWGs, and provide advice to the Liaison Meeting and relevant RCMs on where recurring problems could be addressed through improvements in sampling design, coverage, intensity and international collaboration within the EU Data Collection Framework. - Review developments between Regional Advisory Councils and ICES in developing regional taskforces to address data deficiencies and problems impeding assessments, and recommend how these could link most effectively with PGCCDBS. ToR e) includes: - Review developments in setting up regional data bases, and advise on the information needed from the data bases to produce reports on quality indicators for time-series data. - Evaluate the impact of any recent changes in data collection on the continuity of data series. The meeting is placed in Rome, Italy, as it is being held in parallel with the corresponding planning group for the Mediterranean EU fisheries (PGMED).
Resource requirements:	
Participants:	Scientists involved in the EU Data Collection Framework and other data collection schemes, usually 30-40 participants.
Secretariat facilities:	
Financial:	
Linkages to advisory committees:	ACOM
Linkages to other committees or groups:	SciCom, fish stock assessment working groups (AFWG, HAWG, NWWG, NIPAG, WGWIDE, WGBAST, WGNAS, WGBFAS, WGNSSK, WGCSE, WGDEEP, WGHMM, and WGANSA), WGEF, WGEEL, WGCRAN, WGMIXFISH, WGNEW, SGBYC and benchmark workshops.
Linkages to other organizations:	DG MARE (DCF)

Annex 5: Examples of PGCCDBS contact persons – Stock data problems relevant to data collection (included in Report from the Assessment Working Groups / Benchmark Workshops)

Stock	Description	How to be addressed?	By whom?
Red seabream in sub-area X	Red seabream species have a hermaphroditic reproduction strategy. More understanding on red seabream reproductive strategy is needed. Maturity staging of hermaphrodite species is in general problematic.	Standard maturity criteria (and scale) should be developed to correctly identify when the two sexes are presented in the gonads. Histology analysis would be to the advantage of the validation of the macroscopic identification. Recommendation: Workshop on hermaphrodite species (or in red seabream in particular).	PGCCDBS
Western Baltic cod	Recreational fisheries are not considered in the assessment although there are indications that recreational fisheries have a high contribution on total removals.	A WK on recreational fisheries will be held this year. The outcome of the WK should provide recommendations on recreational sampling. These recommendations should be taken into consideration in the National Data collection programmes.	Baltic RCM
Megrim and anglerfish	Age reading precision	WKAGME recommends that measures be taken to achieve international consensus among age readings for anglerfish and megrim, particularly in stock unit areas such as the northern shelf. This might best be achieved through a collaborative project whose aims should take into account recommendations of previous workshops.	PGCCDBS

Annex 6: Age reader contacts

Country	Age reader coordinator	Species/Area	Age reader		
Belgium	Annemie Zenner +32 59 56 98 23 annemie.zenner@ilvo.vlaanderen.be	Sole	Ilse Maertens	ilse.maertens@ilvo.vlaanderen.be	+32 59 56 98 35
		Plaice	Martine Moerman Christophe Bonje	martine.moerman@ilvo.vlaanderen.be christophe.bonje@ilvo.vlaanderen.be	+32 59 56 98 73
		Cod			+32 59 56 98 70
		turbot			
		Brill			
		Haddock			
		Whiting			
Bulgaria	Marina Panayotova +359 52 370 486 mpanayotova@io-bas.bg	Sprat			
		Turbot	Marina Panayotova Violin Raykov	mpanayotova@io-bas.bg vio_raykov@abv.bg	+359 52 370 486 +359 52 370 486
		Whiting			
Cyprus	Charis Charilaou 357 22 807 842 ccharilaou@dfmr.moa.gov.cy	Red Mullet	Charis Charilaou	ccharilaou@dfmr.moa.gov.cy	+357 22 807 842
		Striped red mullet	Charis Charilaou	ccharilaou@dfmr.moa.gov.cy	+357 22 807 842
		Bogue	Marios Josephides	mjosephides@dfmr.moa.gov.cy	+357 22 807 840
		Picarel	Marios Josephides	mjosephides@dfmr.moa.gov.cy	+357 22 807 840
		Red Pandora	Nikolas Michailidis	nmichailidis@dfmr.moa.gov.cy	+357 22 807 866
Denmark	Lotte Worsøe Clausen +45 21 36 28 04 law@aqua.dtu.dk	Sprat (North Sea)	Maria Jarnum	mja@aqua.dtu.dk	+ 45 35 88 32 75
		Herring	Stina Bilstrup	sb@aqua.dtu.dk	+45 35 88 33 85
		Sprat (Baltic, IIIa)	Stina Bilstrup	sb@aqua.dtu.dk	+45 35 88 33 85
		Salmon	Frank I. Hansen	fih@aqua.dtu.dk	+45 35 88 33 74
		Cod (IIIa)	Maria Jarnum	mja@aqua.dtu.dk	+ 45 35 88 32 75
		Cod (North Sea)	Helle Rasmussen	hr@aqua.dtu.dk	+45 35 88 33 65
		Cod (Baltic)	Svend-Erik Levinsky	sel@aqua.dtu.dk	+45 35 88 34 44
		Norway pout	Lise Sindahl	ls@aqua.dtu.dk	+45 35 88 32 46
		Haddock	Tommy Henriksen	th@aqua.dtu.dk	+45 35 88 32 41
		Plaice (IIIa south, Baltic)	Frank I. Hansen	fih@aqua.dtu.dk	+45 35 88 33 74
		Sandeel	Nina Fuglsang	nfu@aqua.dtu.dk	+45 35 88 34 56
		Saithe	Lise Sindahl	ls@aqua.dtu.dk	+45 35 88 32 46
		Sole	Peter Vingaard Larsen	pvl@aqua.dtu.dk	+45 35 88 33 62
		Other species	Helle Rasmusen	hr@aqua.dtu.dk	+45 35 88 32 08
		Horse mackerel	Aage Thaarup	aat@aqua.dtu.dk	+45 35 88 32 48
		Mackerel	Maria Jarnum	mja@aqua.dtu.dk	+ 45 35 88 32 75
		Whiting	Helle Rasmussen	hr@aqua.dtu.dk	+45 35 88 32 08
		Blue whiting	Helle Rasmussen	hr@aqua.dtu.dk	+45 35 88 32 08
		Plaice (North Sea)	Helle Rasmusen	hr@aqua.dtu.dk	+45 35 88 32 08
		Angler fish	Aage Thaarup	aat@aqua.dtu.dk	+45 35 88 32 48
		Flounder	Susanne Hansen	sh@aqua.dtu.dk	+45 35 88 34 71
Estonia	Toomas Saat +372 671 8901 toomas.saat@ut.ee	Herring	Tiit Raid	tiit.raid@ut.ee	+372 671 8953
		Herring	Heli Shpilev	heli.spilev@ut.ee	+372 4433 800
		Sprat	Ain Lankov	ain.lankov@ut.ee	+372 671 8956
		Salmon, trout	Martin Kesler	martin.kesler@ut.ee	+372 671 8959
		Whitefish	Aare Verliin	aare.verliin@ut.ee	+372 737 5092
		Smelt	Heli Shpilev	heli.spilev@ut.ee	+372 4433 800
		Flounder, turbot	Tenno Drevs	tenno.drevs@ut.ee	+372 671 8958
		Cod	Tenno Drevs	tenno.drevs@ut.ee	+372 671 8959
		Cod	Roland Svirgsden	Roland.Svirgsden@ut.ee	+372 737 5092
		Flounder	Kristiina Jürgens	kristiina.jurgens@ut.ee	+372 737 5092
		Perch	Redik Eschbaum	redik.eschbaum@ut.ee	+372 7375 095
		Perch	Ulvi Piirisalu	ulvi.piirisalu@ut.ee	+372 737 5092
		Pike-perch	Ülle Talvik	ulle.talvik@ut.ee	+372 7375 095
		Pike	Mehis Rohtla	mehis.rohtla@ut.ee	+372 7375 092
		Cyprinids	Leili Järv	leili.jarv@ut.ee	+372 671 8962
Faroe Islands	Demersals: Jákup Reinert +298 353935 jakupr@hav.fo Pelagics: Jan Arge Jacobsen +298 3539229 janarge@hav.fo	Cod	Lis Larsen	lisl@hav.fo	+298 353939
		Haddock	Lis Larsen	lisl@hav.fo	+298 353939
		Saithe	Lis Larsen	lisl@hav.fo	+298 353939
		Ling	Lis Larsen	lisl@hav.fo	+298 353939
		Monkfish	Hanna Elina P. Djurhus	hannadj@hav.fo	+298 353916
		Greater argentine	Lis Larsen	lisl@hav.fo	+298 353939
		Herring	Jens Arni Thomassen	jensarni@hav.fo	+298 353924
		Blue whiting	Lis Larsen	lisl@hav.fo	+298 353939
		Mackerel	Jens Arni Thomassen	jensarni@hav.fo	+298 353924
Finland	Jari Raitaniemi +358 20 57 51 685 jari.raitaniemi@rktl.fi	Eel	Jouni Tulonen	jouni.tulonen@rktl.fi	+358 20 57 51 432
		Herring	Jari Raitaniemi Tarja Wiik	jari.raitaniemi@rktl.fi tarja.wiik@rktl.fi	+358 20 57 51 685 +358 20 57 51 691
		Sprat	Folke Halling Tarja Wiik	folke.halling@rktl.fi tarja.wiik@rktl.fi	+358 20 57 51 860 +358 20 57 51 691
		Salmon	Irmeli Torvi (Baltic Sea) Jari Haantie (Arctic Ocean) Jorma Kuusela (Arctic Ocean)	irmeli.torvi@rktl.fi jari.haantie@rktl.fi jorma.kuusela@rktl.fi	+358 20 57 51 313 +358 20 57 51 770 +358 20 57 51 764
		Sea trout	Irmeli Torvi	irmeli.torvi@rktl.fi	+358 20 57 51 313
		Cod	Eero Aro	eero.aro@rktl.fi	+358 20 57 51 253
		Flounder	Eero Aro	eero.aro@rktl.fi	+358 20 57 51 253
		Perch	Karl Sundman Rauno Hokki	karl.sundman@rktl.fi rauno.hokki@rktl.fi	+358 20 57 51 234 +358 20 57 51 569

			Jukka Mikkola	jukka.mikkola@rktl.fi	+358 20 57 51 259
		Pike-perch	Karl Sundman	karl.sundman@rktl.fi	+358 20 57 51 234
		Whitefish	Alpo Huhmarniemi	alpo.huhmarniemi@rktl.fi	+358 20 57 51 874
		Other species	Jari Raitaniemi	jari.raitaniemi@rktl.fi	+358 20 57 51 685
France	Kélig Mahé kelig.mahe@ifremer.fr +33 (0) 3 21 99 56 02	Cod IV, VIId	Jerome Felix	jerome.felix@ifremer.fr	+33 (0) 3 21 99 56 11
		Norway pout IV	Jean-Louis Dufour	jean.louis.dufour@ifremer.fr	+33 (0) 3 21 99 56 13
		Whiting IV, VIId	Jean-Louis Dufour	jean.louis.dufour@ifremer.fr	+33 (0) 3 21 99 56 13
		Saithe IV	Karine Sévin	karine.sevin@ifremer.fr	+33 (0) 3 21 99 56 87
		Plaice IV, VIId	Karine Sévin	karine.sevin@ifremer.fr	+33 (0) 3 21 99 56 87
		Sole IV, VIId	Romain Elleboode	romain.elleboode@ifremer.fr	+33 (0) 3 21 99 56 87
		Herring IV	Jean-Louis Dufour	jean.louis.dufour@ifremer.fr	+33 (0) 3 21 99 56 13
		Sprat IV	Jean-Louis Dufour	jean.louis.dufour@ifremer.fr	+33 (0) 3 21 99 56 13
		Sole, VIIe	Romain Elleboode	romain.elleboode@ifremer.fr	+33 (0) 3 21 99 56 87
		Grenadier, all areas	Elise Bellamy	elise.bellamy@ifremer.fr	+33 (0) 3 21 99 56 87
		Cod VIIe-k	Jerome Felix	jerome.felix@ifremer.fr	+33 (0) 3 21 99 56 11
		Whiting VIIe-k, VIIIa,b	Jean-Louis Dufour	jean.louis.dufour@ifremer.fr	+33 (0) 3 21 99 56 13
		Northern Hake VI, VII,VIII	Jean-Louis Dufour	jean.louis.dufour@ifremer.fr	+33 (0) 3 21 99 56 13
		Sole VIIIa-b	Anne Boiron-Leroy	anne.leroy@ifremer.fr	+33 (0) 5 46 50 06 64
		Saithe VIa	Karine Sévin	karine.sevin@ifremer.fr	+33 (0) 3 21 99 56 87
		Anglerfish (2 species) VIIb-k and VIIIa,b	Elise Bellamy	elise.bellamy@ifremer.fr	+33 (0) 3 21 99 56 87
		Megrim (L. whiffiagonis) VIIb,c,e-k and VIII ab	Karine Sévin	karine.sevin@ifremer.fr	+33 (0) 3 21 99 56 87
		Haddock, VIIb-k	Karine Sévin	karine.sevin@ifremer.fr	+33 (0) 3 21 99 56 87
		Sardine VIII a,b	Erwan Duhamel	erwan.duhamel@ifremer.fr	+33 (0) 2 97 87 38 37
		Anchovy VIIIa,b	Erwan Duhamel	erwan.duhamel@ifremer.fr	+33 (0) 2 97 87 38 37
		Bass	Karine Sévin	karine.sevin@ifremer.fr	+33 (0) 3 21 99 56 87
		Sardine, gulf of Lion	Erwan Duhamel	erwan.duhamel@ifremer.fr	+33 (0) 2 97 87 38 37
		Anchovy, gulf of Lion	Erwan Duhamel	erwan.duhamel@ifremer.fr	+33 (0) 2 97 87 38 37
		Striped red mullet, IV, VII, VIII	Romain Elleboode	romain.elleboode@ifremer.fr	+33 (0) 3 21 99 56 87
		Striped red mullet, gulf of Lion	Romain Elleboode	romain.elleboode@ifremer.fr	+33 (0) 3 21 99 56 87
		Red mullet, gulf of Lion	Romain Elleboode	romain.elleboode@ifremer.fr	+33 (0) 3 21 99 56 87
		Seabream, gulf of Lion	Romain Elleboode	romain.elleboode@ifremer.fr	+33 (0) 3 21 99 56 87
		Dab, all areas	Romain Elleboode	romain.elleboode@ifremer.fr	+33 (0) 3 21 99 56 87
		Lemon sole, all areas	Romain Elleboode	romain.elleboode@ifremer.fr	+33 (0) 3 21 99 56 87
		Red gurnard, all areas	Elise Bellamy	elise.bellamy@ifremer.fr	+33 (0) 3 21 99 56 87
		Tub gurnard, all areas	Elise Bellamy	elise.bellamy@ifremer.fr	+33 (0) 3 21 99 56 87
		Greater forkbeard, all areas	Elise Bellamy	elise.bellamy@ifremer.fr	+33 (0) 3 21 99 56 87
		Blue ling, all areas	Jerome Felix	jerome.felix@ifremer.fr	+33 (0) 3 21 99 56 11
		Ling, all areas	Jerome Felix	jerome.felix@ifremer.fr	+33 (0) 3 21 99 56 11
		Turbot, all areas	Romain Elleboode	romain.elleboode@ifremer.fr	+33 (0) 3 21 99 56 87
		Brill, all areas	Romain Elleboode	romain.elleboode@ifremer.fr	+33 (0) 3 21 99 56 87
		Cod, 3PS	Jerome Felix	jerome.felix@ifremer.fr	+33 (0) 3 21 99 56 11
		Hake, gulf of Lion	Jerome Felix	jerome.felix@ifremer.fr	+33 (0) 3 21 99 56 11
Germany	**Baltic Cod** NN +49 381 8116 XXX	Cod IIIcd	Britta Stepputtis Marianna Wolfram Andres Velasco	britta.stepputtis@vti.bund.de marianna.wolfram@vti.bund.de andres.velasco@vti.bund.de	+49 381 8116 151 +49 381 8116 150 +49 381 8116 123
	Baltic pelagics Dr. Tomas Gröhsler +49 381 8116 104 tomas.groehsler@vti.bund.de	Herring IIIa,b,c,d	Andrea Müller Mario Koth	andrea.mueller@vti.bund.de mario.koth@vti.bund.de	+49 381 8116 135 +49 381 8116 134
		Sprat IIIa,b,c,d	Mario Koth Andrea Müller	mario.koth@vti.bund.de andrea.mueller@vti.bund.de	+49 381 8116 134 +49 381 8116 135
	Baltic flatfish Ulrich Berth +49 381 8116 128 ulrich.berth@vti.bund.de	Plaice, Flounder, Turbot III	Cornelia Albrecht	cornelia.albrecht@vti.bund.de	+49 381 8116 157
		Cod, haddock, saithe, whiting, Norway pout	Friederike Beussel Dorit Schröder	friederike.beussel@vti.bund.de dorit.schroeder@vti.bund.de	+49 40 38905 101 +49 40 38905 101
		Herring, sprat, mackerel, horse mackerel, anchovy, sardine	Gudrun Gentschow Ines Wilhelms	gudrun.gentschow@vti.bund.de ines.wilhelms@vti.bund.de	+49 40 38905 227 +49 40 38905 164
	North Sea & North Atlantic Dr. Christoph Stransky +49 40 38905 228 christoph.stransky@vti.bund.de	Blue whiting	NN		
		Plaice, Sole, Dab, Turbot	Christine Petersen-Frey	christine.petersen-frey@vti.bund.de	+49 40 38905 175
		Redfish	Christoph Stransky	christoph.stransky@vti.bund.de	+49 40 38905 228
Greece	Chryssi Mytilineou +30 210 9856706 chryssi@ath.hcmr.gr	Hake, gulf of Lion	Lefkaditou Eugenia	teuthis@ath.hcmr.gr	+30 210 9856705
		Red mullet	Katerina Anastasopoulou	kanast@ath.hcmr.gr	+30 210 9856705
		Striped red mullet	Katerina Anastasopoulou	kanast@ath.hcmr.gr	+30 210 9856705
		Red pandora	Kleopatra Alidromiti	kleo@ath.hcmr.gr	+30 210 9856713
		Picarel	Petros Bekas	bekasp@ath.hcmr.gr	+30 210 9856713
		Cephalopods	Lefkaditou Eugenia	teuthis@ath.hcmr.gr	+30 210 9856705
	Athanasios Machias +30 210 9856702 amachias@ath.hcmr.gr	Sardine Anchovy			
	Argiris Kallianiotis +30 25940 22691 akallian@inale.gr	Anchovy	Kostas Efthimiadis	kostef@inale.gr	+30 25940 22691
		Bogue	Aris Christidis	christar@inale.gr	+30 25940 22691
		Sole	Foteini Kallianioti	fotinika@inale.gr	+30 25940 22692
		Horse mackerel	Anna Argyri	argyri@inale.gr	+30 25940 22693
		Mediterranean horse mackerel	Anna Argyri	argyri@inale.gr	+30 25940 22694
		Mackerels	Vasso Papantoniou	vassop@inale.gr	+30 25940 22695
		Blue whiting	Kostas Efthimiadis	kostef@inale.gr, erotokritos@inale.gr	+30 25940 22696
		Atlantic bonito	Kostas Efthimiadis	kostef@inale.gr, erotokritos@inale.gr	+30 25940 22697
		Grey mullet	Aris Christidis	christar@inale.gr	+30 25940 22698
		European eel	Argiris Sapounidis	asapoun@inale.gr	
	George Tserpes	Thunnus thynnus	George Tserpes	gtserpes@her.hcmr.gr	+30 2810 337851

	+30 2810 337851 gtserpes@her.hcmr.gr	Thunnus alalunga	George Tserpes	gtserpes@her.hcmr.gr	+30 2810 337852
		Xiphias gladius	George Tserpes	gtserpes@her.hcmr.gr	+30 2810 337853
		Black-bellied anglerfish			
Greenland	Kaj Sünksen +299 361206 kaj@natur.gl Anja Retzel anre@natur.gl +299 361200	Greeland cod	Susanne S Hvass	suhv@natur.gl	+299 361200
		Greenland halibut	Sofie Jeramiassen	soje@natur.gl	+299 361200
			Signe Jeramiassen	Sije@natur.gl	+299 361200
Iceland	Gróa Þóra Pétursdóttir groa@hafro.is +354 5752000	Cod	Gerdur Palsdottir	gerdur@hafro.is	+354 5752000
			Sigrun Johannsdottir	sigrun@hafro.is	+354 5752000
			Groa Petursdottir	groa@hafro.is	+354 5752000
		Haddock	Sigrun Johannsdottir	sigrun@hafro.is	+354 5752000
			Gudrun Finnbogadottir	gunna@hafro.is	+354 5752000
			Groa Petursdottir	groa@hafro.is	+354 5752000
		Saithe	Gudrun Finnbogadottir	gunna@hafro.is	+354 5752000
			Sigrun Johannsdottir	sigrun@hafro.is	+354 5752000
			Groa Petursdottir	groa@hafro.is	+354 5752000
		Blue Whiting	Sigrun Johannsdottir	sigrun@hafro.is	+354 5752000
		Herrring	Ragnhildur Olafsdottir	raddy@hafro.is	+354 5752000
		Mackerel	Gudrun Finnbogadottir	gunna@hafro.is	+354 5752000
		Capelin	Agnar M. Sigurdsson	ams@hafro.is	+354 5752000
			Ragnhildur Olafsdottir	raddy@hafro.is	+354 5752000
		Golden redfish (Sebastes marinus)	Sif Gudmundsdottir	sif@hafro.is	+354 5752000
		Beaked redfish (Sebastes mentella)	Sif Gudmundsdottir	sif@hafro.is	+354 5752000
		Atlantic catfish	Asgeir Gunnarsson	geiri@hafro.is	+354 5752000
			Hlynur Petursson	hlynur@hafro.is	+354 5752000
		Leopardfish, smaller catfish	Asgeir Gunnarsson	geiri@hafro.is	+354 5752000
		Plaice	Audur S. Bjarnadottir	audur@hafro.is	+354 5752000
		Sole	Audur S. Bjarnadottir	audur@hafro.is	+354 5752000
			Adalbjorg Jonsdottir	adda@hafro.is	+354 5752000
		Dab, common dab	Audur S. Bjarnadottir	audur@hafro.is	+354 5752000
		Witch flounder	Adalbjorg Jonsdottir	adda@hafro.is	+354 5752000
			Audur S. Bjarnadottir	audur@hafro.is	+354 5752000
		Tusk	Audur S. Bjarnadottir	audur@hafro.is	+354 5752000
Ireland	Gráinne Ní Chonchúir grainne.nichonchuir@marine.ie +353 91 387200	Cod	Orla Hanniffy	orla.hanniffy@marine.ie	35391387200
			Imelda Hehir	imelda.hehir@marine.ie	35391387200
		Haddock	Orla Hanniffy	orla.hanniffy@marine.ie	35391387200
			Susan Beattie	susan.beattie@marine.ie	35391387200
			Mairead Sullivan	mairead.sullivan@marine.ie	35391387200
		Whiting	Imelda Hehir	imelda.hehir@marine.ie	35391387200
			Fiona Woods	fiona.woods@marine.ie	35391387200
		Hake	Selene Hoey	selene.hoey@marine.ie	35391387200
			Susan Beattie	susan.beattie@marine.ie	35391387200
		Anglerfish	Helen Mc Cormick	helen.mccormick@marine.ie	35391387200
		Plaice	Marcin Blaszkowski	marcin.blaszkowski@marine.ie	35391387200
			Susan Beattie	susan.beattie@marine.ie	35391387200
		Black Sole	Dermot Fee	dermot.fee@marine.ie	35391387200
			Sean O Connor	sean.oconnor@marine.ie	35391387200
		Megrim	Ross Fitzgerald	ross.fitzgerald@marine.ie	35391387200
		Herring	Deirdre Lynch	deirdre.lynch@marine.ie	35391387200
			Eugene Mullins	eugene.mullins@marine.ie	35391387200
		Mackerel	Deirdre Lynch	deirdre.lynch@marine.ie	35391387200
			Susan Beattie	susan.beattie@marine.ie	35391387200
		Blue Whiting	Eugene Mullins	eugene.mullins@marine.ie	35391387200
			Susan Beattie	susan.beattie@marine.ie	35391387200
		Saithe	Helen Mc Cormick	helen.mccormick@marine.ie	35391387200
Italy	(none, refer to individual age readers)	Anchovy Strait of Sicily (GSA 16)	Gualtiero Basilone	gualtiero.basilone@iamc.cnr.it	
		Anchovy Strait of Sicily (GSA 16)	Maria Bonsignore	maria.bonsignore@iamc.cnr.it	
		Sardine Strait of Sicily (GSA 16)	Gualtiero Basilone	gualtiero.basilone@iamc.cnr.it	
		Sardine Strait of Sicily (GSA 16)	Maria Bonsignore	maria.bonsignore@iamc.cnr.it	
		Thunnus thynnus	Simona Genovese	simona.genovese@iamc.cnr.it	
		Thunnus thynnus	Gualtiero Basilone	gualtiero.basilone@iamc.cnr.it	
		Anchovy	Hervé Panciroli	pancirol@dipteris.unige.it	+ 39 0185 283415
		Anchovy	Mario Petrillo	petrillo@dipteris.unige.it	+ 39 0185 283415
		Pilchard	Hervé Panciroli	pancirol@dipteris.unige.it	+ 39 0185 283415
		Pilchard	Mario Petrillo	petrillo@dipteris.unige.it	+ 39 0185 283415
		Hake (Mediterranean GSA10, 19, 18)	Pierluigi Carbonara	carbonara@coispa.it	+39 080 5433596
		Red mullet (Mediterranean GSA10, 19, 18)	Pierluigi Carbonara	carbonara@coispa.it	+39 080 5433596
		Red mullet (Mediterranean GSA10, 19, 18)	Simona Intini	intini@coispa.it	+39 080 5433596
		Stripped mullet (Mediterranean GSA10, 19, 18)	Pierluigi Carbonara	carbonara@coispa.it	+39 080 5433596
		Stripped mullet (Mediterranean GSA10, 19, 18)	Simona Intini	intini@coispa.it	+39 080 5433596
		Atlantic horse mackerel (Mediterranean GSA10, 19, 18)	Pierluigi Carbonara	carbonara@coispa.it	+39 080 5433596
		Mediterranean horse mackerel (Mediterranean GSA10, 19, 18)	Pierluigi Carbonara	carbonara@coispa.it	+39 080 5433596
		Mediterranean horse mackerel (Mediterranean GSA10, 19, 18)	Loredana Casciaro	casciaro@coispa.it	+39 080 5433596
		Bogue (Mediterranean GSA10, 19, 18)	Pierluigi Carbonara	carbonara@coispa.it	+39 080 5433596
		Anchovy (Mediterranean GSA 19)	Pierluigi Carbonara	carbonara@coispa.it	+39 080 5433596
		Anchovy (Mediterranean GSA 19)	Loredana Casciaro	casciaro@coispa.it	+39 080 5433596
		Sardine (Mediterranean GSA 19)	Pierluigi Carbonara	carbonara@coispa.it	+39 080 5433596

		Sardine (Mediterranean GSA 19)	Loredana Casciaro	casciaro@coispa.it	+39 080 5433596
		Anglerfish (2 species Mediterranean GSA 10 and 19)	Pierluigi Carbonara	carbonara@coispa.it	+39 080 5433596
		Common pandora (Mediterranean GSA10, 19, 18)	Pierluigi Carbonara	carbonara@coispa.it	+39 080 5433596
		Atlantic mackerel (Mediterranean GSA 18)	Pierluigi Carbonara	carbonara@coispa.it	+39 080 5433596
		Chub mackerel (Mediterranean GSA 18)	Pierluigi Carbonara	carbonara@coispa.it	+39 080 5433596
		Picarel (Mediterranean GSA 18)	Pierluigi Carbonara	carbonara@coispa.it	+39 080 5433596
		European eel	Fabrizio Capoccioni	fabrizio.capoccioni@uniroma2.it	390672595852
		European eel	Eleonora Ciccotti	ciccotti@uniroma2.it	390672595969
		Hake (GSA 19)	Roberto Carlucci	r.carlucci@biologia.uniba.it	+390805443342
		Horse mackerel (GSA 19)	Roberto Carlucci	r.carlucci@biologia.uniba.it	+390805443342
		Anglerfish (GSA19)	Roberto Carlucci	r.carlucci@biologia.uniba.it	+390805443342
		Bluemouth rockfish (GSA19)	Roberto Carlucci	r.carlucci@biologia.uniba.it	+390805443342
		Red mullet (GSA 19)	Roberto Carlucci	r.carlucci@biologia.uniba.it	+390805443342
		Seabreams (GSA 19)	Roberto Carlucci	r.carlucci@biologia.uniba.it	+390805443342
		Four-spot megrim (GSA 19)	Roberto Carlucci	r.carlucci@biologia.uniba.it	+390805443342
		Swordfish, Bluefin tuna, Albacore, Bonito	Luca Lanteri	luca.lanteri@libero.it	+ 39 0103533018
		Elasmobranches / Mediterranean Sea	Letizia Sion	l.sion@biologia.uniba.it	+ 390805442495
		Hake / Mediterranean Sea	Letizia Sion	l.sion@biologia.uniba.it	+ 390805442495
		Red Mullet / Mediterranean Sea	Letizia Sion	l.sion@biologia.uniba.it	+ 390805442495
		Deep water species / Mediterranean Sea	Letizia Sion	l.sion@biologia.uniba.it	+ 390805442495
		Shi drum/Adriatic Sea	Sabrina Colella	s.colella@ismar.cnr.it	
		Brown meagre/Adriatic Sea	Sabrina Colella	s.colella@ismar.cnr.it	
		Sole/Adriatic Sea	Sabrina Colella	s.colella@ismar.cnr.it	
		Sole/Adriatic Sea	Fortunata Donato	f.donato@ismar.cnr.it	
		Brill/Adriatic Sea	Sabrina Colella	s.colella@ismar.cnr.it	
		Turbot/Adriatic Sea	Sabrina Colella	s.colella@ismar.cnr.it	
		Hake/Adriatic Sea	Fortunata Donato	f.donato@ismar.cnr.it	
		Hake/Adriatic Sea	Sabrina Colella	s.colella@ismar.cnr.it	
		Red Mullet/Adriatic Sea	Fortunata Donato	f.donato@ismar.cnr.it	
		Red Mullet/Adriatic Sea	Sabrina Colella	s.colella@ismar.cnr.it	
		Anchovy/Adriatic Sea	Fortunata Donato	f.donato@ismar.cnr.it	
		Anchovy/Adriatic Sea (juveniles)	Monica Panfili	m.panfili@an.ismar.cnr.it	
		Sardine/Adriatic Sea	Fortunata Donato	f.donato@ismar.cnr.it	
		Anchovy/Adriatic Sea (juveniles)	Monica Panfili	m.panfili@an.ismar.cnr.it	
		Sprat/Adriatic Sea	Fortunata Donato	f.donato@ismar.cnr.it	
		Mackerel/Adriatic Sea	Fortunata Donato	f.donato@ismar.cnr.it	
		Atlantic horse mackerel	Fortunata Donato	f.donato@ismar.cnr.it	
		Transparent goby/Adriatic Sea	Mario La Mesa	m.lamesa@ismar.cnr.it	
		Crystal goby/Adriatic Sea	Mario La Mesa	m.lamesa@ismar.cnr.it	
		Blackbellied angler /Adriatic Sea	Mario La Mesa	m.lamesa@ismar.cnr.it	
		Thunnus Thynnus/Mediterranena Sea	Mario La Mesa	m.lamesa@ismar.cnr.it	
		Madeira rockfish/Mediterranean Sea	Mario La Mesa	m.lamesa@ismar.cnr.it	
		Black scorpionfish/Adriatic Sea	Mario La Mesa	m.lamesa@ismar.cnr.it	
		Small red scorpionfish/Adriatic Sea	Mario La Mesa	m.lamesa@ismar.cnr.it	
		Antarctic toothfish/Antarctic	Mario La Mesa	m.lamesa@ismar.cnr.it	
		Emerald notothen/Antarctic	Mario La Mesa	m.lamesa@ismar.cnr.it	
		Blackfin icefish/Antarctic	Mario La Mesa	m.lamesa@ismar.cnr.it	
		Spiny icefish/Antarctic	Mario La Mesa	m.lamesa@ismar.cnr.it	
		Ocellated icefish /Antarctic	Mario La Mesa	m.lamesa@ismar.cnr.it	
		Common sole/Adriatic Sea	Giuseppe Scarcella	g.scarcella@ismar.cnr.it	
		Red Mullet/east Mediterranean Sea	Giuseppe Scarcella	g.scarcella@ismar.cnr.it	
		Striped red mullet/east Mediterranean Sea	Giuseppe Scarcella	g.scarcella@ismar.cnr.it	
		Bogue/east Mediterranean Sea	Giuseppe Scarcella	g.scarcella@ismar.cnr.it	
		Picarel/east Mediterranean Sea	Giuseppe Scarcella	g.scarcella@ismar.cnr.it	
		Common Pandora/east Mediterra-nean Sea	Giuseppe Scarcella	g.scarcella@ismar.cnr.it	
		Small red scorpionfish/Adriatic Sea	Giuseppe Scarcella	g.scarcella@ismar.cnr.it	
		Black scorpionfish/Adriatic Sea	Giuseppe Scarcella	g.scarcella@ismar.cnr.it	
		Red scorpionfish/Adriatic Sea	Giuseppe Scarcella	g.scarcella@ismar.cnr.it	
		Bluefin tuna/east Mediterranean Sea	Giuseppe Scarcella	g.scarcella@ismar.cnr.it	
		Albacore tuna/east Mediterranean Sea	Giuseppe Scarcella	g.scarcella@ismar.cnr.it	
Latvia	Baltic Pelagics Georgs Kornilovs Georgs.Kornilovs@bior.gov.lv	Herring, Gulf of Riga	Georgs Kornilovs	Georgs.Kornilovs@bior.gov.lv	+ 371 67613775
		Herring, Baltic Sea	Vadim Cervoncevs	Vadims.Cervoncevs@bior.gov.lv	+ 371 67614306
		Sprat	Alla Vingovatova	Alla.Vingovatova@bior.gov.lv	+ 371 67613775
		Flounder, turbot	Didzis Ustups	Didzis.Ustups@bior.gov.lv	+ 371 67610766
	Baltic Demersal Maris Plikshs Maris.Plikss@bior.gov.lv	Cod	Tatjana Baranova	Tatjana.Baranova@bior.gov.lv	+ 371 67610766
		Herring	Ivars Putnis	Ivars.Putnis@bior.gov.lv	+ 371 67610766
		Flounder	Dace Zilniece	Dace.Zilniece@bior.gov.lv	+ 371 67610088
		Cyprinids	Juris Tirzitis, Janis Aizups	Janis.Aizups@bior.gov.lv	+ 371 67612536
	Anadromous and freshwater Janis Birzaks Janis.Birzaks@bior.gov.lv	Salmon, trout	Janis Birzaks	Janis.Birzaks@bior.gov.lv	+ 371 67610088
		Perch	Ivars Kazmers	Ivars.Kazmers@bior.gov.lv	+ 3716 7610766
		Pike	Juris Tirzitis	Juris.Tirzitis@bior.gov.lv	+ 371 67612536
Lithuania	Romas Statkus Romas.Statkus@zuv.lt	Herring, Baltic Sea	Jelena Fedotova	jelena.fedotova@gmail.com	+ 370 46391122
		Sprat, Baltic Sea	Diana Tarvydiene	diana.tarvydiene@gmail.com	+ 370 46391122
		Cod, Baltic Sea	Egidijus Bacevicius	ztl@zuv.lt	+ 370 46391122
		Flounder, Baltic Sea	Dinara Petrenaite	dinara.petrenaite@gmail.com	+ 370 46391122
Malta	Mark Gatt	Fish	Mark Gatt	mark.gatt@gov.mt	+356 2293303

	+356 2293303 mark.gatt@gov.mt	Cephalopods	Roberta Pace	roberta.mifsud@gov.mt	+356 2293315
		Elasmobranches	Francesca Gravino	francesca.gravino@gov.mt	+356 2293326
Netherlands	Loes Bolle +31 317 487069 Loes.Bolle@wur.nl	Herring	Jan Beintema (1st reader)	Jan.Beintema@wur.nl	+31 317 487158
			Andre Dijkman-Dulkes (trainee)	Andre.Dijkman@wur.nl	+31 317 487167
		Sprat	Jan Beintema (1st reader)	Jan.Beintema@wur.nl	+31 317 487158
			Andre Dijkman-Dulkes (trainee)	Andre.Dijkman@wur.nl	+31 317 487167
		Mackerel	Jan Beintema (1st reader)	Jan.Beintema@wur.nl	+31 317 487158
			Andre Dijkman-Dulkes (trainee)	Andre.Dijkman@wur.nl	+31 317 487167
		Horse mackerel	Simon Rijs (1st reader)	Simon.Rijs@wur.nl	+31 317 487192
			Andre Dijkman-Dulkes (2nd reader)	Andre.Dijkman@wur.nl	+31 317 487167
		Blue Whiting	Thomas Pasterkamp	Thomas.Pasterkamp@wur.nl	+31 317 487192
		Greater argentine	Gerrit Rink	Gerrit.Rink@wur.nl	+31 317 487193
		Sole	Kees Groeneveld (1st reader)	Kees.Groeneveld@wur.nl	+31 317 487168
			Marcel de Vries (2nd reader)	Marcel.devries@wur.nl	+31 317 487197
		Plaice	Peter Groot (1st reader)	Peterj.Groot@wur.nl	+31 317 487169
			Marcel de Vries (2nd reader)	Marcel.devries@wur.nl	+31 317 487197
		Turbot	Peter Groot (1st reader)	Peterj.Groot@wur.nl	+31 317 487169
			Marcel de Vries (2nd reader)	Marcel.devries@wur.nl	+31 317 487197
		Brill	Peter Groot (1st reader)	Peterj.Groot@wur.nl	+31 317 487169
			Marcel de Vries (2nd reader)	Marcel.devries@wur.nl	+31 317 487197
		Dab	Peter Groot	Peterj.Groot@wur.nl	+31 317 487169
			Marcel de Vries (trainee)	Marcel.devries@wur.nl	+31 317 487197
		Lemon Sole	Peter Groot	Peterj.Groot@wur.nl	+31 317 487169
		Cod	Gerrit Rink (1st reader)	Gerrit.Rink@wur.nl	+31 317 487193
			Betty van Os (2nd reader)	Betty.vanos@wur.nl	+31 317 487184
		Whiting	Gerrit Rink	Gerrit.Rink@wur.nl	+31 317 487193
		Haddock	Gerrit Rink (1st reader)	Gerrit.Rink@wur.nl	+31 317 487193
			Betty van Os (trainee)	Betty.vanos@wur.nl	+31 317 487184
		Saithe	Gerrit Rink	Gerrit.Rink@wur.nl	+31 317 487193
		Norway pout	Gerrit Rink	Gerrit.Rink@wur.nl	+31 317 487193
Norway	Sigbjørn Mehl + 47 55 23 85 00 + 47 55 23 86 66 sigbjoern.mehl@imr.no (new coordinator spring 2011)	Capelin	Bente Røttingen	bente.roettingen@imr.no	+47 55 23 84 13
			Jostein Røttingen	jostein.roettingen@imr.no	+47 55 23 84 12
			Bente Skjold	bente.skjold@imr.no	+ 47 55 23 84 06
			Eilert Hermansen	eilert.hermansen@imr.no	+ 47 55 23 84 35
			Valantine Anthonypillai	valantine.anthonypillai@imr.no	+ 47 55 23 86 41
			Jaime Alvarez	jaime.alvarez@imr.no	+47 55 23 84 23
			Jan Henrik Nilsen	jan.henrik.nilsen@imr.no	+ 47 55 23 86 21
		Polar cod	Bente Røttingen	bente.roettingen@imr.no	+47 55 23 84 13
			Eilert Hermansen	eilert.hermansen@imr.no	+ 47 55 23 84 35
			Jaime Alvarez	jaime.alvarez@imr.no	+47 55 23 84 23
			Jostein Røttingen	jostein.roettingen@imr.no	+47 55 23 84 12
			Jan Henrik Nilsen	jan.henrik.nilsen@imr.no	+ 47 55 23 86 21
		Norwegian spring spawning herring <= 20 cm:otoliths > 20 cm: scales	Jostein Røttingen	jostein.roettingen@imr.no	+47 55 23 84 12
			Eilert Hermansen	eilert.hermansen@imr.no	+ 47 55 23 84 35
			Jan Henrik Nilsen	jan.henrik.nilsen@imr.no	+ 47 55 23 86 21
			Bjørn Vidar Svendsen	bjoern.vidar.svendsen@imr.no	+47 55 23 84 08
			Bente Skjold	bente.skjold@imr.no	+ 47 55 23 84 06
			Knut Hansen	knut.hansen@imr.no	+47 37 05 90 26
			Jan de Lange	jan.de.lange@imr.no	+47 55 23 84 01
			Elna S. Meland	elna.saelen.meland@imr.no	+47 55 23 84 05
			Valantine Anthonypillai	valantine.anthonypillai@imr.no	+47 55 23 86 41
		North Sea herring	Bjørn Vidar Svendsen	bjoern.vidar.svendsen@imr.no	+47 55 23 84 08
			Eilert Hermansen	eilert.hermansen@imr.no	+ 47 55 23 84 35
			Knut Hansen	knut.hansen@imr.no	+47 37 05 90 26
			Jan de Lange	jan.de.lange@imr.no	+47 55 23 84 01
			Anne-Liv Johnsen	anne.liv.johnsen@imr.no	+47 55 23 86 51
		Blue whiting	Elna Sælen Meland	elna.saelen.meland@imr.no	+47 55 23 84 05
			Jan de Lange	jan.de.lange@imr.no	+47 55 23 84 01
			Øyvind Tangen	oeyvind.tangen@imr.no	+47 55 23 84 14
			Eilert Hermansen	eilert.hermansen@imr.no	+ 47 55 23 84 35
			Jaime Alvarez	jaime.alvarez@imr.no	+ 47 55 23 84 23
			Valantine Anthonypillai	valantine.anthonypillai@imr.no	+ 47 55 23 86 41
		Mackerel	Helga Gill	helga.gill@imr.no	+47 55 23 84 18
			Eilert Hermansen	eilert.hermansen@imr.no	+ 47 55 23 84 35
			Anne-Liv Johnsen	anne.liv.johnsen@imr.no	+47 55 23 86 51
			Jan de Lange	jan.de.lange@imr.no	+47 55 23 84 01
		Horse mackerel	Helga Gill	helga.gill@imr.no	+47 55 23 84 18
		Sprat	Knut Hansen	knut.hansen@imr.no	+47 37 05 90 26
			Inger Henriksen	inger.henriksen@imr.no	+47 37 05 90 46
			Jan de Lange	jan.de.lange@imr.no	+47 55 23 84 01
			Anne-Liv Johnsen	anne.liv.johnsen@imr.no	+47 55 23 86 51
			Jostein Røttingen	jostein.roettingen@imr.no	+47 55 23 84 12
			Bjørn Vidar Svendsen	bjoern.vidar.svendsen@imr.no	+47 55 23 84 08
			Eilert Hermansen	eilert.hermansen@imr.no	+ 47 55 23 84 35
		Sandeel	Inger Henriksen	inger.henriksen@imr.no	+47 37 05 90 46
			Eilert Hermansen	eilert.hermansen@imr.no	+ 47 55 23 84 35
			Knut Hansen	knut.hansen@imr.no	+47 37 05 90 26
			Lisbet Solbakken	lisbet.solbakken@imr.no	+ 47 55 23 86 65
		Norway pout	Lisbet Solbakken	lisbet.solbakken@imr.no	+ 47 55 23 86 65

		Whiting	Lisbet Solbakken	lisbet.solbakken@imr.no	+ 47 55 23 86 65
		Ling	Merete Kvalsund Knut Hansen	merete.kvalsund@imr.no knut.hansen@imr.no	+ 47 55 23 69 92 +47 37 05 90 26
		Tusk	Merete Kvalsund Knut Hansen	merete.kvalsund@imr.no knut.hansen@imr.no	+ 47 55 23 69 92 +47 37 05 90 26
		North Sea cod	Stian Kleven Kate Enersen Harald Senneset Hildegunn Mjanger	stian.kleven@imr.no kate.enersen@imr.no harald.senneset@imr.no hildegunn.mjanger@imr.no	+47 37059037 +47 55 23 85 50 +47 55 23 86 60 +47 55 2386 61
		North east Arctic cod	Hildegunn Mjanger Harald Senneset Stian Kleven	hildegunn.mjanger@imr.no harald.senneset@imr.no stian.kleven@imr.no	+47 55 2386 61 +47 55 23 86 60 +47 55 23 85 49
		North Sea and Northeast Arctic saithe	Lisbet Solbakken Harald Senneset Stian Kleven Hildegunn Mjanger Merete Nilsen Asbjørn Borge Else Holm	lisbet.solbakken@imr.no harald.senneset@imr.no stian.kleven@imr.no hildegunn.mjanger@imr.no merete.nilsen@imr.no asbjoern.borge@imr.no else.holm@imr.no	+47 55 23 86 65 +47 55 23 86 60 +47 55 23 85 49 +47 55 2386 61 +47 55 236804 +47 55 23 86 91 +47 55 23 86 59
		North Sea and Northeast Arctic haddock	Else Holm Stian Kleven Hildegunn Mjanger Janicke Skadal Harald Senneset	else.holm@imr.no stian.kleven@imr.no hildegunn.mjanger@imr.no janicke.skadal@imr.no harald.senneset@imr.no	+ 47 55 23 86 59 +47 55 23 85 49 +47 55 2386 61 +47 55 235382 +47 55 23 86 60
		Greenland halibut	Merete Kvalsund Lisbet Solbakken Anne Sæverud	merete.kvalsund@imr.no lisbet.solbakken@imr.no anne.saeverud@imr.no	+47 55 23 69 92 +47 55 23 86 65 +47 55 23 86 37
		Sebastes mentella	Lise Heggebakken	lise.heggebakken@imr.no	+47 77 60 97 26
		Sebastes marinus	Lise Heggebakken Arne Storaker	lise.heggebakken@imr.no arne.storaker@imr.no	+47 77 60 97 26 +47 55 23 86 88
		Flatfish	Hege Øvrebø Hansen	hege.oeverboe.hansen@imr.no	+47 37 05 90 44
		Roughhead grenadier	Hege Øvrebø Hansen	hege.oeverboe.hansen@imr.no	+47 37 05 90 44
		Greater argentine	Hege Øvrebø Hansen	hege.oeverboe.hansen@imr.no	+47 37 05 90 44
		Elasmobranchs	Lise Heggebakken	lise.heggebakken@imr.no	+47 77 60 97 26
		Atlantic halibut	Merete Kvalsund Lisbet Solbakken	merete.kvalsund@imr.no lisbet.solbakken@imr.no	+ 47 55 23 69 92 +47 55 23 86 65
		Anglerfish	Lise Heggebakken	lise.heggebakken@imr.no	+47 77 60 97 26
		Salmon (scales)	Gunnar Bakke	gunnar.bakke@imr.no	+47 55 23 68 95
		Seals	Anne Kristine Frie	annek@imr.no	+47 55 23 85 00
Poland	Baltic cod; Dr. Krzysztof Radtke, SFI in Gdynia	IIIc, d	Krzysztof Radtke	krzysztof.radtke@mir.gdynia.pl	+48 58 7356223
	Baltic herring; Mirosław Wyszyński, SFI in Gdynia	IIId	Mirosław Wyszyński	miroslaw.wyszynski@mir.gdynia.pl	+48 58 73 56 269
	Baltic sprat; Dr. Włodzimierz Grygiel, SFI in Gdynia	IIId	Włodzimierz Grygiel	wlodzimierz.grygiel@mir.gdynia.pl	+48 58 73 56 270
	Baltic flatfishes; Edyta Gosz; edyta.gosz@mir.gdynia.pl	IIId; flounder, plaice, turbot	Zuzanna Mirny	zuzanna.mirny@mir.gdynia.pl	+48 587-326-213
	Baltic salmonids; Dr. Wojciech Pelczarski, SFI in Gdynia	IIId, salmon, sea trout, whitefish	Wojciech Pelczarski	wojciech.pelczarski@mir.gdynia.pl	+48 58 73 56 236
	European eel caught on the Baltic Sea; Tomasz Nermer, SFI in Gdynia	IIId	Tomasz Nermer	tomasz.nermer@mir.gdynia.pl	+ 48 58 73 56 211
	Commercial freshwater fishes caught on the Baltic Sea; Dr. Iwona Psuty, SFI in Gdynia	IIId	Iwona Psuty	iwona.psuty@mir.gdynia.pl	+48 58 73 56 218
	North East Atlantic - ICES Sub-areas I-X, XII and XIV and North West Atlantic - NAFO area; Co-chair: Dr. Kordian Trella, SFI in Gdynia; kor-dian.trella@mir.gdynia.pl; +48 58 7356266	Sebastes mentella; area XII, XIVb (periodically)	Dr. Kordian Trella	kordian.trella@mir.gdynia.pl	+48 58 73 56 266
		Gadus morhua; area I, II (periodically)			
		Trachurus murphyi; area SFRMO (periodically)			
		Scomber scombrus; area I, II (periodically)			
		Reinhardtius hippoglossoides (Greenland halibut); area I and II (periodically)	Barbara Grabowska	barbara.grabowska@mir.gdynia.pl	+48 58 73 56 274
	Co-chair Dr. Jerzy Janusz, SFI in Gdynia jerzy.janusz@mir.gdynia.pl +48 58 7356214	Melanogrammus aeglefinus; area I, II (periodically)			
		Pollachius virens; area IV (periodically)	Radosław Zaporowski	radoslaw.zaporowski@mir.gdynia.pl	+48 58 7356 364
		Coryphenoides rupestris; area Vb, VI-X, XII, XIV (periodically)	Jerzy Janusz	jerzy.janusz@mir.gdynia.pl	+48 58 7356214
Portugal (IPIMAR)	Alberto Murta (IPIMAR) amurta@ipimar.pt +351 21 302 7120	Horse Mackerel	Maria João Ferreira	mjferr@ipimar.pt	+351 21 302 7129
	Maria Manuel Martins mane@ipimar.pt +351 21 302 7111	Mackerel	Maria Manuel Martins	mane@ipimar.pt	+351 21 302 7000
		Spanish Mackerel	Maria Manuel Martins	mane@ipimar.pt	+351 21 302 7000
	Alexandra Silva asilva@ipimar.pt +351 21 302 7095	Sardine	Delfina Morais Eduardo Soares Raquel Milhazes	dmorais@ipimar.pt esoares@ipimar.pt rmilhazes@ipimar.pt	+351 21 302 7179 +351 21 302 7117 +351 22 9396940
		Blue Whiting	Ana Luisa Ferreira	aferreira@ipimar.pt	+351 21 302 7062
	Ivone Figueiredo ivonefig@ipimar.pt +351 21 3027131	Black Scabbardfish	Ana Vieira Inês Farias	 ifarias@ipimar.pt	+351 21 3027108 +351 21 3027108
		Raja clavata	Barbara Pereira	bpereira@ipimar.pt	+351 21 3027108
	Ricardo Alpoim ralpoim@ipimar.pt +351 21 302 7024	Cod	Ricardo Alpoim	ralpoim@ipimar.pt	+351 21 302 7024
		American Plaice	Ricardo Alpoim	ralpoim@ipimar.pt	+351 21 302 7024
		Yellowtail flounder	Ricardo Alpoim	ralpoim@ipimar.pt	+351 21 302 7024

		Grenadiers	Ricardo Alpoim	ralpoim@ipimar.pt	+351 21 302 7024
		Greenland halibut	Ricardo Alpoim	ralpoim@ipimar.pt	+351 21 302 7024
		Redfish	Ricardo Alpoim António Ávila de Melo	ralpoim@ipimar.pt amelo@ipimar.pt	+351 21 302 7024 +351 21 302 7024
	Ernesto Jardim ernesto@ipimar.pt +351 21 302 7093	Hake Hake	Sandra Dores Ana Costa	sdores@ipimar.pt amcosta@ipimar.pt	+351 21 302 7062
	Susana Siborro siborro@ipimar.pt +351 21 302 7112	Sole	Susana Siborro	siborro@ipimar.pt	+351 21 302 7112
	Portugal (DOP-Azores) Dalia Reis dreis@uac.pt +351 292 200 435	Seabreams Beryx sp. Greater forkbeard Bluemouth rockfish Other demersal species	Dalia Reis	dreis@uac.pt	+351 292 207 800
Romania	Valodea MAXIMOV maxi@alpha.rmri.ro 0040 724217409	turbot, Black Sea whiting sprat anchovy horse mackerel	Tania ZAHARIA	zahar@alpha.rmri.ro	+40 724549290
Russia (PINRO)	Konstantin Drevetnyak +78152 472231 drevko@pinro.ru	Capelin	Prokhorova Tatyana Murashko Ekaterina	alice@pinro.ru kattim@pinro.ru	+7 815 2 472147 +7 815 2 472147
		Blue Whiting	Prokhorova Tatyana Murashko Ekaterina	alice@pinro.ru kattim@pinro.ru	+7 815 2 472147 +7 815 2 472147
		Norwegian spring spawning herring (otoliths)	Prokhorova Tatyana Murashko Ekaterina	alice@pinro.ru kattim@pinro.ru	+7 815 2 472147 +7 815 2 472147
		Polar cod	Prokhorova Tatyana Murashko Ekaterina	alice@pinro.ru kattim@pinro.ru	+7 815 2 472147 +7 815 2 472147
		Mackerel	Seliverstova Elena Rybakov Maxim	alice@pinro.ru fisher@pinro.ru	+7 815 2 472147 +7 815 2 472147
		North east Arctic cod	Valentina Koloskova Natalya Zuykova	zunat@pinro.ru zunat@pinro.ru	+7 815 2 472231 +7 815 2 472231
		North east Arctic haddock	Marina Baltykova	zunat@pinro.ru	+7 815 2 472231
		North east Arctic saithe	Natalya Zuykova	zunat@pinro.ru	+7 815 2 472231
		Greenland halibut (shell, otoliths)	Alexey Amelkin (Barents Sea) Svetlana Glebova (Barents Sea)	amelkin@pinro.ru smirnov@pinro.ru	+7 815 2 472231 +7 815 2 472231
			Ilya Skryabin (Greenland)	skryabin@pinro.ru	+7 815 2 450569
		Norway pout	Natalya Zuykova	zunat@pinro.ru	+7 815 2 472231
		Sebastes mentella	Konstantin Drevetnyak (Barents Sea, Norwegian Sea) Dmitry Alexandrov (Barents Sea, Norwegian Sea) Alexey Rolskiy (Irminger Sea) Pochtar Maria (Irminger Sea)	drevko@pinro.ru mitja@pinro.ru rolskiy@pinro.ru pochtar@pinro.ru	 +7 815 2 472231 +7 815 2 450568 +7 815 2 450569
Russia (AtlantNIRO)	Baltic Sea Igor Karpushevskiy karpushevskiy@atlant.baltnet.ru +7 (4012) 925 568)	Baltic cod	Igor Karpushevskyi	karpushevskiy@atlant.baltnet.ru	+7 (4012) 925 568
			Anastasia Karpushevskaya	karpushevskiy@atlant.baltnet.ru	+7 (4012) 925 452
		Herring, Baltic Sea	Natalia Krasovskaya	krasovskaya@atlant.baltnet.ru	+7 (4012) 925 530
		Sprat, Baltic Sea	Tatyana Vasilyeva	vasiljeva@atlant.baltnet.ru	+7 (4012) 925 468
		Turbot, Baltic Sea	Sergei Ivanov	vanov_atl@rambler.ru	+7 (4012) 925 367
		Flounder, Baltic Sea	Sergei Ivanov	vanov_atl@rambler.ru	+7 (4012) 925 367
	Atlantic Ocean Nikolay Timoshenko timoshenko@atlant.baltnet.ru +7 (4012) 925 554	Blue whiting	Nikolay Timoshenko	timoshenko@atlant.baltnet.ru	+7 (4012) 925 554
		Central east Atlantic mackerel	Nikolay Timoshenko	timoshenko@atlant.baltnet.ru	+7 (4012) 925 554
		Central east Atlantic horse mackerels	Nikolay Timoshenko	timoshenko@atlant.baltnet.ru	+7 (4012) 925 554
		Central east Atlantic sardine	Natalia Barkova	barkova@atlant.baltnet.ru	+7 (4012) 925 456
		Antarctic mackerel icefish	Zhanna Frolkina	frolkina@atlant.baltnet.ru	+7 (4012) 925 449
Slovenia	Bojan Marčeta bojan.marceta@zzrs.si +386 124 434 11	Sardine	Tomaz Modic	tomaz.modic@zzrs.si	+386 124 434 09
		Anchovy	Tomaz Modic	tomaz.modic@zzrs.si	+386 124 434 09
Spain (AZTI)	Iñaki Artetxe +34 94 657 400 00 iartetxe@azti.es	Anchovy	Iñaki Rico	irico@azti.es	+34 94 657 400 00
		Pilchard	Iñaki Rico	irico@azti.es	+34 94 657 400 00
		Horse Mackerel	Iñaki Rico	irico@azti.es	+34 94 657 400 00
		Mackerel	Iñaki Rico	irico@azti.es	+34 94 657 400 00
		Anglerfish	Carmen Abaroa	cabaroa@azti.es	+34 94 657 400 00
		Megrim	Amaia Gomez de Segura	amgomez@azti.es	+34 94 657 400 00
		Hake	Arantza Maceira	amaceira@azti.es	+34 94 657 400 00
		Cod	Inmaculada Martin	imartin@azti.es	+34 94 657 400 00
Spain (IEO)	Esther Román (Far Fisheries) +34 986 49 21 11 esther.roman@vi.ieo.es	ICES-NAFO / Atlantic Cod	Esther Román	esther.roman@vi.ieo.es	+34 986 49 21 11
			Eva Marull	eva.marull@vi.ieo.es	+34 986 49 21 11
		NAFO / Roughhead grenadier	Esther Román	esther.roman@vi.ieo.es	+34 986 49 21 11
			Josefina Teruel	josefina.teruel@vi.ieo.es	+34 986 49 21 11
		ICES-NAFO / Greenland halibut	Esther Román	esther.roman@vi.ieo.es	+34 986 49 21 11
		ICES / Roundnose grenadier	Esther Román	esther.roman@vi.ieo.es	+34 986 49 21 11
	Begoña Villamor (Pelagic) +34 942 29 17 16	ICES / Anchovy	Clara Dueñas M. Rosario Navarro Begoña Villamor	clara.duenas@st.ieo.es charo.navarro@st.ieo.es begona.villamor@st.ieo.es	+34 942 29 17 16
		ICES / Horse Mackerel	Clara Dueñas Ana Antolinez Begoña Villamor	clara.duena@st.ieo.es ana.antolinez@st.ieo.es begona.villamor@st.ieo.es	+34 942 29 17 16
		ICES/ Mediterranean Horse Mackerel	Clara Dueñas	clara.duenas@st.ieo.es	+34 942 29 17 16

	begona.villamor@st.ieo.es		Begoña Villamor	begona.villamor@st.ieo.es	
		ICES / Mackerel	M. Rosario Navarro Clara Dueñas Begoña Villamor	charo.navarro@st.ieo.es clara.duenas@st.ieo.es begona.villamor@st.ieo.es	+34 942 29 17 16
		ICES/ Chub Mackerel	M. Rosario Navarro Begoña Villamor	charo.navarro@st.ieo.es begona.villamor@st.ieo.es	+34 942 29 17 16
		ICES / Blue Whiting	Rosendo otero Manolo Meixide	rosendo.otero@vi.ieo.es manolo.meixide@vi.ieo.es	+34 986 49 21 11
		ICES / Sardine	Eugenia Peleteiro Isabel Loureiro Isabel Riveiro	quena.peleteiro@vi.ieo.es isabel.loureiro@vi.ieo.es isabel.riveiro@vi.ieo.es	+34 986 49 21 11
	Jorge Landa (Benthic) +34 942 29 17 16 jorge.landa@st.ieo.es	ICES / Megrim	Jorge Fontenla Jorge Landa	jorge.fontenla@vi.ieo.es jorge.landa@st.ieo.es	+34 942 29 17 16
		ICES / Four-spot megrim	Jorge Fontenla Jorge Landa	jorge.fontenla@vi.ieo.es jorge.landa@st.ieo.es	+34 942 29 17 16
		ICES / Anglerfish	Jorge Landa Joaquín Barrado	jorge.landa@st.ieo.es joaquin.barrado@st.ieo.es	+34 942 29 17 16
		ICES / Black-bellied anglerfish	Jorge Landa Joaquín Barrado	jorge.landa@st.ieo.es joaquin.barrado@st.ieo.es	+34 942 29 17 16
	Carmen Piñeiro (Demersal) +34 986 49 21 11 carmen.pineiro@vi.ieo.es	ICES / Hake	Carmen Piñeiro María Sainza	carmen.pineiro@vi.ieo.es maria.sainza@vi.ieo.es	+34 986 49 21 11
		ICES / Pouting	Carmen Piñeiro María Sainza Ana Leal Isabel Bruno Cristina Gonzalez	carmen.pineiro@vi.ieo.es maria.sainza@vi.ieo.es ana.leal@vi.ieo.es isabel.bruno@vi.ieo.es cristina.gonzalez@vi.ieo.es	+34 986 49 21 11
		ICES /Greater forkbeard	Carmen Piñeiro María Sainza Ana Leal Isabel Bruno Cristina Gonzalez	carmen.pineiro@vi.ieo.es maria.sainza@vi.ieo.es ana.leal@vi.ieo.es isabel.bruno@vi.ieo.es cristina.gonzalez@vi.ieo.es	+34 986 49 21 11
		ICES/ European conger eel	Carmen Piñeiro María Sainza Ana Leal Isabel Bruno Cristina Gonzalez	carmen.pineiro@vi.ieo.es maria.sainza@vi.ieo.es ana.leal@vi.ieo.es isabel.bruno@vi.ieo.es cristina.gonzalez@vi.ieo.es	+34 986 49 21 11
		ICES/ Blackbelly rosefish	Carmen Piñeiro María Sainza Ana Leal Isabel Bruno Cristina Gonzalez	carmen.pineiro@vi.ieo.es maria.sainza@vi.ieo.es ana.leal@vi.ieo.es isabel.bruno@vi.ieo.es cristina.gonzalez@vi.ieo.es	+34 986 49 21 11 +34 986 49 21 11
		ICES/Witch	Carmen Piñeiro María Sainza Ana Leal Isabel Bruno Cristina Gonzalez	carmen.pineiro@vi.ieo.es maria.sainza@vi.ieo.es ana.leal@vi.ieo.es isabel.bruno@vi.ieo.es cristina.gonzalez@vi.ieo.es	+34 986 49 21 11
		ICES/Ling	Carmen Piñeiro María Sainza Ana Leal Isabel Bruno Cristina Gonzalez	carmen.pineiro@vi.ieo.es maria.sainza@vi.ieo.es ana.leal@vi.ieo.es isabel.bruno@vi.ieo.es cristina.gonzalez@vi.ieo.es	+34 986 49 21 11 +34 986 49 21 11
	Alberto García (Mediterranean Sea) agarcia@ma.ieo.es +34 952 47 69 55	Mediterranean Sea / Anchovy	Pedro Torres	pedro.torres@ma.ieo.es	+34 952 47 69 55
		Mediterranean Sea / Mackerel	Miguel Vivas	miguel.vivas@mu.ieo.es	
		Mediterranean Sea / Anglerfish	Elena Barcala	elena.barcala@mu.ieo.es	+34 968 18 05 00
		Mediterranean Sea / Hake	Jose Luis Pérez-Gil	joseluis.perez@ma.ieo.es	+34 952 47 69 55
		Mediterranean Sea / Atlantic Horse Mackerel	Pedro Torres	pedro.torres@ma.ieo.es	+34 952 47 69 55
			Jesús Acosta	jesus.acosta@ma.ieo.es	
		Mediterranean Sea / Mediterranean Horse Mackerel	Pedro Torres	pedro.torres@ma.ieo.es	+34 952 47 69 55
			Jesús Acosta	jesus.acosta@ma.ieo.es	
		Mediterranean Sea / Red Mullet	Xisco Ordinas	xisco.ordinas@ba.ieo.es	+34 971 40 15 61
			Antoni Quetglas	toni.quetglas@ba.ieo.es	
			Natalia González	natalia.gonzalez@ba.ieo.es	+34 971 40 15 61
		Mediterranean Sea / Striped Red Mullet	Xisco Ordinas	xisco.ordinas@ba.ieo.es	+34 971 40 15 61
			Natalia González	natalia.gonzalez@ba.ieo.es	
			Antoni Quetglas	toni.quetglas@ba.ieo.es	+34 971 40 15 61
		Mediterranean Sea / Blue whiting	Encarnación García	encarnacion.garcia@mu.ieo.es	+34 968 18 05 00
		Mediterranean Sea / Sardine	Luis Quintanilla	luis.quintanilla@ma.ieo.es	+34 952 47 69 55
			Carlota Ceruso	carlota.ceruso@mu.ieo.es	+34 968 18 05 00
			Francisco Alemany	francisco.alemany@ba.ieo.es	+34 971 133721
Spain (IIM)	Fran Saborido-Rey fran@iim.csic.es +34 986 21 44 66	Cod	Antonio Vázquez	avazquez@iim.csic.es	+34 986 23 19 30
		Redfish	Fran Saborido-Rey	fran@iim.csic.es	+34 986 21 44 66
		Redfish	Mariña Fabeiro	fabeiro@iim.csic.es	+34 986 23 19 30
Sweden		Cod (Baltic)	Ann-Sofie Ågren	ann-sofie.agren@fiskeriverket.se	+46 455 36 28 26
			Yvonne Walther	yvonne.walther@fiskeriverket.se	+46 455 36 28 52
			Fredrik Nilsson	fredrik.nilsson@fiskeriverket.se	+46 455 36 28 54
		Cod (IIIa and Baltic)	Rajlie Sjöberg	rajlie.sjoberg@fiskeriverket.se	+46 523 187 26
			Anne-Marie Palmén Bratt	ann-marie.bratt@fiskeriverket.se	+46 523 187 11
		Eel	Yvette Heimbrand	yvette.heimbrand@fiskeriverket.se	+46 173 464 75
			Carin Ångström	carin.angstrom@fiskeriverket.se	+46 173 464 77
			Anne Odelström	anne.odelstrom@fiskeriverket.se	+46 173 464 69
		Eelpout	Martina Blass	martina.blass@fiskeriverket.se	+46 173 464 75
			Yvette Heimbrand	yvette.heimbrand@fiskeriverket.se	+46 173 464 75
		Flounder Baltic	Carin Ångström	carin.angstrom@fiskeriverket.se	+46 173 464 77
			Martina Blass	martina.blass@fiskeriverket.se	+46 173 464 75
			Yvette Heimbrand	yvette.heimbrand@fiskeriverket.se	+46 173 464 75
		Herring (IIIa)	Birgitta Krischansson	birgitta.krischansson@fiskeriverket.se	+46 523 187 21
		Herring (IIIa)	Marianne Johansson	marianne.johansson@fiskeriverket.se	+46 523 187 19

	Francesca Vitale +46 523 187 92 francesca.vitale@fiskeriverket.se	Herring (Baltic)	Carina Jernberg	carina.jernberg@fiskeriverket.se	+46 523 187 18
			Marie Leiditz	marie.leiditz@fiskeriverket.se	+46 523 187 25
			Anne Odelström	anne.odelstrom@fiskeriverket.se	+46 173 464 69
			Martina Blass	martina.blass@fiskeriverket.se	+46 173 464 75
			Yvette Heimbrand	yvette.heimbrand@fiskeriverket.se	+46 173 464 75
		Sprat	Birgitta Krischansson	birgitta.krischansson@fiskeriverket.se	+46 523 187 21
		Sprat	Marianne Johansson	marianne.johansson@fiskeriverket.se	+46 523 187 19
		Salmon (Baltic)	Ingrid Holmgren	ingrid.holmgren@fiskeriverket.se	+46 26 825 05
		Perch	Carin Ångström	carin.angstrom@fiskeriverket.se	+46 173 464 77
			Anne Odelström	anne.odelstrom@fiskeriverket.se	+46 173 464 69
			Yvette Heimbrand	yvette.heimbrand@fiskeriverket.se	+46 173 464 75
			Marju Kaljuste	marju.kaljuste@fiskeriverket.se	+46 173 464 75
			Martina Blass	martina.blass@fiskeriverket.se	+46 173 464 75
		Pike	Anne Odelström	anne.odelstrom@fiskeriverket.se	+46 173 464 69
		Pikeperch	Martina Blass	martina.blass@fiskeriverket.se	+46 173 464 75
			Yvette Heimbrand	yvette.heimbrand@fiskeriverket.se	+46 173 464 75
			Anne Odelström	anne.odelstrom@fiskeriverket.se	+46 173 464 69
			Carin Ångström	carin.angstrom@fiskeriverket.se	+46 173 464 77
		Plaice	Barbara Bland	barbara.bland@fiskeriverket.se	+46 523 187 20
			Sofia Carlshamre	sofia.carlshamre@fiskeriverket.se	+46 523 187 72
			Jan-Erik Johansson	jan-erik.johansson@fiskeriverket.se	+46 523 187 25
		Haddock	Barbara Bland	barbara.bland@fiskeriverket.se	+46 523 187 20
			Karin Frohlund	karin.frohlund@fiskeriverket.se	+46 523 187 14
		Saithe	Eva Ilic	eva.ilic@fiskeriverket.se	+46 523 187 37
		Turbot (Baltic)	Carin Ångström	carin.angstrom@fiskeriverket.se	+46 173 464 77
			Yvette Heimbrand	yvette.heimbrand@fiskeriverket.se	+46 173 464 75
			Anne Odelström	anne.odelstrom@fiskeriverket.se	+46 173 464 69
		Vendace	Carin Ångström	carin.angstrom@fiskeriverket.se	+46 173 464 77
			Anne Odelström	anne.odelstrom@fiskeriverket.se	+46 173 464 69
			Yvette Heimbrand	yvette.heimbrand@fiskeriverket.se	+46 173 464 75
			Martina Blass	martina.blass@fiskeriverket.se	+46 173 464 75
		Witch Flounder	Barbara Bland	barbara.bland@fiskeriverket.se	+46 523 187 20
			Sofia Carlshamre	sofia.carlshamre@fiskeriverket.se	+46 523 187 72
			Jan-Erik Johansson	jan-erik.johansson@fiskeriverket.se	+46 523 187 25
		Whitefish	Carin Ångström	carin.angstrom@fiskeriverket.se	+46 173 464 77
			Anne Odelström	anne.odelstrom@fiskeriverket.se	+46 173 464 69
			Yvette Heimbrand	yvette.heimbrand@fiskeriverket.se	+46 173 464 75
			Martina Blass	martina.blass@fiskeriverket.se	+46 173 464 75
		Other species	Barbara Bland	barbara.bland@fiskeriverket.se	+46 523 187 20
			Carin Ångström	carin.angstrom@fiskeriverket.se	+46 173 464 77
UK-England	Mark Etherton +44 1502 524539 mark.etherton@cefas.co.uk	Cod	Dave Brown	dave.brown@cefas.co.uk	+44 1502 524223
			Gary Burt	gary.burt@cefas.co.uk	+44 1502 524490
			Joana Silva	joana.silva@cefas.co.uk	+44 1502 524441
			Sarah Pitcher	sarah.pitcher@cefas.co.uk	+44 1502 524270
			Brian Harley	brian.harley@cefas.co.uk	+44 1502 524254
		Haddock	Phil Welsby	phil.welsby@cefas.co.uk	+44 1502 524559
			Richard Ayers	richard.ayers@cefas.co.uk	+44 1502 524224
			Peter Robinson	peter.robinson@cefas.co.uk	+44 1502 527725
		Whiting	Tom Woods	tom.woods@cefas.co.uk	+44 1502 524316
			Mark Etherton	mark.etherton@cefas.co.uk	+44 1502 524539
			Phil Welsby	phil.welsby@cefas.co.uk	+44 1502 524559
		Hake	Steve Warnes	steve.warnes@cefas.co.uk	+44 1502 524450
			Tom Woods	tom.woods@cefas.co.uk	+44 1502 524316
		Plaice	Mark Etherton	mark.etherton@cefas.co.uk	+44 1502 524539
			Brian Harley	brian.harley@cefas.co.uk	+44 1502 524254
			Grant Course	grant.course@cefas.co.uk	+44 1502 524409
			Ian Holmes	ian.holmes@cefas.co.uk	+44 1502 524244
			Rob Bush	robert.bush@cefas.co.uk	+44 1502 524211
			Joanne Smith	joanne.smith@cefas.co.uk	+44 1502 527753
		Sole	Stephen Shaw	stephen.shaw@cefas.co.uk	+44 1502 524502
			Ian Holmes	ian.holmes@cefas.co.uk	+44 1502 524244
			Denise Goldsmith	denise.goldsmith@cefas.co.uk	+44 1502 524382
			Mary Brown	mary.brown@cefas.co.uk	+44 1502 524227
			Richard Humphreys	richard.humphreys@cefas.co.uk	+44 1502 524239
		Lemon Sole	Joanne Smith	joanne.smith@cefas.co.uk	+44 1502 527753
			Alison Holmes	alison.holmes@cefas.co.uk	+44 1502 527783
		Brill	Mark Etherton	mark.etherton@cefas.co.uk	+44 1502 524539
			Tom Woods	tom.woods@cefas.co.uk	+44 1502 524316
		Turbot	Mark Etherton	mark.etherton@cefas.co.uk	+44 1502 524539
		Dab	Brian Harley	brian.harley@cefas.co.uk	+44 1502 524254
			Mark Etherton	mark.etherton@cefas.co.uk	+44 1502 524539
		Anglers	Phil Large	phil.large@cefas.co.uk	+44 1502 524491
			Sally Warne	sally.warne@cefas.co.uk	+44 1502 527787
		Norway Pout	Mark Etherton	mark.etherton@cefas.co.uk	+44 1502 524539
			Brian Harley	brian.harley@cefas.co.uk	+44 1502 524254
		Herring	Mark Etherton	mark.etherton@cefas.co.uk	+44 1502 524539
			Louise Cox	louise.cox@cefas.co.uk	+44 1502 524299
			Steve Warnes	steve.warnes@cefas.co.uk	+44 1502 524450
		Saithe	Phil Welsby	phil.welsby@cefas.co.uk	+44 1502 524559
			Gary Burt	gary.burt@cefas.co.uk	+44 1502 524490
			Mark Etherton	mark.etherton@cefas.co.uk	+44 1502 524539
		Mackerel	Phil Welsby	phil.welsby@cefas.co.uk	+44 1502 524559
			Alison Holmes	alison.holmes@cefas.co.uk	+44 1502 527783
		Megrim	Mark Etherton	mark.etherton@cefas.co.uk	+44 1502 524539
			Sally Songer	sally.warne@cefas.co.uk	+44 1502 527787
			Ben Hatton	benjamin.hatton@cefas.co.uk	+44 1502 524270
		Sprat	Mark Etherton	mark.etherton@cefas.co.uk	+44 1502 524539
		Flounder	Mark Etherton	mark.etherton@cefas.co.uk	+44 1502 524539
		European eel	Mark Etherton	mark.etherton@cefas.co.uk	+44 1502 524539

		Red Mullet	Mark Etherton Alison Holmes	mark.etherton@cefas.co.uk alison.holmes@cefas.co.uk	+44 1502 524539 +44 1502 527783
		Horse Mackerel	Phil Welsby	phil.welsby@cefas.co.uk	+44 1502 524559
		Bass	Alison Holmes Dave Brown Ben Hatton Mary Brown	alison.holmes@cefas.co.uk dave.brown@cefas.co.uk benjamin.hatton@cefas.co.uk mary.brown@cefas.co.uk	+44 1502 527783 +44 1502 524223 +44 1502 524270 +44 1502 524227
UK-Scotland	Mandy Gault M.Gault@marlab.ac.uk +44 1224 295400	Cod	Mandy Gault	M.Gault@marlab.ac.uk	+44 1224 295400
			Peter Clark	P.Clark@marlab.ac.uk	+44 1224 295400
		Haddock	Owen Goudie	M.Mathewson@marlab.ac.uk	+44 1224 876544
			Peter Clark	P.Clark@marlab.ac.uk	+44 1224 295400
		Whiting	Peter Clark	P.Clark@marlab.ac.uk	+44 1224 295400
			Gordon Henderson	G.I.Henderson@marlab.ac.uk	+44 1224 295395
		Saithe	Lynette Ritchie	L.Ritchie@marlab.ac.uk	+44 1224 876544
			Peter Clark	P.Clark@marlab.ac.uk	+44 1224 295400
			Mandy Gault	M.Gault@marlab.ac.uk	+44 1224 295400
		Norway Pout	Peter Clark	P.Clark@marlab.ac.uk	+44 1224 295400
			Owen goudie	O.J.Goudie@marlab.ac.uk	+44 1224 295422
			Gordon Henderson	G.I.Henderson@marlab.ac.uk	+44 1224 295395
		Monkfish	Gordon Henderson	G.I.Henderson@marlab.ac.uk	+44 1224 295395
		Megrim	Gordon Henderson	G.I.Henderson@marlab.ac.uk	+44 1224 295395
		Scabbard/grenadier	Gordon Henderson	G.I.Henderson@marlab.ac.uk	+44 1224 295395
		Herring	Owen Goudie	O.J.Goudie@marlab.ac.uk	+44 1224 295422
			Robert Watret	R.Watret@marlab.ac.uk	+44 1224 295422
		Mackerel	Owen Goudie	O.J.Goudie@marlab.ac.uk	+44 1224 295422
			Robert Watret	R.Watret@marlab.ac.uk	+44 1224 295422
		Sprat	Owen Goudie	O.J.Goudie@marlab.ac.uk	+44 1224 295422
			Robert Watret	R.Watret@marlab.ac.uk	+44 1224 295422
		Sandeel	Robert Watret	R.Watret@marlab.ac.uk	+44 1224 295397
UK-Northern Ireland	Willie McCurdy willie.mccurdy@afbini.gov.uk '+ 44 28 90255513	Cod	Willie McCurdy	willie.mccurdy@afbini.gov.uk	+ 44 28 90255513
			Ian McCausland	ian.mccausland@afbini.gov.uk	+ 44 28 90255498
		Haddock	Willie McCurdy	willie.mccurdy@afbini.gov.uk	+ 44 28 90255513
			Ian McCausland	ian.mccausland@afbini.gov.uk	+ 44 28 90255498
		Whiting	Willie McCurdy	willie.mccurdy@afbini.gov.uk	+ 44 28 90255513
			Ian McCausland	ian.mccausland@afbini.gov.uk	+ 44 28 90255498
		Herring	Willie McCurdy	willie.mccurdy@afbini.gov.uk	+ 44 28 90255513
			Ian McCausland	ian.mccausland@afbini.gov.uk	+ 44 28 90255498
		Sprat	Willie McCurdy	willie.mccurdy@afbini.gov.uk	+ 44 28 90255513
		Plaice	Willie McCurdy	willie.mccurdy@afbini.gov.uk	+ 44 28 90255513
			Ian McCausland	ian.mccausland@afbini.gov.uk	+ 44 28 90255498
		Saithe	Willie McCurdy	willie.mccurdy@afbini.gov.uk	+ 44 28 90255513
		Salmon	Robert Rosell	robert.rosell@afbini.gov.uk	+ 44 28 90255506
			Gavin Marshall	gavin.marshall@afbini.gov.uk	+ 44 28 90255497
		Sea trout	Richard Kennedy	richard.kennedy@afbini.gov.uk	+ 44 28 20732544
			Robert Rosell	robert.rosell@afbini.gov.uk	+ 44 28 90255506
			Dennis Ensing	dennis.ensing@afbini.gov.uk	+ 44 28 90255054
		Roach, Bream, Pike and Perch	Robert Rosell	robert.rosell@afbini.gov.uk	+ 44 28 90255506
		European eel	Derek Evans	derek.evans@afbini.gov.uk	+ 44 28 90255551

Annex 7: Interactive Table of Age Calibration Workshop, Exchange and Study Group Reports, available in the PGCCDBS Documents Repository (http://www.ices.dk/reports/acfm/pgccdbs/PGCCDBSdocrepository.asp)

Year	Baltic Cod	Baltic Salmon	Salmon	Baltic Herring	Herring	Atlanto-Scandian Herring	Baltic Sprat	Sprat	Sardine	Mackerel	Horse Mackerel	Blue Whiting	Greenland Halibut	Redfish	Cod	Arctic Cod	Greenland Cod	Whiting	Sandeel	Hake	Angler
2010										WKARMAC											
2009																	WKARGC			WKAEH	
2008				WKARBH			WKARBS							WKADR	WKARNSC						
2007																					
2006	SGABC	SGSAD					WK						NAFO SCR Doc 06/49	WKADR					WK + EX		
2005	SGABC			WK + EX Companion					WK			WK						WK 2005 EX 2004			
2004	SG							WK												WK Annexe	WK Annexe
2003																					
2002		SG							WK												
2001		SG																			
2000	SG																				
1999											WK									WK (2nd)	EFAN 2_2000
1998	SG			SG														WK + EX			
1997				SG					WK				WK	SG?						WK	WK
1996	SG																				
1995														WK							
1994																					

WK Workshop

EX Full Exchange (Pre-Workshop Ex)

SG Study Group

EX Document awaiting transmission to docs repository

Annex 7 cont.

Year	Megrim	Flounder	Plaice	Sole	Turbot	Eel	Brill	Anchovy	Saithe	Roundnose Grenadier	Red Pandora	Black Scabbard Fish	Red Mullet & Striped Mullet
2010			WKARP										
2009						WKAREA		WKARA					WKACM
2008		WKARFLO			WKART								
2007		WKARFLO							EX	WKARRG			
2006													
2005													
2004	WK												
2003			WK + EX										
2002			WK + EX										
2001													
2000													
1999												EX	
1998													
1997													
1996													
1995													
1994													

WK Workshop

EX Full Exchange (Pre-Workshop Ex)

SG Study Group

EX Document awaiting transmission to docs repository

Annex 8: Overview of present maturity sampling and guidelines for future maturity sampling (based on DCF Appendix VII), tables from RCMs NS&EA, RCM NA and RCM Baltic 2010

Overview of present maturity sampling and guidelines for future maturity sampling (based on DCF Appendix VII), tables from RCMs NS&EA, RCM NA and RCM Baltic

RCM NS&EA — Optimal way to sample =surveys

Species (Engl.)	Species (Latin)	Area/Stock	Species group(a)	Maturity sampl Freq.	Spawning period (month)	Recom. Sampling period (month)	WK ref	Present appropriate sampling source	Possible countries for sampling	Presently involved countries in sampling (2011-2013)
ICES areas I, II										
European Eel	*Anguilla anguilla*	I, II	G1	T	This species is not relevant for the area or very limited catches					
Tusk	*Brosme brosme*	I, II	G2	T	EU landings less than 5% of the total international landings					
Atlanto-Scandian herring	*Clupea harengus*	I, II,V	G1	Y	1-3	12	WGWIDE 2009 WKMSHS 2010	Market	NOR	DNK, UK
Cod	*Gadus morhua*	I, II	G1	Y	1-4	1-4	AFWG2009,WKMSCWHS07,IMR Norway	survey	NOR	POL
Haddock	*Melanogrammus aeglefinus*	I, II	G1	Y	3-5	1-4	AFWG2009,WKMSCWHS07,IMR Norway	survey	NOR	?
Blue whiting	*Micromesistius poutassou*	I-IX, XII, XIV	G1	Y	Covered by RCM NEA					
Northern shrimp	*Pandalus borealis*	I, II	G1	Y	6-10	autumn	?	?	NOR	LIT
Saithe	*Pollachius virens*	I, II	G1	Y	1-5	1-4	AFWG2009,WKMSCWHS07,IMR Norway	Survey and at-sea sampling of fisheries	NOR	?
Greenland halibut	*Reinhardtius hippoglossoides*	I, II	G1	Y	EU landings less than 5% of the total international landings					
Mackerel	*Scomber scombrus*	II, IIIa, IV, V, VI, VII, VIII, IX	G1	Y	Covered by RCM NEA					
Redfish	*Sebastes mentella*	I, II	G1	Y	3-5		WKMSREGH 2010	At-sea	ESP, PRT, POL	ESP, PRT, POL
Horse mackerel	*Trachurus trachurus*	IIa, IVa, Vb, VIa, VIIa-c, e-k, VIIIabde	G2	T	Covered by RCM NEA					
Capelin	*Mallotus villosus*	I, II	G2		No EU quota or landings for the area.					
Salmon	*Salmo salar*	I, II	G1	T	This species is not relevant for the area or very limited catches					
Skagerrak and Kattegat - ICES area IIIa										
Sand eel	*Ammodytidae*	IIIa	G2		12-1	11		sandell survey		DNK
European Eel	*Anguilla anguilla*	IIIa	G1	T	NA	NA				SWE
Herring	*Clupea harengus*	IV, VIId, IIIa/22-24, IIIa	G1	Y	1-3	12-1 or 2	WKMSHS 2010	IBTS Q1 / IBTS Q3	Germany	DNK, SWE
Roundnose grenadier	*Coryphaenoides rupestris*	IIIa	G2	T	The fishery for this species has been stopped and therefore no landings					
Grey gurnard	*Eutrigla gurnardus*	IIIa	G2	T	This species is not relevant for the area or very limited catches					
Cod	*Gadus morhua*	IV, VIId, IIIaN	G1	Y	1-3	1-3	WKMSCWHS 2007 b	IBTS Q1	COORDINATED BY IBTS	DNK, SWE
Cod	*Gadus morhua*	IIIaS	G1	Y	1	1-3	WKMSCWHS 2007 b	IBTS Q1		DNK, SWE
Witch flounder	*Glyptocephalus cynoglossus*	IIIa	G2	T	?	1-12	WKMSSPDF 2010	IBTS Q1-Q3/ BITS Q1/at-sea	COORDINATED BY IBTS	DNK, SWE
Dab	*Limanda limanda*	IIIa	G2		?		WKMSSPDF 2010	BITS Q1		DNK
Haddock	*Melanogrammus aeglefinus*	IV, IIIa	G1	Y	3-4	1-3	WKMSCWHS 2007 b	IBTS Q1	COORDINATED BY IBTS	SWE
Whiting	*Merlangius merlangus*	IIIa	G2	T	2-6 [1]	1-3	WKMSCWHS 2007 b	IBTS Q1	COORDINATED BY IBTS	
Hake	*Merluccius merluccius*	IIIa, IV, VI, VII, VIIIab	G1	Y	Covered by RCM NEA					
Blue whiting	*Micromesistius poutassou*	I-IX, XII, XIV	G1	Y	Covered by RCM NEA					
Norway lobster	*Nephrops norvegicus*	Functional unit	G1	Y	spawn. 8 hatch. 5-6	1-12	WKNEPH 2006	At-sea/ sole survey		DNK, SWE
Northern shrimp	*Pandalus borealis*	IIIa, IVa east/ IVa/IVb	G1	Y	spawn. 10-11 hatch. 3-4	1-12	C.M1994/K:8	At-sea		DNK, SWE
Plaice	*Pleuronectes platessa*	IIIa	G1	Y	1-3	12-3	WKMSSPDF 2010	IBTS Q1-Q3/ BITS Q1	COORDINATED BY IBTS	DNK, SWE
Saithe	*Pollachius virens*	IV, IIIa, VI	G1	Y	1-3	12-3	WKMSCWHS	IBTS Q1	COORDINATED BY IBTS	SWE
Turbot	*Psetta maxima*	all areas	G2	T	4-8	4-8	WKMSTB 2011	IBTS Q1/ IBTS Q3		DNK
Mackerel	*Scomber scombrus*	II, IIIa, IV, V, VI, VII, VIII, IX	G1	Y	6-7 IIIa					
Brill	*Scophthalmus rhombus*	IIIa	G2	T	4-8	4-8	WKMSTB 2011	IBTS Q1-Q3/ BITS Q1-Q3	COORDINATED BY IBTS	
Sole	*Solea solea*	IIIa, 22	G1	Y	4-7	2-7	WKMSSPDF 2010	IBTS Q1/ IBTS Q3	COORDINATED BY IBTS	DNK
Sprat	*Sprattus sprattus*	IIIa	G1	Y	4-7	3-7	WKMSHS 2010	Market, IBTS Q1		SWE
Sharks	*Squalidae*	IIIa N	G1		variable					
Norway pout	*Trisopterus esmarki*	IV, IIIa	G2		1-3	12-3	WGNSSK	IBTS Q1		SWE

Annex 8 cont.

North Sea and Eastern Channel — ICES areas IV, VIId										
Sand eel	*Ammodytidae*	IV	G2		12-1	11		Sand eel survey		DNK
European Eel	*Anguilla anguilla*	IV, VIId	G1	T	?	?	?	?	NDL, GER, SWE	NDL, GER, SWE
Catfish	*Anarhichas spp .*	IV	G2		Species not relevant for the area					
Argentine	*Argentina spp .*	IV	G2		Species not relevant for sampling under revised EU Regs 2010					
Red gurnard	*Aspitrigla cuculus*	IV	G2	T	?	2, 8	WGIBTS2009,2010	IBTS Q1, Q3	COORDINATED BY IBTS	COORDINATED BY IBTS
Tusk	*Brosme brosme*	IV, IIIa	G2	T	EU landings is less than 10% of the total international landings					
Herring	*Clupea harengus*	IV, VIId, IIIa	G1	Y	WKMSHS 2011 TO ADVISE	WKMSHS 2011 TO ADVISE	WKMSHS 2011	VARIOUS	DNK, GER, NDL, UK	DNK, GER, NDL, UK
Common Shrimp	*Crangon crangon*	IV, VIId	G2	T	?	?	?	?	GER, DNK, UK	DNK
Sea bass	*Dicentrarchus labrax*	IV, VIId	G2	T	2-5		WGNEW 2006	UK LIMITED TO SURVEYS	FRA , UK	UK
Grey gurnard	*Eutrigla gurnardus*	IV	G2	T	Previously indicated that Red and Grey Gurnards were combined for maturity sampling. IBTS will treat these species seperately					
Cod	*Gadus morhua*	IV, VIId, IIIa	G1	Y	1-2 (till 4 in North) [1]	1-3	WKMSCWH 07, WKMSGAD 2011	IBTS Q1	DNK, FRA, NDL, UK, GER, S	DNK, FRA, NDL, UK, GER, SWE
Witch flounder	*Glyptocephalus cynoglossus*	IV	G2	T	?	2, 8	WGIBTS2009,2010	IBTS Q1, Q3	COORDINATED BY IBTS	COORDINATED BY IBTS
Blue-mouth rockfish	*Helicolenus dactylopterus*	IV	G2	T	This species is not relevant for the area or very limited catches					
Four-spot megrim	*Lepidorhombus boscii*	IV, VIId	G2	T	This species is not relevant for the area or very limited catches					
Megrim	*Lepidorhombus whiffiagonis*	IV, VIId	G2	T	?	4	Scheduled in 2011-2012	UK MONKFISH/MEGRIM SURVEY	UK	UK
Dab	*Limanda limanda*	IV, VIId	G2	T	1-9	?	et al, 1992; WGIBTS2009,2010; WKMSSPD	Market ??	DNK, GER, NDL	DNK, GER, NDL
Black-bellied angler	*Lophius budegassa*	IV, VIId	G1	Y	The sampling for the two anglerfish species is combined					
Anglerfish	*Lophius piscatorius*	IIIa, IV, VI	G1	Y	?	4	Scheduled in 2011-2012	UK MONKFISH/MEGRIM SURVEY	UK	UK
Roughhead grenadier	*Macrourus berglax*	IV, IIIa	G2	T	This species is not relevant for the area or very limited catches					
Haddock	*Melanogrammus aeglefinus*	IV, IIIa	G1	Y	3-4 [2]	1-3	WKMSCWH 07	IBTS Q1	DNK, FRA, NDL, UK, GER	FRA, SWE, UK
Whiting	*Merlangius merlangus*	IV, VIId	G1	Y	2-6 [2]	1-3	WKMSCWH 07	IBTS Q1	DNK, FRA, NDL, UK, GER	FRA, UK
Hake	*Merluccius merluccius*	IIIa, IV, VI, VII, VIIIab	G1	Y	??	2, 8	WGIBTS2009,2010	IBTS Q1, Q3	COORDINATED BY IBTS	COORDINATED BY IBTS
Blue whiting	*Micromesistius poutassou*	I-IX, XII, XIV	G1	Y	Should be combined with the RCM NEA					
Lemon sole	*Microstomus kitt*	IV, VIId	G2	T	??	2, 8	WGIBTS2009,2010	IBTS Q1, Q3	COORDINATED BY IBTS	COORDINATED BY IBTS
Blue ling	*Molva dypterygia*	IV, IIIa	G1	T	This species is not relevant for the area or very limited catches					
Ling	*Molva molva*	IV, IIIa	G2	T	??	2, 8	WGIBTS2009,2010	IBTS Q1, Q3	COORDINATED BY IBTS	COORDINATED BY IBTS
Red mullet	*Mullus barbatus*	IV, VIId	G2	T	The sampling for the two mullet species is combined					
Striped red mullet	*Mullus surmuletus*	IV, VIId	G2	T	?	2, 8	WGIBTS2009,2010	IBTS Q1, Q3	COORDINATED BY IBTS	COORDINATED BY IBTS
Norway lobster	*Nephrops norvegicus*	all functional units	G1	Y	10-12	8-11	WKMSC 2009	SURVEYS	DNK, NDL, SWE, UK	DNK, NDL, SWE, UK
Northern shrimp	*Pandalus borealis*	IIIa, IVa east/IVa/IVb	G1	T	10-12	8-11	?	?	DNK, SWE	DNK, SWE
Common scallop	*Pecten maximus*	VIId	G2	T	?	?	?	SURVEYS	UK	UK
Greater Forkbeard	*Phycis blennoides*	IV	G2	T	This species is not relevant for the area or very limited catches					
Forkbeard	*Phycis phycis*	IV	G2	T	This species is not relevant for the area or very limited catches					
Flounder	*Platichthys flesus*	IV	G2	T	2-5	2-3	WGIBTS2009,2010; WKMSSPDF2_2012	IBTS Q1, Q3	COORDINATED BY IBTS	COORDINATED BY IBTS
Plaice	*Pleuronectes platessa*	IV	G1	Y	1-3	1-2	WGIBTS2009,2010; WKMSSPDF2_2012	IBTS Q1, Q3	COORDINATED BY IBTS	COORDINATED BY IBTS
Plaice	*Pleuronectes platessa*	VIId	G1	Y	?	2, 8	WGIBTS2009,2010; WKMSSPDF2_2012	IBTS Q1, Q3	COORDINATED BY IBTS	COORDINATED BY IBTS
Saithe	*Pollachius virens*	IV, IIIa, VI	G1	Y	1-5 [2]	2	WKMSCWH 07	IBTS Q1	COORDINATED BY IBTS	COORDINATED BY IBTS
Turbot	*Psetta maxima*	IV, VIId	G2	T	4-8	4-5	WKMSTB 2011	SURVEYS; MARKET SAMPLING	COORDINATED BY IBTS; ADDITIONAL MARKET SAMPLING PROGRAMMES NDL, DNK	COORDINATED BY IBTS
Thornback ray	*Raja clavata*	IV, VIId	G1	T	6-8	2, 8	WKMSEL 2010	IBTS Q1, Q3	COORDINATED BY IBTS. REVIEW AFTER WKMSEL 2010	COORDINATED BY IBTS
Spotted ray	*Raja montagui*	IV, VIId	G1	T	?	2, 8	WKMSEL 2010	IBTS Q1, Q3	COORDINATED BY IBTS. REVIEW AFTER WKMSEL 2010	COORDINATED BY IBTS
Cuckoo ray	*Raja naevus*	IV, VIId	G1	T	?	2, 8	WKMSEL 2010	IBTS Q1, Q3	COORDINATED BY IBTS. REVIEW AFTER WKMSEL 2010	COORDINATED BY IBTS
Starry ray	*Raja radiata*	IV, VIId	G1	T	?	2, 8	WKMSEL 2010	IBTS Q1, Q3	COORDINATED BY IBTS. REVIEW AFTER WKMSEL 2010	COORDINATED BY IBTS
Other rays and skates	*Rajidae*	IV, VIId	G1		?	2, 8	WKMSEL 2010	IBTS Q1, Q3	COORDINATED BY IBTS. REVIEW AFTER WKMSEL 2010	COORDINATED BY IBTS

Annex 8 cont.

Greenland halibut	*Reinhardtius hippoglossoides*	IV	G2	T	This species is not relevant for the area or very limited catches					
Salmon	*Salmo salar*	IV	G1	T	This species is not relevant for the area or very limited catches					
Mackerel	*Scomber scombrus*	II, IIIa, IV, V, VI, VII, VIII, IX	G1	Y	?	?	WKMSMAC 2007	SURVEYS	DNK, NDL, UK	DNK, NDL, UK
Brill	*Scophthalmus rhombus*	IV, VIId	G2	T	2/3-6	?	WKMSTB 2011	SURVEYS; MARKET SAMPLING	COORDINATED BY IBTS; ADDITIONAL MARKET SAMPLING PROGRAMMES NDL	COORDINATED BY IBTS
Redfish	*Sebastes mentella*	IV	G1	Y	This species is not relevant for the area or very limited catches					
Deepwater shark	*Shark-like Selachii*	IV	G1	T	This species is not relevant for the area or very limited catches					
Small shark	*Shark-like Selachii*	IV, VIId	G1	T	This species is not relevant for the area or very limited catches					
Sole	*Solea solea*	IV	G1	Y	?	?	WGIBTS2009,2010; WKMSSPDF2_2012	SURVEYS; MARKET SAMPLING	BEL, FRA, NDL, UK, DNK, G	BEL, FRA, NDL, UK, DNK, GER
Sole	*Solea solea*	VIId	G1	Y	2-4	-	Stock Annexsol-eche	Market	BEL, FRA, UK	BEL, FRA, UK
Sprat	*Sprattus sprattus*	IV/VIIde	G1	T	5-6(1-6)	5	WKMSHS 2011	SURVEYS; MARKET SAMPLING	DNK; IBTS PARTICIPANTS	DNK; IBTS PARTICIPANTS
Spurdog	*Squalus acanthias*	IV, VIId	G1	T			WKMSEL 2010		REVIEW AFTER WKMSEL 2010	
Horse mackerel	*Trachurus trachurus*	IIa, IVa, Vb, VIa, VIIa-c, e-k, VIIIabde/IIIa, IVbc, VIId	G2	T	Covered by RCM NEA					
Tub gurnard	*Trigla lucerna*	IV	G2	T	5-6	2, 8	WGIBTS2009,2010	IBTS Q1, Q3	COORDINATED BY IBTS	COORDINATED BY IBTS
Norway pout	*Trisopterus esmarki*	IV, IIIa	G2		1-3	1-2	Species not relevant for sampling under revised EU Regs 2010 but collected for IBTS indices	IBTS Q1	COORDINATED BY IBTS	COORDINATED BY IBTS
John Dory	*Zeus faber*	IV, VIId	G2	T	end of winter and at the start of spring	?	No information in WGNEW ref from Fishbase	IBTS Q1, Q3	COORDINATED BY IBTS	COORDINATED BY IBTS
North East Atlantic and Western ……										
Golden redfish	*Sebastes marinus*	ICES Sub-areas V, VI, XII, XIV, & NAFO SA 2 + (Div. 1F + 3K)	G1	Y	3-5		WKMSREGH 2010	At-sea	ESP, PRT, POL	ESP, PRT, POL
Deep sea redfish	*Sebastes mentella*	ICES Sub-areas V, VI, XII, XIV, & NAFO SA 2 + (Div. 1F + 3K)	G1	Y	3-5		WKMSREGH 2010	At-sea	ESP, PRT, POL	ESP, PRT, POL
NAFO areas										
Cod	*Gadus morhua*	2J 3KL	G1	Y	Not assessed in NAFO SC, EU catches than 5% of the total international catches					
Cod	*Gadus morhua*	3M	G1	Y	3-4	1-4	Working Group on Reproductive Potential	EU - Flemish Cap survey	SPN	SPN
Cod	*Gadus morhua*	3NO	G1	Y	4-6	2-6	Working Group on Reproductive Potential	Canadian Spring survey	Canada	Canada
Cod	*Gadus morhua*	3Ps	G2	T	Not assessed in NAFO SC, EU catches than 5% of the total international catches					
Cod	*Gadus morhua*	SA 1	G1	Y	Not assessed in NAFO SC, EU catches than 5% of the total international catches					
Witch flounder	*Glyptocephalus cynoglossus*	3NO	G2	T	3-5	1-5	Working Group on Reproductive Potential	Canadian Spring survey	Canada	Canada
American plaice	*Hippoglossoides platessoides*	3LNO	G1	Y	4-6	1-6	Working Group on Reproductive Potential	Canadian Spring survey	Canada	Canada
American plaice	*Hippoglossoides platessoides*	3M	G1	T	3-5	2-7	Working Group on Reproductive Potential	EU - Flemish Cap survey	PRT-SPN	PRT-SPN
Yellowtail flounder	*Limanda ferruginea*	3LNO	G2	T	4-7	1-7	Working Group on Reproductive Potential	Canadian Spring survey	Canada	Canada
Grenadier	*Macrouridae*	SA 2+3	G2	T			Working Group on Reproductive Potential			
Pandalid shrimp	*Pandalus* spp.	3L	G1	Y			Working Group on Reproductive Potential			
Pandalid shrimp	*Pandalus* spp.	3M	G1	Y			Working Group on Reproductive Potential			
Rays and skates	*Raja* spp.	SA 3	G1	T			Working Group on Reproductive Potential			
Greenland halibut	*Reinhardtius hippoglossoides*	3KLMNO	G1	Y	?8		Working Group on Reproductive Potential			
Greenland halibut	*Reinhardtius hippoglossoides*	SA 1	G1	Y	EU landings less than 10% of the total international landings					
Salmon	*Salmo salar*	ICES Sub-area XIV % NAFO Sub-area 1	G1	Y	Not assessed in NAFO SC, EU catches than 5% of the total international catches					
Redfish	*Sebastes* spp.	3LN	G1		5-6	2-6	Working Group on Reproductive Potential	Canadian Spring survey	Canada	Canada
Redfish	*Sebastes* spp.	3M	G1		2-4	2-6	Working Group on Reproductive Potential	EU - Flemish Cap survey	PRT-SPN	PRT-SPN
Redfish	*Sebastes* spp.	3O	G1		5-6	2-6	Working Group on Reproductive Potential	Canadian Spring survey	Canada	Canada
Redfish	*Sebastes mentella*	SA 1	G1	Y	Demersal Redfish caught as by-catches in the Greenland shrimp fishery, No EU landings in recent years.					

1) Maturity staging should be carried out on all cod from 15 cm and above-below 15 no staging - no sex and maturity

2) Maturity staging should be carried out on all length class groups

Report of the study group on life histories and assessment of pandalus stocks in the North Atlantic (Reykjavik, 6-10 sept 1993)

3) ref= Le rouget barbet de roche Mullus surmuletus (L. 1758) en Manche orientale et mer du Nord. Mahé, K. et al. 2005

4) ref= Delbare, D. and De Clerck, R. (1999). Stock discrimination in relation to the assessment of the brill fishery - Study in support of the Common Fisheries Policy. Final Report EC-Study Contract DG XIV 96/001.

Annex 8 cont.

RCM NA										
Species (Engl.)	**Species (Latin)**	**Area/Stock**	**Species group(a)**							
				Maturity sampl Freq.	**Spawning period (month)**	**Recom. Sampling period (month)**	**WK ref**	**Present appropriate sampling source**	**Presently involved countries in sampling: Maturity@ Length/Maturity@age**	**Possible countries for sampling**
NEA										
Smoothhead	Alepocephalus bairdii	VI, XII	G2	T				Observer on board (ESP)	ESP	
Sand eel	Ammodytidae	VIa	G2							
European Eel	Anguilla anguilla	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1	T						
Scabbardfish	Aphanopus spp.	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1	Y	10-12		WKMAT07	Purchase of fish - Surveys-market samples (PRT)	PRT	
Argentine	Argentina spp.	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G2	T				Auction purchase (NL)	NL	
Meagre	Argyrosomus regius	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G2	T						
Red gurnard	Aspitrigla cuculus	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G2	T				EVHOEsurvey (FR)	FRA	
Alfonsinos	Beryx spp.	V,VI,VII (excl. VIId), VIII, IX(exc IXa), XII,XIV	G1	Y				Purchase of fish + Discard samples	PRT	
Alfonsinos	Beryx spp.	IXa and X	G1	T						
Edible crab	Cancer pagurus	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G2	T					IRL	
Gulper shark	Centrophorus granulosus	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1	T						
Leafscale gulper shark	Centrophorus squamosus	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1	T	3-4		WKMAT07			
Black dogfish	Centroscyllium fabricii	V, VI, VII, XII	G1							
Portuguese dogfish	Centroscymnus coelolepis	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1	T						
Longnose velvet dogfish	Centroscymnus crepidater	V, VI, VII, IX, X, XII	G1							
Basking shark	Cetorhinus maximus	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1							
Herring	Clupea harengus	VIa/VIaN/VIa S, VIIbc/ VIIa/VIIj	G1	Y			WKHERMAT10	Port sampling/Survey(IRL), Market samples/Surveys (UK), Commercial (NL)	NL, IRL, UK	
Conger	Conger conger	V,VI,VII (excl. VIId), VIII, IX, XII,XIV	G2	T				Market samples/Surveys (ESP)	ESP	
Conger	Conger conger	X	G2	T						
Roundnose grenadier	Coryphaenoides rupestris	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1	Y				Observer on board (ESP)	ESP	
Kitefin shark	Dalatias licha	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1						PRT	
Common stingray	Dasyatis pastinaca	VII, VIII	G1							
Birdbeak dogfish	Deania calcea	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1							
Sea bass	Dicentrarchus labrax	V,VI,VII (excl. VIId), VIII, X, XII,XIV	G2	T	1-3		WKMAT07		UK	
Sea bass	Dicentrarchus labrax	IX	G2	T						
Wedge sole	Dicologoglosa cuneata	VIIIc, IX	G2							
Common skate	Dipturus batis	V, VI, VII, VIII	G1							
Longnose skate	Dipturus oxyrinchus	V, VI, VII, VIII	G1							
Anchovy	Engraulis encrasicolus	IXa (only Cádiz)	G1	T	4-7		WKMAT07,WKSPMAT08	Market samples/Surveys (ESP)	ESP	
Anchovy	Engraulis encrasicolus	VIII	G1	Y	4-8		WKMAT07,WKSPMAT08	Market samples/Surveys (ESP)	ESP	
Velvet belly	Etmopterus spinax	VI, VII, VIII	G1							
Grey gurnard	Eutrigla gurnardus	VIId,e	G2	T						
Cod	Gadus morhua	Va/Vb/VIa/VIb/VIIa/VIIe-k	G1	Y	2-5		WKMAT07/WKMSCWHS07	Observer trips / Surveys(IRL), Surveys (UK)	IRL, UK	
Blackmouth dogfish	Gaelus melastomus	VI, VII, VIII, IX, X	G1							
Witch	Glyptocephalus cynoglossus	VI, VII	G2							
Bluemouth rockfish	Helicolenus dactylopterus	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G2		4-9		WKMAT07		PRT	
Lobster	Homarus gammarus	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G2	T					IRL	
Orange roughy	Hoplostethus atlanticus	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1	Y						
Shortfin mako	Isurus oxyrinchus	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1							
Porbeagle	Lamna nasus	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1							
Silver scarbbardfish	Lepidopus caudatus	IXa	G2	T						
Four-spot megrim	Lepidorhombus boscii	VIIIc, IXa	G1	Y	12-5		WKMAT07	Market samples/Surveys (ESP)	ESP	
Megrim	Lepidorhombus whiffiagonis	VI/VII, VIIIabd/VIIIc, IXa	G1	Y	1-4		WKMAT07	Market samples/Surveys (ESP), Surveys (IRL),Market samples/Surveys (UK)	ESP,IRL, UK	
Sandy ray	Leucoraja circularis	VI, VII, VIII	G1							
Shagreen ray	Leucoraja fullonica	V, VI, VII, VIII	G1							
Dab	Limanda limanda	VIIe/VIIa,f-h	G2	T			WKMSSPDF10			
Common squid	Loligo vulgaris	V,VI,VII (excl. VIId), VIII (excl. VIIIc), IX (excl. IXa),X, XII,XIV	G2							
Common squid	Loligo vulgaris	VIIIc, IXa	G2	T	1-12		WKMAT07			
Black-bellied angler	Lophius budegassa	IV, VI/VIIb-k, VIIIabd	G1	Y	12-2; 5-7		WKMSHM07 / WKMAT07	Market samples/Surveys (ESP), Surveys(IRL)	ESP, IRL, UK	
Black-bellied angler	Lophius budegassa	VIIIc, IXa	G1	Y	12-2; 5-7		WKMSHM07 / WKMAT07	Market samples/Surveys (ESP),	ESP,	
Anglerfish	Lophius piscatorious	IV, VI/VIIb-k, VIIIabd	G1	Y	12-3; 5-7		WKMSHM07 / WKMAT07	Market samples/Surveys (ESP), Surveys(UK),Surveys(IRL)	ESP, IRL, UK	
Anglerfish	Lophius piscatorious	VIIIc, IXa	G1	Y	12-3; 5-7		WKMSHM07 / WKMAT07	Market samples/Surveys (ESP),	ESP	
Capelin	Mallotus villosus	XIV	G2							
Haddock	Melanogrammus aeglefinus	Va/Vb	G1	Y	2-5		WKMAT07/WKMSCWHS07			
Haddock	Melanogrammus aeglefinus	VIa/VIb/VIIa/VIIb-k	G1	Y	2-5		WKMAT07/WKMSCWHS07	Observer trips/Survey(IRL), Survey (UK)	IRL, UK	

Annex 8 cont.

Whiting	Merlangius merlangus	VIII/IX, X	G2	T	1-5		WKMAT07/WKMSCWHS07			
Whiting	Merlangius merlangus	Vb/VIa/VIb/VIIa/VIIe-k	G1	Y	1-5		WKMAT07/WKMSCWHS07	Observer trips / Survey(IRL), Survey (UK)	IRL, UK	
Hake	Merluccius merluccius	IIIa, IV, VI, VII, VIIIab / VIIIc, IXa	G1	Y	12-6		WKMAT07	Market samples/Surveys (ESP), Observer trips/Survey(IRL), Surveys(UK)	ESP,IRL, UK	
Wedge sole	Microchirus variegatus	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G2							
Blue whiting	Micromesistius poutassou	I-IX, XII, XIV	G1	Y	1-5		WKMAT07	Port sampling/Survey(IRL), On board sampling (GER)	GER, IRL	
Lemon sole	Microstomus kitt	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G2	T						
Blue ling	Molva dypterygia	V,VI,VII (excl. VIId), VIII, IX, XII,XIV	G1	T						
Blue ling	Molva dypterygia	X	G1	T					PRT	
Ling	Molva molva	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G2	T				Purchase od fish/Discard samples (PRT)	ESP;FR	
Striped red mullet	Mullus surmuletus	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G2	T						
Starry smooth-hound	Mustelus asterias	VI, VII, VIII, IX	G1							
Smooth-hound	Mustelus mustelus	VI, VII, VIII, IX	G1							
Blackspotted smooth-hou	Mustelus punctulatus	VI, VII, VIII, IX	G1							
Common eagle ray	Myliobatis aquila	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1							
Norway lobster	Nephrops norvegicus	VI Fuctional unit	G1	Y			/WKMSC09	Market sampling/Surveys (UK)	UK	
Norway lobster	Nephrops norvegicus	VII Functional unit	G1	Y			/WKMSC09	Port sampling/Survey(IRL), Market (FR), Market sampling/Surveys (UK)	FR, IRL, UK	
Norway lobster	Nephrops norvegicus	VIII, IX Functional unit	G1	Y	4-9		WKMAT07//WKMSC09	Market samples(ESP), Market(FR)	ESP,FR	
Common octopus	Octopus vulgaris	V,VI,VII (excl. VIId), VIII (excl. VIIIc), IX (excl. IXa),X, XII,XIV	G2	T						
Common octopus	Octopus vulgaris	VIIIc, IXa	G2		2-10		WKMAT07	Purchase of fish - Surveys(PRT)	PRT	
Sea bream	Pagellus bogaraveo	IX, X	G1	T					ESP;PRT	
Pandalid shrimps	Pandalus spp.	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G2							
White shrimp	Parapenaeus longirostris	IXa	G2	T	4-10		WKMAT07/WKMSC09	Purchase of fish - Surveys(PRT)	PRT	
Greater Forkbeard	Phycis blennoides	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G2	T				Market samples/Surveys (ESP)	ESP	
Forkbeard	Phycis phycis	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G2	T					PRT	
Plaice	Pleuronectes platessa	VIIa/VIIe/ VIIfg	G1	Y	9-4		WKMAT07, WKMSSPDF10	Survey (IRL), Market Samples/Surveys (UK)	IRL, UK	
Plaice	Pleuronectes platessa	VIIbc/VIIh-k/ VIII, IX, X	G1	Y			WKMSSPDF10	Survey (IRL)	IRL	
Pollack	Pollachius pollachius	V,VI,VII (excl. VIId), VIII, XII,XIV	G2	T					IRL	
Pollack	Pollachius pollachius	IX, X	G2	T					ESP	
Saithe	Pollachius virens	Va/Vb/IV, IIIa, VI	G1	Y	2-4		WKMAT07/WKMSCWHS07		PRT	
Saithe	Pollachius virens	VII, VIII	G2	T	2-4		WKMAT07/WKMSCWHS07	Surveys (UK)	UK	
Wreckfish	Polyprion americanus	X	G2							
Blue shark	Prionace glauca	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1							
Turbot	Psetta maxima	all areas	G2	T						
Blue stingray	Pteroplatytrygon violacea	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1							
Bottlenosed skate	Raja alba	IX	G1							
Blond ray	Raja brachyura	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1		3-4		WKMAT07	Survey (IRL),Purchase of fish - Surveys(PRT),Maket Samples/Surveys (UK)	IRL, PRT, UK	
Thornback ray	Raja clavata	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1	T	1-3; 5-11		WKMAT07	Survey (IRL),Purchase of fish - Surveys(PRT),Maket Samples/Surveys (UK)	IRL, PRT, UK	
Small eyed ray	Raja microocellata	VII, IX	G1							
Brown ray	Raja miraletus	IX	G1							
Spotted ray	Raja montagui	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1	T	4-7		WKMAT07	Survey (IRL),Purchase of fish - Surveys(PRT),Maket Samples/Surveys (UK)	IRL, PRT, UK	
Cuckoo ray	Raja naevus	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1	T				Survey (IRL),Purchase of fish - Surveys(PRT),Maket Samples/Surveys (UK)	IRL, PRT, UK	
Starry ray	Raja radiata	V	G1							
Other rays and skates	Rajidae	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1							
Greenland halibut	Reinhardtius hippoglossoides	V, XIV/VI	G1	Y						
Salmon	Salmo salar	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1							
Sardine	Sardina pilchardus	VIIIabd/VIIIc, IXa	G1	Y	10-5		WKMAT07,WKSPMAT08	Market samples/Surveys (ESP), Purchase of fish - Surveys(PRT)	PRT,ESP	
Spanish mackerel	Scomber japonicus	VIII, IX	G2	T	1-6		WKMAT07		PRT, ESP	
Mackerel	Scomber scombrus	II, IIIa, IV, V, VI, VII, VIII, IX	G1	Y	1-6		WKMAT07	Market samples/Surveys (ESP), Port sampling/Survey(IRL),Purchase of fish - Surveys(PRT),M	ESP,GER,IRL,NL,PRT,UK	
Brill	Scophtalmus rhombus	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G2	T					UK	
Golden Redfish	Sebastes marinus	ICES Sub areas V, VI, XII, XIV & NAFO SA 2 + (Div. 1F + 3K).	G1	Y	3-5		WKMSREGH 2010			
Deep sea Redfish	Sebastes mentella	ICES Sub areas V, VI, XII, XIV & NAFO SA 2 + (Div. 1F + 3K)	G1	Y	3-5		WKMSREGH 2010			
Cuttlefish	Sepia officinalis	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G2	T	3-10		WKMAT07		ESP	
Sole	Solea solea	VIIa/VIIfg	G1	Y	1-6		WKMAT07	Survey (IRL), Maket Samples/Surveys (UK),	IRL,UK,	
Sole	Solea solea	VIIbc / VIIhjk / Ixa / VIIIc	G1	Y	1-6		WKMAT07	Survey (IRL), Maket Samples/Surveys (UK)	IRL,UK,	
Sole	Solea solea	VIIe	G1	Y	1-6		WKMAT07	Market (FR), Maket Samples/Surveys (UK)	FRA,UK	
Sole	Solea solea	VIIIab	G1	Y	1-6		WKMAT07	Market (FR)	FRA	
Sea breams (in plural)	Sparidae	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G2		1-3		WKMAT07		PRT,	
Spurdog	Squalus acanthias	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1	T						
Angelshark	Squatina squatina	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1							
Electric ray	Torpedo marmorata	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G1							
Mediterranean horse mac	Trachurus mediterraneus	VIII, IX	G2	T					ESP	
Blue jack mackerel	Trachurus picturatus	X	G2	T					PRT	
Horse mackerel	Trachurus trachurus	IIa, IVa, Vb, VIa, VIIa-c, e-k, VIIIabde/X	G2	T	1-6		WKMAT07	Market samples/Surveys (ESP), Port sampling/Survey(IRL), Auction purchase	ESP,GER,IRL,NL,PRT	
Horse mackerel	Trachurus trachurus	VIIIc, IXa	G2	T				Market samples/Surveys (ESP), Purchase of fish - Surveys(PRT)	ESP,PRT	
Pouting	Trisopterus spp.	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G2		1-4		WKMAT07			
John Dory	Zeus faber	V,VI,VII (excl. VIId), VIII, IX,X, XII,XIV	G2	T						

Annex 8 cont.

ICES areas I and II										
Atlanto-Scandian herring	Clupea harengus	I, II,V	G1	Y	1-3	12	WGWIDE 2009 WKMSHS 2010	Market, Auction purchase (NL)		
Blue whiting	Micromesistius poutassou	I-IX, XII, XIV	G1	Y	1-5		WKMAT07			
Mackerel	Scomber scombrus	II, IIIa, IV, V, VI, VII, VIII, IX	G1	Y	1-6		WKMAT07			
Horse mackerel	Trachurus trachurus	IIa, IVa, Vb, VIa, VIIa-c, e-k, VIIIabde	G2	T	1-6		WKMAT07			
Skag +Kat										
Hake	Merluccius merluccius	IIIa, IV, VI, VII, VIIIab	G1	Y	12-6		WKMAT07			
Blue whiting	Micromesistius poutassou	I-IX, XII, XIV	G1	Y	1-5		WKMAT07			
Saithe	Pollachius virens	IV, IIIa, VI	G1	Y	2-4		WKMAT07			
Turbot	Psetta maxima	all areas	G2	T						
Mackerel	Scomber scombrus	II, IIIa, IV, V, VI, VII, VIII, IX	G1	Y	1-6		WKMAT07			
North Sea										
Sprat	Sprattus sprattus	IV/VIId e	G1	T						
Horse mackerel	Trachurus trachurus.	IIa, IVa, Vb, VIa, VIIa-c, e-k, VIIIabde/IIIa, IVbc, VIId	G2	T	1-6		WKMAT07			
							HMS Oceans			
Frigate tuna	Auxis rochei		G2	T						
Atlantic back skipjack	Euthynnus alleteratus		G2	T						
Billfish	Istiophoridae		G1	T						
Shortfin mako	Isurus oxyrinchus		G1	T						
Skipjack tuna	Katsuwonus pelamis		G1	T						
Porbeagle	Lamna nasus		G1	T						
Blue shark	Prionace glauca		G1	T						
Atlantic bonito	Sarda sarda		G1	T						
Sharks	Shark-like Selachii		G1	T						
Other sharks	Squaliformes		G1	T						
Albacore	Thunnus alalunga		G1	T						
Yellowfin tuna	Thunnus albacares	coast of Gabon (Gulf Guinea) to 25ºW	G1	T	10-3		Bard et al. 1991			
Yellowfin tuna	Thunnus albacares	Senegal-Ginea	G1	T	4-6		ICCAT Evaluation Group, 1993			
Yellowfin tuna	Thunnus albacares	Cabo Verde	G1	T	6-10		Vieira 1991			
Bigeye tuna	Thunnus obesus	South of Brasil	G1	T	1-6		Cayré et al. 1998			
Bigeye tuna	Thunnus obesus	Gulf Guinea	G1	T	12-4		Cayré et al. 1998			
Bigeye tuna	Thunnus obesus	Cabo Verde	G1	T	7-9		Rudomiotkina op.cit			
Bigeye tuna	Thunnus obesus	Congo, Angola	G1	T	11-2		Rudomiotkina op.cit			
Bluefin tuna	Thunnus thynnus		G1	T						
Swordfish	Xiphias gladius		G1	T						

Species (English)	Species (Latin)	Area/Stock	Species group (a)	Maturity sampl. freq.[1]	Spawning period (month)	Recom. sampling period (month)	WK ref.	Present appropriate sampling source	Presently involved countries in sampling (2009-2010)	Involved countries in sampling 2011-2013	Possible countries for sampling
European eel	*Anguilla anguilla*	22-32	G1	T				survey; commercial	GER, POL, SWE	DNK, GER, LTU, POL, SWE	
Herring	*Clupea harengus*	22-24, IIIa	G1	Y	3-5	pending	WKMSHS2011	survey (BIAS)	DNK, GER, POL, SWE	DNK, GER, POL, SWE	
		25-27, 28.2, 29, 32	G1	Y	3-9	pending	WKMSHS2011	survey (BIAS)	EST, FIN, LVA, LTU, POL, SWE	EST, FIN, LVA, LTU, POL, SWE	
		28.1	G1	Y	5-6	pending	WKMSHS2011	survey	EST, LVA	EST, LVA	EST, LVA
		30	G1	Y	5-9	pending	WKMSHS2011	survey (BIAS)	FIN, SWE	FIN, SWE	FIN, SWE
		31	G1	Y	5-9	pending	WKMSHS2011	commercial	FIN	FIN	FIN
Common whitefish	*Coregonus lavaretus*	22-32	G2	T	10-11	7-10		survey; commercial	EST, FIN	EST, FIN	EST, FIN
Pike	*Esox lucius*	22-32	G2	T	4-5	1-4		survey	EST	EST	EST
Cod	*Gadus morhua*	22-24	G1	Y	3-5	1-3	WKMSCWHS2007	BITS Q1	DNK, GER, POL	DNK, GER, POL	
		25-32	G1	Y	6-8	1-3	WKMSCWHS2007	BITS Q1	DNK, EST, GER, LVA, LTU, POL, SWE	DNK, EST, GER, LVA, LTU, POL, SWE	
Dab	*Limanda limanda*	22-32	G2	T	?	1-3, 12	WKMSSPDF2010	BITS Q1	GER	DNK, GER	
Perch	*Perca fluviatilis*	22-32	G2	T	4-5	1-4		survey; commercial	EST, FIN, LVA	EST, FIN, LVA	EST, FIN, LVA
Flounder	*Platichthys flesus*	22-32	G2	T	3-5	1-3, 12	WKMSSPDF2010	BITS Q1	EST, FIN, GER, LTU, LVA, SWE	EST, FIN, GER, LTU, LVA, SWE	
Plaice	*Pleuronectes platessa*	22-32	G2	T	3-5	1-3, 12	WKMSSPDF2010	BITS Q1		DNK	DNK
Turbot	*Psetta maxima*	22-32	G2	T	5-6	1-4		BITS Q1	EST, LVA	EST, LVA	EST, LVA
Salmon[2]	*Salmo salar*	22-31	G1	Y	10-12			survey; commercial	DNK, LVA	DNK, LVA	
		32	G1	Y	10-12			survey; commercial	EST	EST	
Sea trout[2]	*Salmo trutta*	22-32	G2	T	9-12			survey; commercial	EST, LVA	EST, LVA	
Pike-perch	*Sander lucioperca*	22-32	G2	T	5-6	1-5		survey; commercial	EST, FIN, LVA	EST, FIN, GER[3], LVA	EST, FIN, GER[3], LVA
Sole	*Solea solea*	22-32	G1	Y	3-5	1-3, 12	WKMSSPDF2010	BITS Q1	DNK	DNK	DNK
Sprat	*Sprattus sprattus*	22-32	G1	Y	4-6	pending	WKMSHS2011	survey (SPRAS, BIAS), commercial	DNK, FIN, EST, GER, LTU, LVA, SWE	DNK, EST, FIN, GER, LTU, LVA, SWE	GER, LVA, POL

Annex 9: Guidelines for otolith exchanges (update)

PGCCDBS Guidelines for Otolith Exchanges

7 – 11 February 2011

Vienna, Austria.

Introduction

The objective of exchanges of calcified structures is to estimate precision and relative/absolute bias in the age estimations from age readers of the different age reading laboratories, to check that this is still within acceptable levels. The frequency of exchanges and workshops mainly depends on the quality of the age determination and will be revised by national age reading coordinators and by expert groups. Exchange programmes obtain more objective estimations of the precision and bias in age reading, since the readers use their own equipment and are not subject to a tight time schedule (criteria which may not be applicable in a workshop). Exchange organisers should ensure they have read EFAN Report 3-2000 (Eltink *et al.*, 2000) particularly Section 3.9 "Comparison of sets of different preparation techniques" or of different calcified structures, Section 3.13 "Age reading comparisons" and Section 4.7.2.12 "Age reading of the last set for estimating improvement in age reading".

In 2010, PGCCDBS agreed the following 'five-step approach' to be implemented:

1) If an analytical assessment for a species is carried out and advice is given, or if otoliths are available and future assessments are being prepared, a 'small' scale otolith exchange programme has to be carried out every three years.

2) If the age reading performance in the small otolith exchange programme is medium or bad, ToRs must be drafted to solve identified problems and a 'full' scale exchange must be carried out.

3) If the age reading remains medium or bad, after this full scale exchange then, an age calibration workshop must be planned,

4) Workshops consist of a series of discussions and exchanges designed to resolve the problems identified in a pre-workshop exchange. If the problems are not resolved or new problems are identified, another full-size exchange must be carried out before a further workshop can take place.

5) If the age reading performance in the small otolith exchange programme is good, a further small otolith exchange programme should be carried out in three years time.

Additionally, PGCCDBS emphasises that exceptions to the 'five-step-approach' can be allowed in certain cases, e.g. when species of special conservation concern are involved, it can make more sense to immediately have a second workshop gathering the relevant experts, instead of going through an exchange first. This process is illustrated in a schematic Figure 1.

The frequency of exchanges and workshops mainly depends on the quality of the age determination and will be revised by national age reading coordinators and by expert groups. Even if no age reading issues were revealed in workshops or exchanges, quality assurance requires the organisation of an exchange at least once every 3-5 years. The possibility for a workshop should be offered every 5 years.

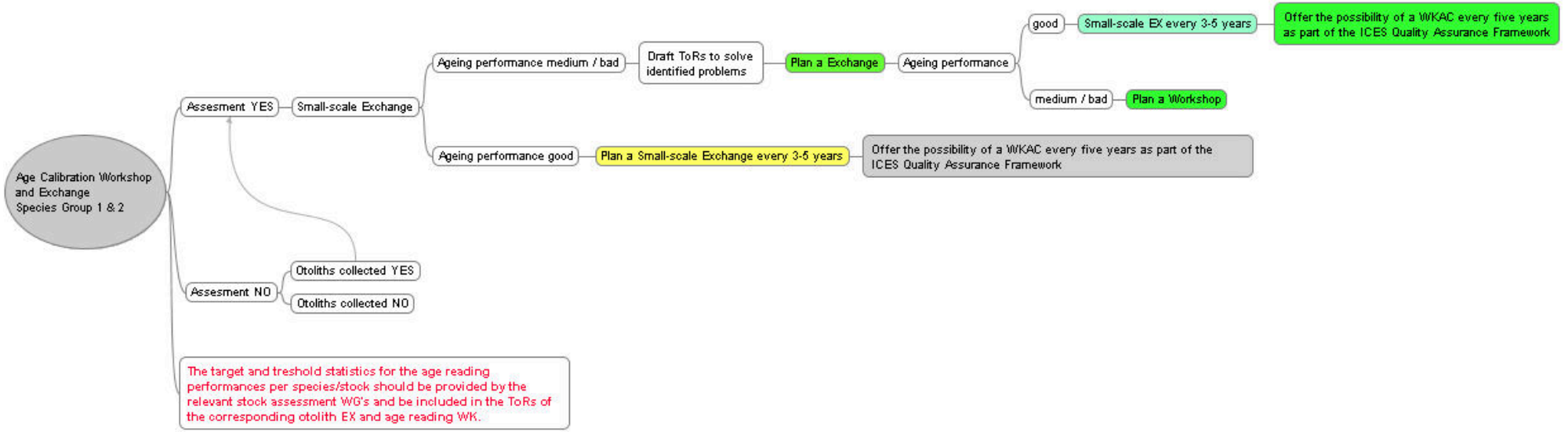


Figure 1. The five-step process for planning age calibration exchanges and workshops.

PGCCDBS highly recommends the use of the **European Age Readers Forum** (http://groupnet.ices.dk/AgeForum/default.aspx) in tandem with the **WebGR** tool (http://webgr.wiki.azti.es/doku.php) to streamline the preparation and the implementation of age calibration exchanges and workshops. Age calibration exchanges and workshops should be announced and marked on the calendar of the Age Reader Forum. Their reports should also be posted on the forum. The use of WebGR needs to be evaluated on the next PGCCDBS after which these guidelines might be updated.

Small scale exchanges

Images are not required for small scale exchanges, but could be considered as an option to ease the exchange speed. The suggested sample size for small scale exchanges is 3-5 recently collected otoliths for each length class, from the period when the otoliths have translucent edges (e.g. Q1) and a sample of the same size from the period when the otoliths have opaque edges (e.g. Q3/Q4). If two methods are used for age reading, e.g. sectioning and breaking otoliths, there should be two collections in the exchange. Otoliths should be read by the preferred method.

The chair of the relevant Assessment Working Group should be informed of the intension to carry out an exchange and should also be circulated the exchange report and recommendations.

Full scale exchanges

If a full scale exchange is carried out, it should include **both images and samples of calcified structures**.

Because comparisons between different methods or comparisons in reading ability between the start and end of a workshop might be required, these possible comparisons need to be planned from the start of the full scale exchange and carried out using the principles of designed experiments (see for example, Heath (1995)). The most important ideas for experimental design are to compare like with like and to control for other variables that affect age reading ability. For example, do not provide otoliths for the full scale exchange from one area to be followed by the age estimation of otoliths from a different area at the end of the workshop. This comparison could show increased agreement in ageing due to increased ability gained at the workshop or due to the 2nd area being easier to read and it will be impossible to separate the two effects. Similarly, avoid running the before and after comparisons on exactly the same set of otoliths. This is necessary if there are small numbers of otoliths but otherwise is undesirable as improvements seen in agreement may be from remembering specific cases and not apply in general.

Building on the guidance in the EFAN report, the PGCCDBS recommended that the procedure for setting up two sets of otoliths for comparison should be by randomly assigning otoliths (described in the paragraph Selecting Calcified Structures (see below)) of each strata defined group to either the first or second set. The two sets do not have to be of the same size. When the first set will be used for the exchange and the second set for recalibration at the end of the workshop, it is sensible to make the second set smaller. If the age workshop coordinator can specify changes in estimation bias or CV that are biologically meaningful, then sample size calculations can be carried out to help decide how big the data sets should be.

Identifying Exchange Participants

The coordinator is required to contact other age reading laboratories to identify the age readers who will participate in the exchange. This is generally done through the Age Reading Coordinators, whose contact details can be found on the age readers contact list updated by PGCCDBS annually. It is recommended to contact all the age reader coordinators in the first instance to ensure that all interested parties are afforded an opportunity to participate. The exchange can be open to all interested parties to participate regardless of their level of experience. The exchange should be announced on the European Age Readers Forum also.

The chair of the relevant Assessment Working Group should be informed of the intension to carry out a full scale exchange and should also be circulated the exchange report and recommendations.

Generally , it is recommended that two sets of analysis are carried out. Firstly confining the analysis to those readers whose age readings are used for stock or environmental assessments. And secondly reporting the analysis including all readers. The analysis including all readers can be presented in an annex of the exchange report. At the same time he/she needs to inquire how much experience the readers have in age reading this and other stocks. Participants can be asked to provide a brief statement describing the species that they read (including details on the stock(s)) and the number of years they have been reading these stock(s). This information is also needed to identify the most experienced readers. Participants should also provide a summary of the quality management procedures used at their institute.

Selecting Calcified Structures

Where there is a requirement for an exchange of the same species from areas or different stocks with widely differing growth rates, separate sampling sets must be set up for each area and care must be taken that the sample sets are analysed separately in case appropriate.

The age span in an exchange set of calcified structures (CS) should, if possible, be from age 0 to the maximum age possible (try to exceed the age range as used for stock or environmental assessment purposes).

As a rule of thumb, a minimum of two sets of otoliths from fish caught in the same year are needed for a reliable estimation of CV at age, each with 10 specimens within each age group, to ensure that the number with translucent edges and the number with opaque edges are representative of the annual distribution. E.g. from January to March and July to September for many Northeast Atlantic continental shelf spp. This is to ensure that the estimated precision and bias are representative for the age readings over the whole year as used for stock assessment purposes.

Identify variables that you suspect influence the ability to age. The **number of possible age reading problems** that you want to check, **determines the number of sets in the exchange**. Identify variables that you suspect influence the quality of the age readings. Compare years and quarters to look for identifiable features that may reveal faults, e.g. abundant years classes becoming less abundant and vice versa. For variables that are not of interest control their effect by standardising them. For variables that are of interest or cannot be fixed, define strata based on these variables. The co-ordinator might also decide to assemble a set of calcified structures, which consists of a number of sub-sets. Control the effect of variables that are not of interest by standardising them. For example: keep laboratory procedures consistent.define strata

based on variables that are of interest or cannot be fixed. For example: month and fish length group. (We suggest strata based on fish length group to help balance the age distributions in the first and second set.)

The CS for the exchange should be completely representative of the CS used for stock or environmental assessment. Bearing this in mind, the coordinator should try to limit the total number of calcified structures; otherwise the burden for the age readers will be too much. The co-ordinator should inquire whether calcified structures of known age are available to be included as an extra set in the exchange. He should do his very best to include such a separate set of calcified structures of known age.

Exclude otoliths you know are poorly prepared or have other obvious reasons why they are different from the rest of the otoliths in the exchange.

Instructions to Participants

It is important to read the exchange programme otoliths in exactly the same way as they are read for stock or environmental assessment and not to make a special effort to get the best possible result. Participants **must be provided with** the area and date of capture for each CS in the exchange. Participants should be **strongly encouraged** to make a **first 'blind' age reading,** for each CS and then make a second reading using the available biological information. Making an initial 'blind' reading can lower unintentional bias in assigning age and may eventually improve reader self-confidence.

Using Images of CS

Where images of CS are to be included in the exchange, it is important to ask each reader to annotate the position of each annual translucent zone on every otolith. These annotated images enable comparisons of how readers derive their age readings and form a valuable record of the exchange that can also be used as a training resource for less experienced readers. The positions of the annual translucent zones are marked on raster layers. The images of the CS should all be prepared at one laboratory. This may either be the co-ordinator's laboratory or another participating laboratory who has agreed to do this work for the co-ordinator.

The coordinator will choose an appropriate value for 'brush size', so that this is not more than 75% of the width of the smallest annual translucent zone and instruct participants to set the brush tool 'hardness' at 100 (no opacity). The coordinator will assign a colour to each age reader at the outset to avoid any duplication. To facilitate the collation of the annotated image data by the coordinator, each participant selects a new raster layer when opening each image and names it with their name or reader identity, before marking the annuli on this layer with their assigned colour and saving it as a '.jpg' image. [*See:* Report of Irish Sea Celtic Sea Cod Otolith International Exchange scheme 2006 Appendix 1: Instructions for using Paint Shop Pro for more information].

Technical specifications for images

Photo quality is very important and proper preparation of otoliths is necessary for obtaining good photographs. Avoid over-exposed pictures. The same magnification needs to be used for the whole set of images and for all the sets within 1 exchange. Remember to calibrate image, information of resolution in the file name is recommended. Pictures should be saved in Jpeg- or Tiff-format. Use only one microscope for each stock, there might be microscope-specific calibration variance. Recalibrate

the setup regularly. The minimum camera specification are good light sensitivity and a minimum of 6 MP. High speed connection between camera and computer is recommended. Processing pictures can be done with specialized software as WebGR, TNPC, or more general software as ImagePro, ImageJ, or others. A high resolution screen is important. (Based on the Report of the Workshop on Age Reading of North Sea Cod (WKARNSC), paragraph 3.7.)

Use of WebGR

When possible, use WebGR to distribute pictures for use in exchanges and workshops.

WebGR is a European project that aims to develop Open Source software for supporting studies of fish growth and reproduction. In particular it promotes the usage of online services to organize calibration workshops. The application facilitates the whole workshop and exercise cycle. Multiple images can be uploaded and assigned to an individual fish. The workshop manager uses attribute-based filters to create a specific image set for an exercise. Each participant annotates the contained image sequence under condition of an appointed key. A group accepted annotation gets a reference state. These reference images will also be used for training purpose.

The Key functions of WebGR are ● Set up of workshops and calibration exercises ● Make and share annotations (coordinates, text-fields, graphical settings) ● Compare annotations ● Set reference annotations ● Upload images ● Manage fish samples ● Export lists and tables to process in spread sheet- and statistical software ● Training exercises without administrative overhead ● Let users choose their expertise coverage ● Define different key tables (research standards) ● Comprehensive search and filter abilities

Technical details of the WebGR application: ● Intranet application, only authorized access ●Web browser based ●Self registration with e-mail confirmation ● Free definable form fields with multiple values and ranges for image search ● Free definable value lists for fields ● Data validation and filtering ● Access control for different roles and actions.

Managing the Exchange

One of the major problems in an exchange of calcified structures is the length of time taken for the successful completion of an exchange scheme. The co-ordinator should contact the participating laboratories to find when the readers are available for the most efficient circulation of the exchange otoliths. Once a schedule has been agreed it then becomes the responsibility of the individual age reader to inform the exchange coordinator of any changes necessary to revise the schedule due to other unforeseen work commitments, illness etc., in order to ensure the timely circulation of the exchange material. “Only images”-exchanges possibly in combination with the use of WebGR, will relieve the co-ordinator of these particular problems there the images can/will be available for all participants at the same time.

The individual age reader is responsible for informing the coordinator when he/she has received the exchange set. Each reader is required to e-mail both the coordinator and the next participant on the exchange schedule before the exchange set is passed on to ensure that the next person on the list is still available to receive the otoliths. If this is not the case the coordinator can arrange for another participant to receive the exchange material. Before sending on the exchange material the age reader must ensure that all the age reading material is present and accounted for. If at this stage any

problems with missing material are identified, the individual age reader must inform the coordinator. Participants should ensure the CS are securely wrapped in protective packaging to minimise the risk of damage during shipment to the next laboratory. Caution should be taken to pack the otoliths in a way that the otoliths are safely packed, but still easily handled.

At the end of the planned exchange, the CS can be returned to the reader(s) who were not able to read these at the planned time, before being shipped back to the co-ordinator. The co-ordinator should recommend sending the sets **by special courier** in order to speed up the exchange and to reduce the possibility of losing one of the sets.

Analysing the Exchange Results

There are several ways of comparing age readings. However, the best way is by making age bias plots, which are easy to understand for the age readers (ICES, 1994 and Campana *et al.*, 1995). The "Age Comparison Tool" (Eltink *et al*., 2000) offers an easy tool to analyse the data. The output of this tool is now widely used within fisheries laboratories in Europe. However, other tools also exist and their use should be examined because the "Age Comparison Tool" by Eltink is not applicable to all species.

Basic statistics are in the output of the WebGR tool.

Reporting the Results of the Exchange

The co-ordinator is responsible for the report of the exchange. Preferably, the report of the age reading exchange contains the following sections:

- Abstract
- Introduction
- Material and methods
- Results
- Discussions
- Conclusions
- Recommendations.

Valid statistical tests and measures should be used to quantify the conclusions of the exchange. The co-ordinator should try to get firm conclusions concerning what preparation techniques or calcified structures to use (aim for standardising methods).

The co-ordinator should return the otoliths to the appropriate age reading laboratories.

He/she should discuss by e-mail the first draft of the report and incorporate the comments. Finally he/she should distribute the report to all participants and post the report on the Age Reader Forum so it is available for the whole ICES - age estimation community. In case an agreed reference image set is one of the outcomes of an exchange, this reference set should be made available to the participants of the exchange. Existence of reference sets and their whereabouts should also be specified on the forum.

The coordinator of the exchange should also send a copy of the exchange report and an extended abstract to the chair(s) of the PGCCDBS.

Exchange Checklist

1.	Inform the PG Liaison person/stock coordinator/ or chair of the relevant AWG of pending exchange and look for feedback.	**[ ]**
2.	E mail age reader coordinators (PGCCDBS age contacts list) to establish participation from each country.	[ ]
3.	Establish list of participants and direct them to the European Age Readers Forum (EARF)	[ ]
4.	Using the EARF, agree a circulation schedule for all participants.	[ ]
5.	Establish exchange set – follow PGCCDBS Guidelines on this.	[ ]
6.	All age readings received.	[ ]
7.	Complete analysis – follow PGCCDBS Guidelines on this.	[ ]
8.	Present analysis for age readers contributing to Stock Assessment.	[ ]
9.	Present analysis for all age readers in the annex of the report.	[ ]
10.	Circulate exchange results to all participants with draft conclusions.	[ ]
11.	Forward the report from the exchange to the AWG/stock coordinator and PGCCDBS.	[ ]
12.	Provide an extended abstract to the PGCCDBS.	[ ]
13.	Upload images, or a link to where a set of agreed ages, resulting from the exchange, can be found to the EARF.	[ ]

Annex 10: Guidelines for Workshops on Age Calibration (update)

PGCCDBS Guidelines for Workshops on Age Calibration

7 – 11 February 2011

Vienna, Austria.

Introduction

The main objective of an age reading workshop is to decrease the relative/absolute bias and to improve the precision (reduce CV) of age determinations (their reproducibility) between age readers of the different age reading laboratories. An exchange of calcified structures must be carried out first to indicate the errors in age reading before a recommendation for an age reading workshop can be made (see previous section).

Problems Indicated by the Exchange.

At a workshop an attempt should be made to solve the problems indicated by the exchange. The following possible problems in reading might exist:

- the age reading methods differ too much (as indicated by statistical tests);
- the precision in age reading is too low for certain age readers;
- there is a strong bias in the age readings of young and/or old fish;
- precision differs considerably for different preparation methods;
- inexperienced readers;
- other age reading problems.

It is very important to ensure that the workshop also addresses any issues relating to age reading as highlighted by the relevant assessment working group. The workshop coordinator should endeavour to get feedback from the assessment working group chair on what he/she feels are important outcomes that should be achieved from the upcoming workshop. It is recommended that the chair of the relevant assessment working group should be encouraged to contribute to the workshop as an end user of the data, either in person where possible or via webex etc.

Topics to Consider When Preparing for a Workshop

The following topics can be and all should be considered:

- The biology of the species;
- The results of previous exchanges and workshops;
- When and how the age reading technique was validated;
- The sample processing techniques used at the different age reading laboratories;
- If necessary, try to standardise the processing techniques of calcified structures;
- Agreement on age determination criteria;
- Discuss disagreements in age reading results from the sets of the calcified structures read during the exchange and at the workshop and try to agree on the age reading method;
- Determine at the end of the workshop the precision in age reading and the relative bias (if possible the absolute bias);
- Estimate improvement in age reading concerning precision and bias by comparing exchange set and the last set at the workshop;
- Make recommendations on how to improve the age reading quality;
- Indicate which calcified structures can be used for the "agreed collection" and (if possible) produce digitised images.

Other topics may be addressed based on the conclusions from the exchange.

PGCCDBS recommends that workshop coordinators use the following criteria for classifying age reading performance into 'good', 'medium' or 'bad'.

- **Bad ageing performance:** When the quality of the data is unknown or there are serious concerns about the reliability of the age data and/or its value to stock assessment WGs. Indicators may include poor agreement between age readers and age data that do not appear to agree with other methods of growth estimation for the stock/species. Causes may include difficulty in observing/interpreting calcified structure (CS) growth patterns, no protocol for preparation/age reading and the use of inappropriate CS or preparation methods.
- **Medium ageing performance:** The age data is sufficiently reliable to be used for stock assessment purposes but improvement is required. Indicators may include levels of agreement between age readers that are below a reference target value for the stock/species (e.g. VIIa cod - 90%, redfish - 40%), difficulty in interpreting aspects of CS growth patterns (e.g. disagreement over the location of the first annulus or otolith edge interpretation), protocols for age reading are used but may need revision and the use of less reliable preparation/observation methods.
- **Good ageing performance:** The age data is considered reliable. Indicators may include repeated high levels of agreement between age readers at successive exchanges or workshops. Causes may include calcified structure CS growth patterns that are easier to interpret, good protocols for preparation/age reading and the implementation of QA and/or QC procedures at individual institutes.

  Stock coordinators should be aware of levels of percentages of agreement and CV's amongst stock assessment readers. Age coordinators should recommend achievable percentage agreement and CVs based on the most recent exchange and workshops.

Workshop Participants

Everyone who participated in the exchange should also participate in the workshop, and vice versa; no one should participate in the workshop unless they also took part in the exchange.

Experimental Design in Age Reading Workshops

Workshops usually compare the performance of readers between the start and end of the workshop. These comparisons need to be planned from the start of the exchange and carried out using the principles of designed experiments. The most important ideas for experimental design are to compare like with like and to control for other variables that affect age reading ability. For example, do not provide otoliths for the exchange from one area then read otoliths from a different area at the end of the workshop.

It is important to avoid running the before and after comparisons on exactly the same set of otoliths. This is necessary if there are small numbers of otoliths but otherwise is undesirable as improvements seen in agreement may be from remembering specific cases and not apply in general. The procedure for generating two sets of otoliths for comparison of exchange and workshop results should be: Define the relevant strata

and assign otoliths by strata randomly to either the first or second set. The two sets do not have to be the same size. When the first set is for the exchange and the second set for the end of the workshop it is sensible to make the second set smaller. If the age workshop coordinator can specify changes in reading bias or CV that are biologically meaningful to detect then sample size calculations can be carried out to help decide how big the data sets should be.

The 'Tool for Age Reading Comparisons' was developed by Eltink *et al.* in 2000, has proved an invaluable contribution to Quality Control for fish age calibration. Eltink *et al.* (2000) advised that the precision errors in age readings are best described by the coefficient of variation CV by age group (CV = st. dev/mean age recorded). Although CV is often the preferred statistical tool for this task, the index of average percentage error (APE) is also commonly used. (Kimura, D. K., and Anderl, D.M. 2005; Morison *et al.* 2005). The dangers of the percent agreement statistic have long been recognised (Beamish and Fournier 1981; Chang 1982; Campana 2001), yet despite this Campana *et al.* (1995) reported that roughly 35% of 21 randomly sampled age comparison papers published between 1985 and 1995, used only percent agreement. More recently Morison *et al.* (2005) reported that responses to a questionnaire to assess current QA and QC practices that was completed by representatives of over 50 fish ageing laboratories worldwide, indicated that percentage agreement was still the most commonly used measure of precision (40% of respondents) despite its limitations and criticisms. Nevertheless, in order to ensure comparability between studies on different species, the CV and/or APE has to be reported as obligatory precision estimate.

Improvements to the original spreadsheet tool have been developed at CEFAS, UK. Eltink compared a number of results in the "work table of the bias test" of the original spreadsheet and the new spreadsheet, which calculates the results of the bias test in the overview table and so far has not found any discrepancies (Eltink *pers. com.*). Eltink advises that the new spreadsheet is much faster than the original one. The downside is that the new spreadsheet is limited in the number of otoliths as well as in the number of age-readers. The original spreadsheet did not have these restrictions. Eltink concludes that the new spreadsheet cannot replace the original one at this stage, but can be used within these restrictions.

Generic ToRs for ageing workshops

a) Provide information on participating laboratory procedures
- Sampling and storing of calcified structures.
- Equipment and preparation of calcified structures
- Documentation on processes and protocols (QA)
- How age determination are being checked within laboratories (QC):
  - availability of reference collections
  - results of age reading comparisons between readers
  - percentage of samples re-read
- Estimate (relative) accuracy and precision

b) Resolve interpretation differences between readers and laboratories.

Disagreements on the interpretation of annual increments can exist between experienced readers. Usually these differences are resolved when the readers discuss the otoliths jointly (note: annotated images largely simplify this process). However, this is not always the case and then follow-up actions must be formulated.

c) Create or update an ageing manual

There should be a standardised ageing manual for each species in a unified format that is internationally agreed upon by all experienced age readers. This manual focuses on the interpretation of the structures (e.g. date of birth, interpretation of rings and edges, period of opaque and translucent ring formation). The manuals on preparation of calcified structures are usually created and updated on the national level.

d) Collate agreed age reference collection.

The output of every workshop should be an agreed age reference collection. Preferably the agreed interpretation should be annotated (as a separate raster layer – see previous section) in the images. These sets of images could then be made available online to train new age readers or to have as a reference set for experienced readers. If establishing a digital collection on a website is not possible, then information about location of the reference collection and contact person should be available on the website.

e) Formulate follow-up actions

See the guidelines in the following section

f) Formulate species (and stock specific) target and threshold statistics

As tool for the evaluation of the quality of age readings we recommend that target and threshold statistics are formulated for each species and stock. The statistics refer to the percentage agreement, the CV and the bias. The target value is the value you would like to achieve and know is possible based on exchange and workshop results. The threshold value is the minimum value required before a reader is qualified to supply data to working groups and can if necessary be derived by discussion between expert readers. Usually, a CV of 5% is set as a threshold for sufficient data quality (Campana 2001).

Guidelines for follow-up actions

Dissemination of the results

Dissemination of the results is in principle the responsibility of the coordinator of the exchange and/or workshop. The full report of the workshop should be made available on the internet, and placed (in pdf-format) in the PGCCDBS document repository (http://www.ices.dk/reports/acfm/pgccdbs/PGCCDBSdocrepository.asp). An extended summary of all workshops and exchanges should be submitted to PGCCDBS and to the relevant working group/PGCCDBS liaison person, and the stock coordinator. This extended summary should provide sufficient information to enable the working group to judge whether or not the quality of the ageing data (by country) is sufficient to include the data in a quantitative stock assessment.

The extended summary should contain the following information:

1) Description of sets of calcified structures included in the exchange and/or workshop:

2) The number of calcified structures in each set

3) Composition (age and/or length structure, area)

4) Preparation methods

5) Images available?

6) Description of participants (numbers per country etc.)

7) Number of readers, laboratories and countries

8) Expertise level of each reader (trainee, intermediate, experienced)

9) Which readers provide ageing data to the WG's

10) Which laboratories provide ageing data to the WG's but are not represented in calibration

11) Accuracy and precision estimates

i) Percentage agreement, CV and bias by age group

ii) Only readers providing data to WG's

iii) Readers combined

iv) By reader (anonymous, but lab/country stated)

v) If relevant, by stratum (spatial and/or temporal differentiation

12) Summarise currently existing ageing problems, either detected in exchange or not solved in workshop.

13) Evaluation of quality of age data provided to WG

i) Preferably a quantitative evaluation (i.e. in relation to target and threshold statistics)

ii) If not possible then a qualitative evaluation

14) A list of the expert groups to be informed.

Specific follow-up actions

If ageing problems are not solved within the ageing workshop, then the participants must formulate clear follow-up actions which will lead to solving the ageing problems. If there are no distinct ageing problems, but the workshop thinks the general ageing quality can be improved by follow-up actions than these should be formulated clearly. The workshop should point out who is responsible for coordinating and carrying out the follow-up actions and in what time frame. The required follow-up can differ depending on the species and the problem occurring. To aid the workshop coordinator some possible follow-up actions are listed here:

- Validation exercises must always be encouraged. A continuous comparison of age readings does not always solve the problem (an example to be learned from: the bias in hake ageing).
- In some species in which the contrast between the structures is poorly visible it may be advisable to improve preparation methods.
- If one or a few readers are disagreeing with the majority of experienced readers, then small scale regional exchanges and/or meetings can be organised.
- If interpretation problems of the first annuli are occurring, then back-calculated growth can provide an indication on the correct interpretation. If samples of '0'-group fish are available throughout the 1st year of life, the period of annual translucent zone may be determined by marginal incremental analysis.
- If age reading protocols are not available for all participants this should be remedied.
- When new age reading criteria are established and agreed at a workshop, all readers should be asked to implement the agreed criteria directly after the workshop, using a small set of images or age reading material. This

serves the dual purpose of ensuring that the agreed ageing criteria are adopted by all and also provides a format for testing the new criteria.

Workshop Checklist

1.	Inform the PG Liaison person/stock coordinator/ or chair of the relevant AWG of the pending workshop and look for feedback.	**[ ]**
2.	Establish list of participants from the exchange and direct them to the European Age Readers Forum (EARF).	[ ]
3.	Using the EARF, the workshop coordinator should agree a date, and location for the WK and any other house – keeping issue around the organisation of the WK.	[ ]
4.	Follow PGCCDBS Guidelines regarding the design and generic TOR's for the WK.	[ ]
5.	Conduct Workshop.	[ ]
6.	Complete analysis – follow PGCCDBS Guidelines on this.	[ ]
7.	Present analysis for age readers contributing to Stock Assessment.	[ ]
8.	Present analysis for all age readers in the annex of the report.	[ ]
9.	Circulate the draft report of the Workshop to all participants.	[ ]
10.	Forward the final report from the workshop to ICES, the AWG/stock coordinator and the Chair of PGCCDBS.	[ ]
11.	Provide an extended abstract to the PGCCDBS.	[ ]
12.	Upload images, or a link to where a set of agreed ages, resulting from the Workshop, can be found to the EARF.	[ ]

Annex 11: Workshop proposals

Methodological issues

WKPICS2 – Second Workshop on practical implementation of statistical sound catch sampling programmes

The **Second Workshop on practical implementation of statistical sound catch sampling programmes** (WKPICS2), chaired by Jon-Helge Vølstad, Norway, and Mike Armstrong, UK, will meet in ICES HQ, Copenhagen, in October 2012, to:

a) On the basis of case studies, examine how national catch sampling programs can be designed and coordinated to meet DCF or other objectives at a regional scale in the most cost-effective way.

b) On the basis of case studies, examine how statistically sound sampling schemes targeting small-scale fisheries can practically be implemented.

WKPICS2 will report by December 2012 for the attention of PGCCDBS, RCMs, STECF/SGRN; ACOM

Supporting information:

Priority:	**Essential**
Scientific justification:	This Workshop is an essential follow-on to WKACCU, WKPRECISE, WKMERGE, and WKPICS1 to establish a methodological support system to facilitate the design and practical implementation of regional fishery catch sampling schemes. This workshop is a continuation of the work started by WKPICS1 in 2011, and the main aim of the workshop is to provide countries with enough support to design and implement statistically sound and transparent sampling programmes to supply data that can be combined to give regional or stock based estimates meeting the requirements for precision and minimal bias. The current DCF legislation allows for countries to collaborate in biological data collection, in which case it is the combined rather than the national estimates that are evaluated against DCF precision targets. However there is a need for guidelines on how a regional sampling scheme should be designed to meet regional goals, and how the component national schemes should be designed and implemented to ensure that the data can be combined in a statistically valid way. Guidelines are also needed on how to allocate national sampling effort to meet the desired precision in the most cost-effective manner. The appropriate documentation of proper sampling designs and estimation procedures that supports regional estimates, and enable quality assessment of estimates used for stock assessment, will therefore have priority in WKPICS2. This sequential second workshop should facilitate the design and implementation of sampling schemes that are internationally coordinated to meet objectives at the regional or stock level whilst making the most cost-effective use of national and DCF funds. This second workshop may then replace the planned WKDRASS (Workshop on the Design of Regional Age Sampling Schemes), which was scheduled for 2010, as the PG found it appropriate to first go for general methodology (WKPICS-1) and then go regional. The workshop will be based on a small number of representative case studies allowing for a more thorough discussion on the details of design and implementation of catch sampling schemes at a regional level, and how the component national schemes can be designed and coordinated to allow aggregation at the regional or stock level with unbiased estimates of precision. The workshop should also consider how a regional sampling database could be

	designed to facilitate this. The case studies should from a methodological point of view be of general interest, covering different types of sampling schemes common in European fisheries, and should be well prepared prior to the workshop. Recommendations for type of case studies to be included in the WKPICS2 will be based on results and discussions in WKPICS1. Based on representative case studes, the WKPICS2 should come up with suggestions for a robust regional design that takes the logistic problems into account, and that can serve as a guideline for countries to set up national programs that are coordinated. It is considered beneficial that the case-studies included for the workshop be of general interest, with sufficient documentation to serve as examples in a planned text-book on design and analysis of catch-sampling programs. The goal is to collate the findings of the WKPICS1 and WKPICS2 workshops (and previous workshops such as WKMERGE) into a reference book, as such a book with contemporary methodology and examples is presently missing from the fisheries literature. This book should describe how sampling schemes and associated estimators can be developed and implemented in practice for a wide range of typical fishery sampling scenarios. A book would help attract experts to the workshop which is crucial for a good outcome. To ensure an efficient and successful meeting, a number of participants will be asked to prepare detailed case studies as Working Documents.
Resource requirements:	In addition to scientists with in-depth knowledge of national and regional sampling programs, the participation of leading expertise in the field of sampling survey methods applied to fisheries is crucial for guaranteeing a best possible outcome of the workshop.
Participants:	Participants will include the national and regional experts involved in the case studies, invited experts on sampling statistics and design, and a cross section of end-users including stock assessment scientists and statisticians. Participants should announce their intention to participate on the workshop no later than 2 months before the meeting. More detailed information about data requirements will be given by the chairs.
Secretariat facilities:	
Financial:	Travel and accomodation expenses need to be covered for these experts. It is advised that travel costs will be eligible for participants from Member States of the European Union through the EU Data Collection Framework.The outcome of this series of workshops is meant to establish a scientific sound basis for an improved and coordinated catch sampling design within the ICES area. Since this will have an influence on the current catch sampling programs, i.e., the EU-DCF and non-EU national sampling programs, extra funding to bring invited experts to the meeting should be sought through the EU and national institutes/programs. Application for financial support should also be sent to EFARO (The European Fisheries and Aquaculture Research Organisation; an association composed of the Directors of the main European Research Institutes involved in Fisheries and Aquaculture research; www.efaro.eu).
Linkages to advisory committees:	ACOM
Linkages to other committees or groups:	Expert WG
Linkages to other organizations:	There is a direct link with the EU DCF.

WKSABCAL – Workshop on Statistical Analysis of Biological Calibration Studies

A **Workshop on Statistical Analysis of Biological Calibration Studies** (WKSABCAL), chaired by Lotte Worsøe Clausen, Denmark, and Ernesto Jardim, Portugal, will meet in Lisbon, late May 2013, to:

a) compile statistical methods for analysing reader agreement;

b) identify the strengths and weaknesses of each method for fisheries calibration studies;

c) review existing software for analysing calibration workshop data;

d) define data summaries and analysis outputs required by calibration workshop participants and as stock assessment input.

WKSABCAL will report by 30 June 2013 for the attention of ACOM and PGCCDBS.

Supporting Information

PRIORITY:	High. Age and maturity data are fundamental parts of the stock assessment process and a great deal of effort is put into ensuring the data are of high quality. Therefore it is important that the analytical tools used at age, maturity and other calibration workshops are fit for purpose, delivering informative outputs for the workshop participants and the stock assessment process.
SCIENTIFIC JUSTIFICATION:	This work relates to quality assurance of biological measurements as part of ICES' goal to advise on the sustainable use of living marine resources. Calibration workshops dealing with age and maturity estimation are funded and held under the auspices of the PGCCDBS. The main objectives of these important workshops are to decrease bias and improve the precision of age/maturity determinations between scientists from different laboratories.The end results are published in extensive ICES reports. However, there is a question of whether the right audience is reached by these reports. Moving beyond precision is increasingly common in calibration workshops and creating outputs better tailored to input for stock assessment models would greatly improve the application of the results. PGCCBDS (2010) also recognized that there is a need to review current methods of analysing data from calibration studies and consider issues such as agreement measures for the age of long-lived species and the best way to incorporate histologically validated samples for maturity staging comparisons. Finally, at a broader level, there is a large body of research on agreement statistics and methodology available from the field of medical statistics so it would be beneficial to transfer this knowledge into the fisheries arena .
RESOURCE REQUIREMENTS:	No specific resource requirements beyond the need for members to prepare for and participate in the meeting.
PARTICIPANTS:	Participants should include a mixture of scientists with expertise in statistical methods, stock assessment, age reading and maturity staging.
SECRETARIAT FACILITIES:	None.
FINANCIAL:	Travel costs will be eligible for participants from Member States of the European Union through the EU Data Collection Framework (DCF). Funding for external experts on the statistical methods may be required.
LINKAGES TO ADVISORY COMMITTEES:	The workshop will link to ACOM through PGCCDBS and PGMED.
LINKAGES TO OTHER COMMITTEES OR GROUPS:	The outputs will be directly relevant to all age reading and maturity staging workshops.
LINKAGES TO OTHER ORGANIZATIONS:	This topic links to the EU DCF, the COST (European Cooperation in the field of Scientific and Technical Research) Action FA0601 "Fish Reproduction and Fisheries" (FRESH) and the WebGR project (http://webgr.azti.es).

Age determination

WKAMDEEP – Workshop on Age Estimation Methods of Deep Water Species

A **Workshop on Age Estimation Methods of Deep Water Species** (WKAMDEEP), chaired by Ole Thomas Albert, Norway, and Beatriz Morales Nin, Spain, will meet at IMEDEA, Esporles, Spain, 22-26 October 2012, to:

a) Review information on age estimations, otolith exchanges, workshops and validation work done so far on the following species: tusk, ling, blue ling, roundnose grenadier, greater argentine, black scabbardfish, black-spotted sea bream, greater forkbeard and orange roughy;

b) Evaluate all available information on individual growth patterns in order to achieve a general consensus about the most probable levels of longevity and growth rates for the different species;

c) Review the available scientific work on validation of age-structures in otoliths in deep water fish species;

d) To revise the age estimation procedures and explore the possibilities to use supplementary information to verify estimated ages, this include: Otolith weight and/or morphometry, as well as Length distribution in surveys and catches;

e) Exploring mathematical methods for estimating age composition of deep water fish species catches to be used by WKDEEP;

f) Based on results, conclusions and recommendations from this workshop to initiate and design an international exchange of otoliths for age reading after the workshop;

g) Address the generic ToRs adopted for workshops on age calibration (see 'PGCCDBS Guidelines for Workshops on Age Calibration').

WKAMDEEP will report by 1 December 2012 for the attention of ACOM and PGCCDBS.

Supporting Information

PRIORITY:	Essential. Age determination is an essential feature in fish stock assessment to estimate the rates of mortalities and growth. Assessment of deep water fish stocks using age structured models has proved useful in establishing a diagnosis on stock status. However, the approach has several limitations and shortcomings such as stock structure, natural mortality and growth. Age data is provided by different countries and are estimated using international ageing criteria which have not been validated. Therefore, a WK should be carried out in order to make a general methodological review, evaluate available information on otolith growth patterns, age determination issues and ultimately pave the way for solid input data to age-based assessments which has been subject of concern of WKDEEP and make progress towards a solution.
SCIENTIFIC JUSTIFICATION:	The necessity of age validation studies for all species assessed in WKDEEP is massive. The stock-assessment is severely hampered by the lack of valid age-structured data and the fact that the agreement in the age-data supplied to the assessment is very low (as seen in previous exchanges). For some of the shorter-lived species (e.g. tusk, greater silver smelt, greater forkbeard) techniques such as marginal increment analysis or length-modal analysis may be appropriate, while for longer lived species

	radiometric techniques (e.g. lead-radium) that have been refined in recent years for species such as orange roughy, could be applied. Some institutes have conducted tagging programs which should be applied in order to validate seasonal zones in otoliths. The aim of the workshop is to identify the state of art of age estimation after validation studies conducted so far.
RESOURCE REQUIREMENTS:	No specific resource requirements beyond the need for members to prepare for and participate in the meeting.
PARTICIPANTS:	Participants should include a mixture of scientists with expertise in age determination methods, deep water species biology, and stock assessment.
SECRETARIAT FACILITIES:	None.
FINANCIAL:	Travel costs will be eligible for participants from Member States of the European Union through the EU Data Collection Framework (DCF). Funding for external experts on the age determination methods may be required.
LINKAGES TO ADVISORY COMMITTEES:	ACOM
LINKAGES TO OTHER COMMITTEES OR GROUPS:	WGDEEP
LINKAGES TO OTHER ORGANIZATIONS:	There is a direct link with the EU DCF.

WKARHOM – Workshop on Age Reading of horse mackerel, Mediterranean horse mackerel and blue jack mackerel

A **Workshop on Age Reading of horse mackerel (*Trachurus trachurus*), Mediterranean horse mackerel (*Trachurus mediterraneus*) and blue jack mackerel (*Trachurus picturatus*)** (WKARHOM), chaired by XXX, will exchange information by correspondence in 2011 and meet in XXX (venue), dates 2012, to:

a) Review information on age determination, and validation on these species;

b) Compare different otolith-based age determination methods;

c) Identify sources of age determination error in terms of bias and precision: i.e. analyse different validation techniques and describe the corresponding interpretational differences between readers and laboratories, and agree on a common ageing criteria;

d) Analyse growth increment patterns and provide specific guidelines for the interpretation of growth structures in otoliths;

e) Create a reference collection of otoliths and start the development of a data base of otolith images.

f) Address the generic ToRs adopted for workshops on age calibration (see 'PGCCDBS Guidelines for Workshops on Age Calibration').

WKARHOM will report by XXX(dates) for the attention of ACOM and PGCCDBS.

Supporting Information

PRIORITY:	Age determination is an essential feature in fish stock assessment to estimate the rates of moralities and growth. In order to arrive at appropriate management advice ageing procedures must be reliable. Otolith processing methods and age reading methods might differ considerably between countries. Therefore, otolith exchanges should be carried out on a regular basis, and if serious problems exist age reading workshops should be organised to solve these problems.
SCIENTIFIC JUSTIFICATION:	The aim of the workshop is to review the available information on age determination, and validation for *Trachurus* spp., to dentify the present problems in age determination for these species, improve the accuracy and precision of age determinations and spread information of the methods and procedures used in different ageing laboratories. A number of samples of otoliths should be circulated among different laboratories to assess the precision of age readers during 2011. At the workshop, in 2012, results from the otoliths circulation will be presented and discussed.
RESOURCE REQUIREMENTS:	No specific resource requirements beyond the need for members to prepare for and participate in the meeting.
PARTICIPANTS:	In view of its relevance to the EU Data Collection Framework (DCF), the Workshop is expected to attract interest from both Mediterranean, EU and ICES Member States.
SECRETARIAT FACILITIES:	None.
FINANCIAL:	Additional funding will be required for facilitate the attendance of the scientists and technicians.
LINKAGES TO ADVISORY COMMITTEES:	ACOM

LINKAGES TO OTHER COMMITTEES OR GROUPS:	WGWIDE, WGMEGS; PGCCDBS, PGMED The outputs will be directly relevant to all age reading workshops.
LINKAGES TO OTHER ORGANIZATIONS:	There is a direct link with the EU DCF and outcomes from this Workshop will be of interest to several RFMOs.

Maturity staging

WKMSSPDF2 – Workshop on sexual maturity staging of sole, plaice, dab and flounder – already approved by ACOM

2010/2/ACOM50 The **Workshop on sexual maturity staging of sole, plaice, dab and flounder** (WKMSSPDF2), chaired by Ingeborg de Boois and Cindy van Damme, The Netherlands, will meet in Oostende, Belgium, 9-13 January 2012 to:

a) Report on the use of the common maturity scale proposed in 2010;

b) Check the description of the characteristics of the stages of the 2010 scale;

c) Calibrate staging of sole, plaice, dab and flounder using fresh fish, following the pattern of trial-discussion-retrial;

d) Calibrate staging of sole, plaice, dab and flounder using photographs, following the pattern of trial-discussion-retrial;

e) Validate macroscopic maturity determination with histological analysis.

f) address the generic ToRs adopted for maturity staging workshops (see 'PGCCDBS Guidelines for Workshops on Maturity Staging

WKMSSPDF2 will report by 7 February 2012 for the attention of ACOM and PGCCDBS.

Supporting Information:

PRIORITY:	The maturity stage is an important biological parameter to be used in the calculation of maturity ogives (and therefore of Spawning Stock Biomass), for the definition of the spawning season of a species, for the monitoring of long-term changes in the spawning cycle, and for many other research needs regarding the biology of fish.
SCIENTIFIC JUSTIFICATION:	During the 2010 workshop, a common maturity scale with objective common criteria was proposed for sole, plaice, dab and flounder. Laboratories involved in collection maturity data agreed to use the common scale for reporting. This workshop has the objective to report on the use of the 2010 proposed scale and to calibrate maturity staging between the different laboratories involved in staging. The expectation of TOR a) has the goal of measuring the usdefulnes of the new 2010 maturity scales. TOR b) to validate the criteria and descriptions to classify maturity stages of the new 2010 scales. TOR c and d) calibrate maturity staging between the different laboratories. TOR e)validate with histological analysis the macroscopic maturity stage, mainly the resting stages that are incorrectly classified as immature. It is recommended that the Workshop be organised in January 2012. Participating institutes will be able to test the new scale and collect samples during 2010 and 2011.
RESOURCE REQUIREMENTS:	Before the Workshop, the chairs will setup a sampling plan for collecting samples for to be used during workshop. The sampling will be carried out during 2010-11. For all species, the sampling parameters are: total length; gonad visual inspection - maturity stage by the new common maturity scale; total weight; gonad weight; liver weight; gutted weight; gonad photo; age; histological maturity stage; microscopic preparation photo. This workshop will be based on the analysis of both digital photos of gonads

	and fresh gonads. Therefore facilities suitable to examine fresh biological material must be available during the workshop. It would be necessary to have a web server for storage and easy access to the photos collected by the participants before the workshop.
PARTICIPANTS:	In view of its relevance to the DCF, the Workshop is expected to attract wide interest from ICES Member States that participate in biological sampling of sole, plaice, dab and flounder.
SECRETARIAT FACILITIES:	
FINANCIAL:	To obtain all biological data before the Workshop, funding is needed for buying fresh ungutted fish, to estimate age and to process gonads histology. To ensure wide attendance of relevant experts, additional funding will be required, preferably through the EU, e.g. by making attendance to the Workshop eligible under the DCF.
LINKAGES TO ADVISORY COMMITTEES:	ACOM
LINKAGES TO OTHER COMMITTEES OR GROUPS:	This workshop is proposed by PGCCDBS. Outcomes from this Workshop will be of interest to all Working and Study Groups related to sole, plaice, dab and flounder, namely WGNSSK, WGBFAS and WGCSE, as well as to survey groups like the IBTSWG and WGBEAM.
LINKAGES TO OTHER ORGANIZATIONS:	There is a direct link with the EU DCF.

WKMSTB – Workshop on Sexual Maturity Staging of Turbot and Brill – already approved by ACOM

2010/2/ACOM51 A **Workshop on Sexual Maturity Staging of Turbot and Brill** (WKMSTB), chaired by Ingeborg de Boois and Cindy van Damme, The Netherlands, will meet in IJmuiden, The Netherlands, 5-9 March 2012 to:

a) Agree on a common maturity scale for turbot (*Psetta maxima*) and brill (*Scophthalmus rhombus*) across laboratories comprising a comparison of existing scales and standardization of maturity determination criteria;

b) Calibrate staging of turbot and brill using fresh fish, following the pattern of trial-discussion-retrial;

c) Calibrate staging of turbot and brill using photographs, following the pattern of trial-discussion-retrial;

d) Validate macroscopic maturity determination with histological analysis;

e) Establish correspondence between old and new scales to convert time series;

f) Propose optimal sampling strategy to estimate accurate maturity ogives;

g) Address the generic ToRs adopted for maturity staging workshops (see 'PGCCDBS Guidelines for Workshops on Maturity Staging').

WKMSTB will report by 4 April 2012 for the attention of ACOM and PGCCDBS.

Supporting Information:

Priority:	Both turbot and brill have wide distribution areas (see below) and high commercial values. At this point, the EU requests advice on these species (both are MoU species that are subject of research in WGNEW and for which available data have also been assembled and analysed in the EU project NESPMAN), but current quota and management are based on historical trends in landing series only. Additionally, there are no species-specific quota for these species, but combined ones for both of them together. The maturity stage is an important biological parameter to be used in the calculation of maturity ogives (and therefore of Spawning Stock Biomass), for the definition of the spawning season of a species, for the monitoring of long-term changes in the spawning cycle, and for many other research needs regarding the biology of fish. These two species have a wide distribution: Turbot: Baltic Sea, from the Northeast Atlantic (European coasts from Arctic Circle to Morocco + south of Iceland) and throughout the Mediterranean. The population in the Black Sea is mostly regarded as a separate subspecies (*P. m. meioticus)*. Brill: Basically the same as turbot, but not as far north along the Norwegian coast and far less numerous in the Mediterranean and Black Seas.
Scientific justification:	Laboratories involved in the collection of maturity data for the various assessment WG's use different macroscopic maturity scales for the same species. Even when a common scale is used, slightly different criteria to classify the maturity stages allows for a subjective interpretation. This may lead to a bias in the data that may be used in stock assessment models, or in other types of analyses. Therefore, this workshop aims at reaching an agreement on a common maturity scale to be used, but also to define objective criteria to classify the separate stages of that scale. Therefore, a common scale for maturity stageing, with a common set of criteria to classify each stage, is to be developed for implementation in all labs. Addressing ToR b) should lead to a validation of the macroscopic maturity stage

	with histological analysis, mainly for stages that are normally incorrectly classified (as the 'resting' stage). ToR c) should be addressed to assess, and if possible to correct, the impact on historical maturity series of the new agreed maturity scale. ToR d) should consider the ecology of the species, existing surveys, commercial sampling capacity and other considerations to define and recommend the optimal sampling strategy to estimate accurate maturity ogives.
Resource requirements:	Before the Workshop, the organising institute will set up a sampling plan for assembling (and collecting, if needed) samples for to be used during the workshop. The Additional sampling will be carried out during 2011. Guidelines on how to prepare the Workshop, as well for collecting maturity data and histological analysis for the Workshop have been updated and are available in the PGCCDBS 2010 report (Annexes 12 and 13).
Participants:	In view of its relevance to the DCF, the Workshop is expected to attract wide interest from ICES Member States that participate in biological sampling of turbot and brill.
Secretariat facilities:	
Financial:	None
Linkages to advisory committee:	ACOM
Linkages to other committees or groups:	This workshop is proposed by PGCCDBS. Outcomes from this Workshop will be of interest to all Working and Study Groups related to turbot and brill, namely WGNEW.
Linkages to other organizations:	There is a direct link with the EU DCF.

WKMSGAD – Workshop on sexual maturity staging of Cod, Whiting, Haddock, Saithe and Hake – already approved by ACOM

2010/2/ACOM52 A **Workshop on Sexual Maturity Staging of Cod, Whiting, Haddock, Saithe and Hake** (WKMSGAD), chaired by Jonna Tomkiewicz*, Denmark, Francesca Vitale*, Sweden, and Maria Korta, Spain, will meet in Copenhagen, Denmark, 12-16 November 2012, to:

a) Evaluate the applicability of the 2007 proposed common maturity scales;

b) Validate macroscopic maturity determination with histological analysis;

c) Evaluate maturity staging of all species using pictures and fresh samples, respectively, before and during the WK with histology and light microscopy as ground truth for determination of staging errors;

d) Compare maturity scales and staging among species with synchronous and asynchronous development and adapt scales if needed;

e) Enhance the macroscopic and microscopic description of the characteristics of the stages of the 2007 scales and finalize the illustrated manuals initiated in 2007;

f) Consider local training programs for scientists and technicians sampling gadoids;

g) Address the generic ToRs adopted for maturity staging workshops (see 'PGCCDBS Guidelines for Workshops on Maturity Staging

WKMSGAD will report by 1 March 2013 for the attention of ACOM and PGCCDBS.

Supporting Information:

Priority:	The maturity stage is an important biological parameter to be used in the calculation of maturity ogives and the proportion spawning (and therefore of Spawning Stock Biomass), for the definition of the spawning season of a species, for the monitoring of long-term changes in the spawning cycle, and for many other research needs regarding the biology of fish.
Scientific justification:	During the 2007 workshop (WKMSCWHS), a common maturity scale with objective histologically validated criteria was proposed for Cod, Whiting, Haddock and Saithe. Laboratories involved in collecting maturity data agreed to use a common scale for reporting. A similar WK was conducted for hake and monkfish in 2007 (WKMSHM), where a five-stage maturity scale was outlined. This workshop has the objective to improve maturity staging of gadoids, considering cod, whiting, haddock, saithe and hake, using histological validation. A particular issue will be to improve the methodology for gadoids with asynchronous development using hake as a model. Illustrated and validated manuals will be developed, contributing to enhance accuracy in maturity staging among laboratories. The expectation of ToR a) is an evaluation of the use and usefulness of the 2007 maturity scales. ToR b) is validation of criteria and descriptions to the classify maturity stages used in the 2007 scales and determination of the maturity stage of samples collected by participants. ToR c) is histological ground thruthing of stage determination of samples and estimation of the effect of training and discussion during the workshop on the accuracy of maturity determinations. Staging of fresh gonads will be validated histologically during the workshop.

	ToR d) is an improvement of maturity determination for gadoids with asynchronous development using the experience gained on hake. ToR e) is the identification and improvement of the descriptive characteristics of the critical stages using input from TOR b and c and the publication of the five species-specific illustrated manuals that were initiated in 2007. ToR f) is an improvement of maturity determination on a broad scale using the experience of the participants locally in laboratories. Participating institutes will be able to test the new scale, collect and analyse samples during and 2011 and 2012.
Resource requirements:	Before the Workshop, the organising institute will setup a plan for collecting samples to be used during the workshop. The sampling will be carried out during 2011 and 2012. For all species, the sampling parameters are: total length; gonad visual inspection - maturity stage by a standard maturity scale and the usual maturity scale used by the institute; total weight; gonad weight; liver weight; gutted weight; gonad photo; age; histological maturity stage; photos of histological sections. This workshop will be based on the analysis of both digital photos of gonads, examination of fresh gonads and histological validation. Selected laboratories will conduct the histological analysis. Without this ground truthing verification, comparison of maturity data is hypothetical. Facilities suitable to examine fresh biological material should be available during the workshop. The new developed web- based tool, i.e. WebGR (available on http://webgr.azti.es) will be used for storage and easy access to the photos collected by the participants before the workshop.
Participants:	In view of its relevance to the DCF, the Workshop is expected to attract wide interest from ICES Member States that participate in biological sampling of gadoids.
Secretariat facilities:	
Financial:	Funding will be required, preferably through the EU, e.g. by making attendance to the Workshop eligible under the DCF, in order to ensure wide attendance of relevant experts and to obtain all the required biological data before and during the workshop. This includes sampling, histological processing of gonads and purchase of fresh ungutted fish.
Linkages to advisory committees:	ACOM
Linkages to other committees or groups:	This workshop is proposed by PGCCDBS. Outcomes from this Workshop will be of interest to all Expert Groups related to Cod, Whiting, Haddock and Saithe, inter alia WGNSSK, WGBFAS, WGCSE, WGHMM, WGBIFS and IBTSWG.
Linkages to other organizations:	There is in direct link with the EU DCF.

WKMATCH – Workshop for maturity staging chairs

A **Workshop for maturity staging chairs (WKMATCH),** chaired by Fran Saborido-Rey, Spain, will meet in Split, Croatia, 11-15 June 2012, to:

a) Revising and, if necessary, enhancing consistency in the currently adopted methods;

b) Analyze, verify and agree methods and protocols for a accurate maturity staging;

c) Develop standard protocols for quality control and tools to analyze error and bias;

d) Evaluate the impact of a newly developed common scales on historical databases;

e) Update the Guidelines for colleting maturity data and developing maturity;

f) Advise on the best way to incorporate newly collected data into assessment.

WKMATCH will report by 15 July 2012 for the attention of ACOM and PGCCDBS.

Supporting Information:

Priority:	The maturity stage is an important biological parameter to be used in the calculation of maturity ogives (and therefore of Spawning Stock Biomass), for the definition of the spawning season of a species, for the monitoring of long-term changes in the spawning cycle, and for many other research needs regarding the biology of fish. Thus, maturity data are fundamental part of the stock assessment process and hence a vast effort is put to validate the macroscopical inspection of gonads. In the last decade a series of workshops addressed the maturity staging of different species with the objective of developing common maturity scales,decreasing discrepancies among laboratories and validating maturity staging through the use of microscopic evaluation. However the appropriate sampling design for estimating accurate maturity ogives (catchability issue) together with the interpretation of the observed maturation pattern lies on a species level and depends on the species-specific biology. A synergic work between assessment scientists and experts on maturity is therefore urgently needed in order to delineate the optimal use of maturty data in stock assessment.
Scientific justification:	A maturity scale, or more precisely a gonad developmental scale, is not used only to estimate the number of mature individuals (for which a two stage scale would be sufficient), but for other purposes as to define temporal and spatial patterns in reproductive cycle and especially to define spawning activity and spawning frequency, both important in stock assessment (egg production methods) and fisheries management (stock recovery). Up to now several workshops on maturity of the most important commercial species in ICES waters have been conducted. Each workshop has produced different reports with a variety of agreed criteria, maturity scales and recommendations instead of following common established guidelines. Thus, before continuing recommending having more workshops of this type on other species, ICES should revise the results from these workshops, their consistency and propose a way to enhance consistency across adopted methods and agreements (ToR a). The above work will allow experts on maturity to analyze verify and agree methods and protocols for an accurate maturity staging for each of the analyzed species or developing a standardized scale across species (ToR b). Once a common criteria is agreed, or in order to achieve a common criteria, researchers need statistical tools to assess sources of bias and errors and establish tools for a QC/QA allowing the definition of a correct and accurate maturity ogive for each species and each year analyzed (ToR c). However, already adopted scales or the new proposed maturity scales may differ from traditional maturity stages in such a

	way that they prevent the use of historical datasets with the subsequent lost of very valuable information. This should be considering when recommended new scales and potential solutions proposed (ToR d). With all the above information, participants should be in position on updating the Guidelines for colleting maturity data and histological analyses for maturity workshops and Guidelines for Workshops on Maturity Staging (see 'PGCCDBS Report 2011 Annex 12 and 13'). These guidelines have been developed in last years within PGCCDBS from the experience of other workshops and experts, but should be updated with the agreements in Tor a-d and to be widely used in future workshops dealing with a wider range of reproductive strategies species (ToR e). Finally, it is acknowledged the impact of Workshops on maturity on data collection, stock assessment and even in fisheries management. This information is already used in stock assessment, but the proposed guidelines, protocols and methods may introduce undesirable source of uncertainty as an important biological parameter (maturity ogive) is suddenly modified. This workshop should work closely with stock assessment experts to advise the best way on incorporating the new information into assessment, improving it and avoiding bias, or conflicts (ToR f)
Resource requirements:	No specific resource requirements beyond the need for members to prepare for and participate in the meeting
Participants:	Chairs of the different Workshops on maturity held since 2007 should participate, together with invited experts on fish maturation and the use of biological information in stock assessment. In view of its relevance to the DCF, the Workshop is expected to attract wide interest from ICES Member States involved in stock assessment. The participation of chairs from several stock assessment working groups should be ensured.
Secretariat facilities:	
Financial:	None
Linkages to advisory committee:	ACOM
Linkages to other committees or groups:	This workshop is proposed by PGCCDBS and recommended by FRESH (COST Action FA0601). Outcomes from this Workshop will be of interest to all the Assessment Working Groups related to the examined species.
Linkages to other organizations:	There is a direct link with the EU DCF.

Annex 12: Recommendations

Report section	Recommendation	For follow up by	Timeframe
2	PGCCDBS recommends that WGDEEP prepares illustrated definitions on length measurement procedures for roundnose grenadier and distribute these through RCMs Not followed up by WGDEEP 2010, so PGCCDBS repeats the 2010 recommendation	WGDEEP, RCMs	April/May 2011
2	PGCCDBS recommends to follow the WGCHAIRS 2011 suggestion that Assessment WG Chairs could be invited to Age reading WKs to establish this link.	Age reading WK chairs, Assessment WG chairs	From now on
2	PGCCDBS recommends to further develop the reporting of age reading error (e.g. based on "EFAN-Eltink" spreadsheet) and inclusion of age reading variance in stock assessments	WKNARC	Sep. 2011
3.1	PGCCDBS recommends RCMs should compile an overview of the cephalopod catch data available and WGCEPH participants should approach the relevant national laboratories. The issue relating to the survey data should be forwarded to IBTSWG.	RCMs, WGCEPH	Sep-Oct 2011
3.1	PGCCDBS recommends that issues relating to the minimum sampling requirements for cephalopod biological data in the DCF should be considered at SGRN. PGCCDBS recommend this to be forwarded and resolved by SGRN in light of DCF requirements.	STECF-SGRN	STECF EWG 11-02, March 2011
3.1	PGCCDBS recommends that the WGCRAN request to increase and standardise sampling effort for bycatches (improve seasonal and spatial coverage) of brown fisheries should be taken up by SGRN to prioritise the allocation of sampling effort in the general context of the DCF. RCMs should look into the outcomes of SGRN.	STECF-SGRN, RCMs	STECF EWG 11-02, March 2011; RCMs Sep-Oct 2011
3.1	PGCCDBS recommends to make better use of discard sampling in recording protected species bycatch occurrence in a range of other fisheries.	STECF-SGRN, RCMs	STECF EWG 11-02, March 2011; RCMs Sep-Oct 2011
3.1	PGCCDBS recommends that reporting of Baltic salmon catch estimates from recreational fisheries on a yearly basis, and for commercial on half year basis, is sufficient (ref. WGBAST 2010 requesting a revision of the DCF Decision 2010/93/EU).	STECF-SGRN	STECF EWG 11-02, March 2011
3.1	PGCCDBS recommends that the proportion of adipose fin clipped salmon and sea trout in Baltic fisheries should be monitored in conjunction with DCF or other data collection programmes (ref. WGBAST 2010) and that RCM Baltic should implement this sampling.	RCM Baltic	Oct 2011
3.1	PGCCDBS recommends that catches (i.e. landings & discards) of deep-sea species should	STECF-SGRN	STECF EWG 11-02,

Report section	Recommendation	For follow up by	Timeframe
	be fully recorded and reported, if possible, by haul-by-haul data for all trawl and longline fisheries (ref. WKDEEP 2010).		March 2011
3.1	PGCCDBS recommends that roundnose grenadier effort data should be provided by all involved countries (ref. WKDEEP 2010).	RCMs	Sep-Oct 2011
3.1	PGCCDBS recommends that some exercises should be made to evaluate between observers (or for the same person) the quality of pre-anal fin length measurements for roundnose grenadier (ref. WKDEEP 2010).	RCMs	Sep-Oct 2011
3.1	PGCCDBS recommends that MS should ensure that, when collecting roundnose grenadier samples, hauling duration and fishing depth is recorded with all samples. Sampling should be spread across a number of trips rather than relying on large samples from fewer trips (ref. WKDEEP 2010).	RCMs	Sep-Oct 2011
3.1	PGCCDBS recommends an increase of the number of discard samples (% of trips covered by observers) on commercial vessels fishing fishing on greater forkbeard (ref. WKDEEP 2010).	STECF-SGRN, RCMs	STECF EWG 11-02, March 2011; RCMs Sep-Oct 2011
3.1	PGCCDBS recommends to examine the possibility of a longline survey for large pelagic sharks. (in the absence of any fisheries-independent data) (ref. WGEF 2010).	RCMs	Sep-Oct 2011
3.1	PGCCDBS recommends that national laboratories should have a data compilation workshop to consider stock separation and assessment data quality for herring in Division IIIa and Subdivisions 22-24 (ref. WKWATSUP 2010).	National laboratories	From now om.
3.1	PGCCDBS recommends intensified sampling of flounder in ICES Sub-area IV for age and biological parameters, especially of the landings (ref. WGNEW 2010).	STECF-SGRN, RCM NS&EA	STECF EWG 11-02, March 2011; RCM NS&EA Sep. 2011
3.1	PGCCDBS recommends that RCM NA considers an increase of sampling levels of the fish and *Nephrops* fisheries in the Celtic Seas Ecoregion through: a) Self-sampling of catches (both landings and discards), b) Development and promote enhanced catch sampling through reference fleets and or fully documented fisheries (ref. WGCSE 2010).	RCM NA	Oct 2011
3.1	PGCCDBS recommends that WGCSE should use the discard sampling level information from RCM NA and review discard raising procedures in accordance with WKDRP 2007 in order to assess bias in discard estimates (quality and quantification of discard data) (ref. WGCSE 2010).	WGCSE	May 2011
3.1	PGCCDBS recommends that RCM NA should	RCM NA	Oct 2011

Report section	Recommendation	For follow up by	Timeframe
	develop a Study Proposal for tagging in the light of uncertainties in unaccounted mortality and in stock structure of several WGCSE stocks in the assessment (ref. WGCSE 2010).		
3.1	PGCCDBS recommends that research on hake growth should continue. Otoliths should continue to be collected, as age reading methods could soon be available (ref. WGHMM 2010).	RCMs	Sep-Oct 2011
3.1	PGCCDSB recommends that RCM NA considers ensuring adequate numbers of small and large (i.e. young and old) fish from deep-water stocks to be sampled, which will improve definition of both ends of the age–length relationship. Age sampling should cover the entire length range of the species (ref. WKDEEP 2010).	RCM NA	Oct 2011
3.1	PGCCDBS recommends that the systematic differences in weight at age of NEA haddock (when comparing Russian surveys in late autumn and Norwegian surveys in winter) should be followed up bilaterally (IMR Norway, PINRO Russia) and reported to PGCCDBS and AFWG. First, the actual differences should be investigated further, e.g. by region, to exclude other possible sources of error. Second, age reading comparisons should be intensified to investigate and possibly remedy between-reader bias (ref. AFWG 2010).	IMR Norway, PINRO Russia	From now on.
3.1	PGCCDBS recommends that Norwegian and Russian age readings of NEA *Sebastes mentella* are harmonized for mature fish, especially above age 15. Frequent otolith exchanges between Norway, Russia and others for comparative age readings should be conducted and reported to PGCCDBS and AFWG (ref. AFWG 2010).	IMR Norway, PINRO Russia	From now on.
3.1	PGCCDBS recommends that parallel age reading of young Western Baltic cod should be followed up bilaterally (Denmark – Germany) and reported to WGBFAS and PGCCDBS (ref. WKBFAS 2010).	DTU-Aqua Denmark, vTI-OSF Germany	From now on.
3.1	PGCCDBS recommends that an otolith exchange for Bay of Biscay sole should be conducted bilaterally (France, Belgium) and reported to WGHMM and PGCCDBS (ref. WGHMM 2010).	IFREMER France, ILVO Belgium	From now on.
4.1	PGCCDBS recommends that the list of stocks in the DCF (Appendix VII of Decision 2010/93/EU) is expanded by the additional stocks listed in the new Memorandum of Understanding between ICES and the EU (see Table 4.1 of the PGCCDBS 2011 report).	STECF-SGRN	STECF EWG 11-02, March 2011, or later
4.2.1.1	PGCCDBS recommends that a new plaice age reading workshop should only be carried out when validation studies have been conducted. PGCCDBS strongly recommends that these studies will be carried out. France has data on the validation of the first annulus by the use of daily increments in the Eastern Channel (ref. WKARP 2010).	Countries involved in age reading of plaice in ICES Sub-area IV and Div. IIIa	From now on.
4.2.1.3	PGCCDBS recommends the use of a standard	WKNARC	Sep. 2011

Report section	Recommendation	For follow up by	Timeframe
	grading system by the mackerel age reader of his/her own readings (e.g. high, medium, low) be considered during the WKNARC as a standard that could be applied in all age calibration exchanges and/or WKs (ref. WKARMAC 2010).		
4.2.2.1	The PGCCDBS recommends that all otolith exchange coordinators adhere to the guidelines of exchanges and workshops. In particular, it should be ensured that all interested countries are able to participate. The guidelines have been updated at PGCCDBS 2011 (see Annexes 9 and 10) and will be made available on the European Age Readers Forum (see section 4.2.4).	Co-ordinators of otolith exchanges and age reading WK chairs	From now on.
4.2.2.2	PGCCDBS recommends that the North Sea cod otolith exchange coordinator re-analyses the exchange results according the PGCCDBS guidelines 2011 and restricts the data to those age readers contributing data to the stock assessments, and then from these results evaluate the need for a workshop. In the mean time, the coordinator might like to circulate the agreed age reading criteria again, and request that all age readers adhere to these criteria. PGCCDBS suggests that a small scale exchange could be circulated to cement the age reading criteria in the minds of the age readers, as was very effectively done in the WKARMAC 2010.	Sigbjørn Mehl and Hildegunn Mjanger (Norway)	From now on.
4.2.2.5	PGCCDBS recommends that the results of the blue whiting otolith exchange are reported according to the updated Guidelines for Otolith Exchanges (Annex 9).	Norway	From now on.
4.2.2.6	PGCCDBS recommends a follow-up full-scale megrim otolith exchange, including both the calcified structures and corresponding images.	IFREMER (France), CEFAS (UK-England).	From now on.
5.1	PGCCDBS recommends that Assessment WGs use the procedures and templates in section 5.1 of the PGCCDBS 2011 report to report on data quality.	ACOM, Assessment WGs	2012, after approval by ACOM
5.2	PGCCDBS recommends that ACOM and the European Commission consider the proposals to improve data transmission and implementation of the ICES Quality Assurance Framework for ICES assessment working groups in section 5.2 of the PGCCDBS 2011 report.	ACOM, European Commission	As soon as possible.
6.1.2	PGCCDBS recommends that the information about existing data sampling devices will be passed on to the staff at the different fisheries institutes, and should be presented and demonstrated in working groups attended by persons involved in sampling,	PGCCDBS Intersession work	From now on
6.1.2	PGCCDBS recommends to establish a forum, participated by field sampling staff and IT-developers, engineers, in which new ideas and new data sampling techniques can be discussed	PGCCDBS and RCMs Intersession work	From now on

Report section	Recommendation	For follow up by	Timeframe
	and suggested		
7.1	PGCCDBS recommends a Second Workshop on practical implementation of statistical sound catch sampling programmes (WKPICS2)	ICES Secretariat, ACOM	Before ICES ASC 2011 (Sep 2011)
7.1	PGCCDBS recommends a Workshop on Statistical Analysis of Biological Calibration Studies (WKSABCAL)	ICES Secretariat, ACOM	Before ICES ASC 2011 (Sep 2011)
7.2.1.3.1	PGCCDBS recommends a small otolith exchange on Bay of Biscay sole (*Solea solea*).	Kélig Mahé (France)	2011
7.2.1.3.2	PGCCDBS recommends a small otolith exchange on Redfish (*Sebastes mentella*).	Lise Heggebakken (Norway)	2011
7.2.1.3.3	PGCCDBS recommends a small otolith exchange on Hake (*Merluccius merluccius*).	Carmen Piñeiro and Maria Sainza (IEO, Spain)	April-May 2011
7.2.2.2.1	PGCCDBS recommends a Workshop on Age Estimation Methods of Deep Water Species (WKAMDEEP)	ICES Secretariat, ACOM	Before ICES ASC 2011 (Sep 2011)
7.2.2.2.2	PGCCDBS recommends a Workshop on Age Reading of horse mackerel (*Trachurus trachurus*), Mediterranean horse mackerel (*Trachurus mediterraneus*) and blue jack mackerel (*Trachurus picturatus*) (WKARHOM)	ICES Secretariat, ACOM	Before ICES ASC 2011 (Sep 2011)
7.3.2.1	PGCCDBS recommends a Workshop for maturity staging chairs (WKMATCH).	ICES Secretariat, ACOM	Before ICES ASC 2011 (Sep 2011)
7.4.1	Prepare a table like Annex 7 with information by ICES stock and prepare a similar table for maturity calibration exercises.	William McCurdy (UK) and Cristina Morgado (ICES Secretariat)	Final draft: November 2011 Final: before WGCHAIRS 2012 (January 2012)
7.4.2	Compile the percentage agreement all age readings workshops and exchanges.	Annemie Zenner (Belgium)	Final draft: August 2011 Final: before WGCHAIRS 2012 (January 2012)