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REPORT OF THE PLANNING GROUP ON COMMERCIAL CATCHES, DISCARDS AND BIOLOGICAL SAMPLING (PGCCDBS)

2-6 MARCH 2009

MONTPELLIER, FRANCE



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International Council for
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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 2–6 March 2009 in Montpellier, France. The Planning Group and workshops are proposed in response to the EC-ICES MoU that requests ICES to provide support for the Data Collection Regulation (DCR; EC Reg. 199/2008, 665/2008 and Decision 2008/949/EC). 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 DCR, and DG MARE is a member of PGCCDBS to ensure coordination with the DCR 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 inclusion of each group's report as an annex of the other; (ii) the organisation of parallel meetings; (iii) the organisation of joint plenary sessions for generic issues, and (iv) 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 mixed species landings, and minimum sampling protocols for sampling length and for age calibration. An age readers forum is about to be established, and would be used as a "one stop shop" for all those involved in age reading. ICES Cooperative Research Reports should be written on the current status of age determination of a species (or group of species) after exchanges and workshops have been conducted. A Common Open Source Tool (COST) for assessing the accuracy of the biological data and parameters estimates collected for stock assessment purpose, and a WebGR project to develop a set of web services to support the organization and data analysis of calibration workshops are among the methodological achievements discussed in the report.

The Group reviewed reports from relevant Expert Groups with respect to recommendations addressed to PGCCDBS.

As feedback mechanism from data users (mainly Assessment WGs) to the PG, 'data contact persons' were proposed with a set of tasks to report on data problems etc. PGCCDBS will act as an advisory group on the further development of InterCatch. InterCatch is a web-based system to ease the data handling for assessment purpose. **PGCCDBS were strongly of the opinion that the improvement of InterCatch needs to be addressed with urgency.**

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

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. Guidelines for organizing otolith exchanges, workshops on age calibration and on

maturity staging were developed and will ensure that the key issues are addressed in a consistent manner.

Based on the reviewed information, a set of otolith exchanges (blue whiting, brill, North Sea cod, North Sea sole, Baltic turbot, roundnose grenadier, dab and Spanish mackerel), methodological workshops (fishery metier merging, regional age sampling, precision estimation, ecosystem indicators of discarding), age reading workshops (Greenland halibut, Greenland cod, dab, North Sea & Skagerrak-Kattegat plaice, mackerel) and maturity workshops (redfish and Greenland halibut, herring and sprat, elasmobranchs and cephalopods) were proposed for 2010.

The report contains a full and updated list of national age readers and co-ordinators.

1 Introduction

1.1 Terms of Reference

The Planning Group on Commercial Catches, Discards and Biological Sampling [PGCCDBS] (Co-Chairs: Christoph Stransky*, Germany, and Kjell Nedreaas*, Norway) met in Montpellier, France, 2–6 March 2009, to:

- a) Review and follow up of last year's recommendations;
- b) Review reports from PGCCDBS contact persons with Assessment Working Groups. Where appropriate propose changes to sampling strategies, protocols, and levels to be proposed for implementation within the EU Data Collection Regulation and national centres responsible for sampling commercial catches;
- c) Identify changes or proposals for changes in data collection that may have a potential impact on stock assessment and advice and summarise these changes for consideration by the Assessment Working Groups;
- d) Agree a workplan for 2010 for further developing and finalising standards and best practices for sampling commercial fisheries;
- e) Finalize the protocol guidelines for maturity staging workshops;

1.2 Participants

First name	Last name	Country
Mike	Armstrong	United Kingdom
Inaki	Artetxe	Spain
Margaret	Bell	United Kingdom
Loes	Bolle	Netherlands
Antonio	Cervantes (part-time)	EU-COM DG MARE
Kenny	Coull	United Kingdom
Jørgen	Dalskov	Denmark
Christian	Dintheer (part-time)	France
Isabel	González Herraiz	Spain
Włodzimierz	Grygiel	Poland
Ryszard	Grzebielec	Poland
Maria	Hansson	Sweden
Ernesto	Jardim	Portugal
Georgs	Kornilovs	Latvia
David	Maxwell	United Kingdom
William	McCurdy	United Kingdom
Kelle	Moreau	Belgium
Cristina	Morgado	ICES Secretariat
Kjell	Nedreaas (Chair)	Norway
Gráinne	Ní Chonchúir	Ireland
Michael	Pennington	Norway
Jukka	Pönni	Finland
Antonio	Punzón	Spain
Tiit	Raid	Italy
Katja	Ringdahl	Sweden
Fran	Saborido-Rey	Spain
María	Sainza	Spain
Marijus	Spegys	Lithuania
Romas	Statkus	Lithuania
Daniel	Stepputtis	Germany
Christoph	Stransky (Chair)	Germany
Els	Torreele	Belgium

First name	Last name	Country
Ville	Vähä	Finland
Sieto	Verver	Netherlands
Joël	Vigneau (part-time)	France
Jon Helge	Vølstad	Norway
John	Witzig	United States
Lotte	Worsøe Clausen	Denmark
Lucia	Zarauz	Spain

Full contact details are given in Annex 1.

1.3 Background

The Planning Group and workshops are proposed in response to the EC-ICES MoU that requests ICES to provide support for the Data Collection Regulation (DCR; EC Reg. 199/2008, 665/2008; Decision 2008/949/EC).

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 DCR, and DG MARE is a member of PGCCDBS to ensure coordination with the DCR 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 remit 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 DCR National Programmes.

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

1.4 General introductory remarks and work plan

As emphasised last year, the PGCCDBS shifted into a more action-based group that could plan and execute tasks. With this in mind, the experts attending the group accepted, to always go beyond recommending, by providing actions, identifying responsibilities and defining schedules to fulfil the tasks proposed.

PGCCDBS took in hands some tasks and defined intersession work to be carried out during 2009. The tasks, task coordinators and deadlines were agreed during the meeting and are included in a specific section about intersession work (Section 5.5).

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 approximately 40 participants from 16 countries, must be built along the years, and finding its role within ICES and having consistent ToRs is of extreme importance.

To avoid large subgroups that partially impaired the productivity in 2006, the meeting was organized in small subgroups with 4 to 9 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 organization 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 inclusion of each group's report as an annex of the other; (ii) the organisation of parallel meetings; (iii) the organization of joint plenary sessions for generic issues, and (iv) the organisation of joint workshops.

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 now 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/pgccdbbs/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 2008, a CRR on hake age calibration was further developed and will be published soon (see section 2.1.5), and other examples will be promoted (redfish ageing, WKACCU/WKPRECISE outcome).

1.7 ICES Theme Session on Data Quality

Suggested presentations or posters to ASC 2009 theme N: Quality and precision of basic data underlying fish stock assessment and implications for fishery management advice [Conveners: E. Jardim (Portugal), Philippe Moguedet (European Commission), and David Balfour (Canada)].

(A) *COST – A generic tool for raising and estimating the properties of statistical estimates in fisheries data.*

Author: Joël Vigneau

Abstract: The Common Open Source Tool (COST) is a set of packages developed in R, designed to provide a comprehensive set of methods for raising and estimating properties of statistical estimates used as input in stock assessment models. This project is financed as part of the European Commission Data Collection Framework (DCF,) which has provisions for estimating fisheries data parameters and their related precision for each of the variables collected throughout a sampling programme. The tool is designed to provide users with appropriate methods for estimating discards volume, length and age structure of catches and landings, and biological parameters such as growth, maturity and sex-ratio. In order to ensure that one method is available in any sampling situation, three approaches are proposed : an analytical, a resampling and a Bayesian modelling. The benefits of the project are threefold: (i) it gathers fisheries statisticians from 9 countries for designing a tool to be used by all European Member States, (ii) it compiles a long history of European projects and workshops tackling the same issues, and (iii) it ensures the accuracy of the proposed methods through an innovative simulation approach. Besides the simulation process, a number of new approaches have been designed specifically for COST in order to render a generic and robust tool, such as common data exchange format specifications and predefined data status upgrading path. Link with end-users is guaranteed through the exportation methods to ICES database (InterCatch) and to the R environment usually used by stock assessment working groups (FLR).

(B) WebGR – storing images of biological material and creating a framework to promote the implementation of sound statistical analysis in age calibration.

Authors: Ernesto Jardim, William James McCurdy (presenting author), et al.

Abstract: The objective of the WebGR project is to develop a set of web services to support the organization and data analysis of calibration workshops, both for age and maturity information, implemented in a coherent tool installable as a website. The website consists of a repository of images, a set of web forms to run a calibration exercise online, a reporting module with the most common statistical analysis and import/export modules to manage images and results. The software has a creative commons license (Open Source) to promote transparency, technology transfer and peer review; and will allow the scientific community to get involved in further developments, like linkage to statistical analysis engines, or any other specific features. The usage of WebGR to carry out calibration workshops will promote the applications of sound statistical analysis to design the experiment and compute workshop results. The results are extracted in a standard format that can easily be sent to scientists doing assessments.

(C) ICES calibration workshops – extracting the juice from bony structures and gonads.

Authors (no order): Lotte Worsøe Clausen, William James McCurdy

Abstract: Age and maturity stage calibration workshops are an acknowledged valuable mechanism for the improvement of the quality of the population structure data that are available to assessment working groups. Additional benefits include the establishment of active peer networking, including continued contact between participants after Workshops and the age reader/age coordinators Google group. This has led to improvement in the self-confidence of the participants and has also provided them an increased understanding of their importance of their unique role within the overall management of the marine ecosystem, including calibration workshops, terms of reference and reports. Workshop networking is especially important for age readers, many of whom work in small groups. The terms of reference for calibration workshops have evolved in parallel with the role of the ICES Planning Group on Commercial Catch, Discards and Biological Sampling, as a pushing mechanism regarding the improvement of data quality. Calibration workshops have moved beyond the study age and sexual maturity in isolation and the prospect of age reader interaction with stock assessors and other experts is very interesting. Calibration workshop reports are now available in the PGCCDBS documents repository and the publication of a series ICES Cooperative Research Reports for age calibration workshops, is bringing this work to the attention of the scientific community and recognising the merit of the scientists involved.

(D) Minimum Sampling Programmes - How to deal with a plethora of different protocols.

Authors (no order): Maggie Bell

Abstract: For many years it has been a task of PGCCDBS to (a) provide guidance on data collection regarding length sampling of fish and shellfish and (b) attempt to produce a protocol which would encourage data collection in a standard and coordinated way throughout Europe. During discussions with members from various countries in 2007 - 2008 it became apparent there were some basic differences in what was actually collected. These posed the questions - were the data comparable, were they biased and should they be used for assessments in an identical way?

In 2008 a Minimum Sampling Protocol was designed as an aid to be used when collecting data. A list of procedures adopted by 21 institutes was compiled and this resulted in some potentially significant differences. For example some countries always weigh their samples to record weights accurately but some countries always use a length/weight relationship to estimate weights sampled. Many countries include spatial stratification when deciding their sampling but other countries sample from the same locations at all times. The procedure used to create missing data for strata that have not been sampled can differ considerably.

Proposal 1) analysis of results to establish if procedures used are compatible within a region – required when raising together to an international level

Proposal 2) to standardise procedures

Proposal 3) use the ‘traffic light’ scorecard developed by WKACCU (ICES 2008e) to provide potential bias created by differences in procedures.

(E) Quality assurance framework – the concept of quality assurance applied to fisheries data and its operationalisation under the ICES scope.

Authors: Kjell Nedreaas, Christoph Stransky, Ernesto Jardim, Joël Vigneau

Abstract: Quality assurance of input parameters for stock assessment is a major subject promoting the confidence of scientists and stakeholders in the advice provided by ICES. Since 2007 PGCCDBS has developed a conceptual framework that includes methodological workshops, calibration workshops, sampling protocols, guidelines and software in a hierarchical structure following the information path from the sampling grounds to advice. The framework is based on the concept of “quality indicators” that constitute meta information of the relevant parameters. Indicators may be statistics, scorecards, or simple “flags” that contain information about the quality of each parameter and allow decisions regarding the usage of data to be made based on objective criteria. Additionally such system promotes standardisation of procedures and dissemination of results.

(F) A framework for improving accuracy in fisheries data used in stock assessments

Authors: Michael Pennington, Joel Vigneau, and Jon Helge Vølstad

The accuracy of fisheries data is determined by systematic errors (bias), and random errors due to sampling of catches. Systematic errors may have at least as much impact on the stock assessment as random sampling errors. Whereas precision in fisheries statistics can be improved by increasing the sample sizes in data collection programs, this is not the case with bias. It is therefore important to minimize or eliminate sources of bias by developing and following sound field data collection procedures and analytical methods. We present a practical framework for detecting potential sources of bias in fisheries data collection programs. Several indicators are used to detect bias in each of these parameters, using a simple scorecard for rating. The scorecard is a practical tool to evaluate the quality of data sources used for stock assessments, and can help reduce bias in future data collections by identifying steps in the data collection process that must be improved. The proposed scorecard was applied to the data collection program for the Norwegian Northeast Arctic saithe fishery in 2007. This case study suggested that the system is practical and useful, but it is recommended that more fisheries be evaluated to develop the scorecard further.

(G) Evaluating the propagation of sampling errors in age-length keys to stock assessments by bootstrapping

Authors (no order): Jon Helge Vølstad, Michael Pennington, Dankert Skagen, Sondre Aanes

Abstract: The reliability of stock assessments and the quality of scientific advice depend on the accuracy of estimated age-composition of commercial catches and of abundance indices from scientific surveys. Data on length and age of fish in commercial catches or in population estimates from scientific surveys are typically obtained by multi-stage sampling, where fish are nested within primary sampling units which typically are defined by stations or trips. As a result of such clustering, the effective sample size with respect to estimates of length and age distributions may be closer to the number of stations or trips than the total number of fish measured. We evaluate the propagation of sampling errors in input data to stock assessments by bootstrapping of the primary sampling units (hauls or trips). Uncertainty in catch predictions according to a simple harvest rule were evaluated by passing data from the bootstrap simulations through assessments using the toolbox TASACS. Uncertainty in stock assessments due to sampling errors in age-length keys is evaluated for Northeast Arctic Cod. We also generated sets of age-structured catch and survey data as input to analytic assessments from a generic artificial population. We study how noise in the input data propagates through the assessment and prediction, and evaluate the effects of alternative survey strategies. Results suggest that systematic errors (year effects) in the survey tuning indices have significantly more impact on the stock assessment than purely random noise. The assessments from VPA type models and separable models were equally impacted.

(H) *Do the regular age reading exercises improve the quality of assessment? A case of Baltic herring.*

Authors (no order): Georgs Kornilovs, Jon Helge Vølstad, Daniel Stepputtis, Dankert Skagen and Tiit Raid

Abstract: In 1997 the ICES Baltic Herring Age Reading Study Group (BHARSG) was founded to investigate and enhance the agreement in age determination of Baltic herring between national laboratories. In total 9 countries around the Baltic Sea were involved in the work of BHARSG. At the beginning, the different methods to sample, store and read the otoliths of Baltic herring were described, followed by the preparation and exchange of herring otolith samples. The first age reading results revealed significant differences between readers. The agreement was around 50% and the coefficient of variation was high. BHARSG had two workshops in 1998 and 2000 and additional regular otolith exchanges. The agreement between readers improved gradually, especially after the workshops, where differences in age determination were thoroughly discussed on case by case basis. The experts decided to continue regular exchanges of otolith samples even after BHARSG was dissolved in 2001. In 2008, a workshop of Baltic herring age reading was held again and the achieved average agreement in age determinations was 86.9% (CV 6.4%). The improvement of age reading in Baltic herring and its consequences on the precision of XSA stock assessment will be presented and discussed.

1.8 Project proposal

Call for tender on age determination and maturity staging of species for which biological sampling for analytical assessments has not been carried out on a routine basis yet

During the meeting, a proposal for a project was put forward, which the PG supported.

Title: Age Determination and Maturity Staging of species for which biological sampling for analytical assessments has not been carried out on a routine basis yet

Budget: 800.000 €

Duration: 18 months

Objective: The new DCR requires biological information on species for which age or maturity determinations have not been carried out on a routine basis yet. This calls for development of validated techniques, harmonised between laboratories handling these species. Based on existing validation techniques and further development of applied methodology, ageing and maturity staging techniques must be developed and stated in agreed manuals through a network of excellence for the following species:

- Lesser spotted dogfish (*Scyliorhinus canicula*)
- Spiny dogfish (*Squalus acanthias*)
- Longnose spurdog (*Squalus blainvillei*)
- Rays & Skates
- Pollack (*Pollachius pollachius*)
- Grey gurnard (*Eutrigla gurnardus*)
- Red gurnard (*Aspitrigla cuculus*)
- Tub gurnard (*Chelidonichthys lucerna*)

- Lemon sole (*Microstomus kitt*)
- Witch flounder (*Glyptocephalus cynoglossus*)
- John Dory (*Zeus faber*)
- Ballan wrasse (*Labrus bergylta*)
- Wolf-fish (*Anarhichas* spp.)
- Conger eel (*Conger conger*)
- Mediterranean horse mackerel (*Trachurus mediterraneus*)
- Pouting (*Trisopterus luscus*)
- Forkbeards (*Phycis* spp.)

A small part of these species will be dealt with in 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]), but only with regard to basic data collection and only for a part of the parameters (maturity, age).

The rationale for such project is given in section 4.7.5. The PG will forward this proposal to the Liaison Meeting and ask for inclusion of the proposal by correspondence.

1.9 Organization of the report

The report is organized by ToR, starting with Section 2 for ToR a) to Section 6 for ToR e). A set of annexes was added including the list of participants, agenda, ToR for 2010, 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 (ToR a)

Table 2.1. Follow up recommendations from last year and update on task status.

Recommendation	For follow up by:	Timeframe	Status at PGCCDBS 2009
Test reporting system from AWG to EC/DCR and PGCCDBS (Section 3.2).	Jørgen Dalskov, Ernesto Jardim, Christoph Stransky and Joël Vigneau	PGCCDBS 2009	Initiated, but not followed up. New proposals for AWG contact persons see section 3.2.
WKISCON report to be distributed	ICES Sec. to forward to EG.	asap	Done.
WKUFS report to be distributed	ICES Sec. to forward to EG.	asap	Done.
Reports of WK on Age Calibration to be distributed	PGCCDBS chair confirm with chairs of WKFLO and WKARRG that the reports were forwarded to EG.	asap	ICES Secretariat didn't send. It is important to identify the EG in the ToRs proposal.
Reports of WK on Maturity Staging to be distributed	PGCCDBS chair to confirm with chairs of WKMSMAC, WKMSHM and WKMSCSWH that the reports were forwarded to EG.	asap	ICES Secretariat didn't send. It is important to identify the EG in the ToRs proposal.

Recommendation	For follow up by:	Timeframe	Status at PGCCDBS 2009
Comments on WKMS recommendations (Table 3.4.4) to be distributed to WKMS chairs.	ICES Sec. to forward to chairs of WKMSMAC, WKMSHM and WKMSCSWH.	asap	Done.
PGCCDBS recommends that follow-up workshops on maturity staging should be held only if intersessional work shows they are necessary.	ICES Sec. to forward to AWG, WKMS and STECF/SGRN.	asap	Recommendation to be included in the AWG ToRs.
Liaison meeting recommendations to be forwarded.	ICES Sec. to forward to LM.	asap	Done. Relevant LM recommendations are forwarded to PGCCDBS.
PGCCDBS recommends an implementation study on landings of mixed species during 2008 to identify this problem and evaluate the need for a workshop. The protocol is described in Section 4.1.	ICES Sec. to forward to EC/STECF/SGRN. Ken Coull will coordinate this work intersessionally.	PGCCDBS 2009	Done (see section 2.1.1)
PGCCDBS recommends a workshop on sampling methods for recreational fisheries [WKSMRF] (See full proposal in Annex 4)	ICES Sec. to send to Council for approval.		Done. Approved by ACOM. Will be held in Nantes, France, 14-17 Apr 2009.
PGCCDBS recommends intersessional work to cross check ICES assessment stocks with DCR species prioritisation (Section 4.1): review the grouping of species proposed by SGRN (Nantes, 2008) and check the allocation of species to each group check if the species-area allocations are in line with the current ICES stock definitions.	ICES Sec. and Maris Plikshs will coordinate this work intersessionally.	End of March.	Done (part of the new DCR).
Compare during 2008 national protocols for sampling length frequencies of landings with the minimum sampling protocol described in Section 6.1.2 to identify main deviances.	Margaret Bell will coordinate this work intersessionally.	WKACCU 2008, PGCCDBS 2009	Done, see section 2.1.2.
PGCCDBS recommends the quality assurance framework described in Section 6.2 to be implemented.	ICES Sec.		Not yet. Wait for WKPRECISE results.
PGCCDBS suggests a set of quality indicators (Section 6.2, Table 6.1 and 6.2) to be considered by WKACCU and WKPRECISE.	PGCCDBS chair to forward to WKACCU and WKPRECISE chairs.	asap	Partly done (WKACCU).
PGCCDBS recommends a Workshop on methods to evaluate and estimate the precision of fisheries data used for assessment [WKPRECISE] (See full proposal in Annex 4).	ICES Sec. to send to Council for approval.		Done. Approved by ACOM. Will be held in Copenhagen, 8-11 Sep 2009.
PGCCDBS recommends the guidelines for otoliths exchange and guidelines for age calibration workshops to be included on the PGCCDBS repository.	ICES Sec.	asap	Done.

PGCCDBS recommends the guidelines for age calibration workshops to be distributed to all future workshop chairs together with the ICES guidelines for chairs.	ICES Sec.		Done for 2009 Wks.
PGCCDBS recommends the draft guidelines for maturity staging workshops to be distributed for comments to WKMS chairs and AWG chairs.	ICES Sec. to forward to WKMS and AWG chairs.	asap	Done for 2009 Wks.
PGCCDBS recommends developing a small database to store the information about workshop planning.	ICES Sec. to develop such tool. PGCCDBS to update and insert information.	PGCCDBS 2009	In progress (see section 5.2) by PGCCDBS.
Set up a minimum sampling protocol for collection of otoliths.	Willie McCurdy will coordinate this work intersessionally.	PGCCDBS 2009	Done (see section 2.1.3).
Explore the possibility of using EU control reports and if possible compile them.	ICES Sec. and Jørgen Dalskov will coordinate this work intersessionally.	PGCCDBS 2009	In progress.
Evaluate google groups and sharepoint to establish a forum for age readers.	Gráinne Ní Chonchúir will coordinate this work intersessionally.	asap	Done (see section 2.1.4).
PGCCDBS recommends an otolith exchange of North Sea Plaice.	Loes Bolle	PGCCDBS 2009	Will be carried out in 2009.
PGCCDBS recommends an otolith exchange of Mackerel.	Owen Goudie and Robert Watret	PGCCDBS 2009	In progress (see section 2.1.8).
PGCCDBS recommends an otolith exchange of Eel.	Willem Dekker	PGCCDBS 2009	Not done yet, but will be carried out in 2009, followed by WKAREA in April 2009, also see section 2.1.8.
PGCCDBS recommends an otolith exchange of Haddock.	Gordon Henderson, Mandy Gault and Willie McCurdy	PGCCDBS 2009	In progress (see section 2.1.8).
PGCCDBS recommends a Workshop on Age estimation of European hake [WKAEH] (See full proposal in Annex 4).	ICES Sec. to send to Council for approval.		Done. Approved by ACOM. Will be held in Vigo, Spain, 9-13 Nov 2009.
PGCCDBS recommends a Workshop on Age reading of European anchovy [WKARA] (See full proposal in Annex 4).	ICES Sec. to send to Council for approval.		Done. Approved by ACOM. Will be held in Mazara del Vallo, Italy, 9-14 Nov 2009.
PGCCDBS recommends a Workshop on Age Calibration of Red mullet (<i>Mullus barbatus</i>) and Striped mullet (<i>Mullus urmuletus</i>) [WKACM] (See full proposal in Annex 4).	ICES Sec. to send to Council for approval.		Done. Approved by ACOM. Will be held in Vigo, Spain, 9-13 Nov 2009.

PGCCDBS recommends a Workshop on Sexual Maturity Staging of sole, plaice, dab and flounder [WKMSSPDF] (See full proposal in Annex 4).	ICES Sec. to send to Council for approval.	Done. Approved by ACOM. Will be held in IJmuiden, The Netherlands, 16 -20 Nov 2009.
PGCCDBS recommends a Workshop on crustaceans (<i>Aristeus antennatus</i> , <i>Aristaeomorpha foliacea</i> , <i>Parapenaeus longirostris</i> , <i>Nephrops norvegicus</i>) maturity stages [WKMSC] (See full proposal in Annex 4).	ICES Sec. to send to Council for approval.	Done. Approved by ACOM. Will be held in Messina, Italy, 19-23 Oct 2009.

2.1 Intersession work

2.1.1 Mixed species landings

PGCCDBS (ICES, 2008b) agreed with the recommendations of Liaison Meeting (Anon., 2008a) on the need to get better information of the species compositions in mixed species landings and that this objective is relevant for all mixed species landings. The Working Group on Elasmobranch Fishes (ICES, 2007) stated that the data collected for skates (Rajidae), and possibly other elasmobranchs, from market sampling and discard surveys were compromised by inaccurate species identification and recommended that PGCCDBS provide the necessary supporting information to ensure that data collection (including species identification) and raising procedures (by gear, season, ICES Division and nation) for skate and ray sampling are standardised across laboratories. In addition, WGEF suggested that such work may be best conducted in the form of a one-off workshop.

This point is emphasised by the provisions of the future DCR as the SGECA-SGRN 08-01 meeting elaborating the rules for implementing the EU Regulation 199/2008, demanded to estimate on a routine basis “the share of the various species for those species that are internationally regulated, e.g. flatfish in ICES division IX, megrim, anglerfish, and elasmobranchs.”

The PG was of the opinion that the first step in addressing this issue was to assess the extent of the problem and to identify the methodological problems. Since the estimation of the share of the various species will be mandatory under the new DCR, the suggestion was for each MS to start in 2008 an implementation study. Such a study should:

- 1) evaluate from the sales notes the total quantity of references to mixed species (rays, anglerfish, “soup”, fry, ...)
- 2) check that the mixed species boxes seen at the market are referenced with a similar label in the sales notes
- 3) check by sampling that boxes of elasmobranchs, labelled as a single species, are composed of the appropriate species
- 4) sample boxes of mixed species, only to count the different taxa
- 5) notice when the species identification could not be carried out because of difficulties in distinguishing the different taxa (morphologically too similar, lack of formation, ...)
- 6) confirm/test that the sampling staff is qualified to distinguish the various taxa composing the mixture of species in the landings.

A total of 10 Institutes from 8 different countries provided either a working document describing their work in detail or a summary report of their findings, see Annex 13.

Working documents were submitted by France, Portugal, Spain (IEO), UK – England, and UK – Scotland with summary reports from Germany, Ireland, The Netherlands, Spain (AZTI) and Sweden. These were summarized in a presentation and discussed in Plenary. In relation to sampling of skate and rays there were 5 examples (France, Portugal, Spain – AZTI, Spain – IEO and UK – Scotland) presented in working documents where estimates of landings were calculated at species level from the quantity landed of “mixed skate”. Following the procedures discussed at PGCCDBS will ensure that the methods of estimating species landings for skate and rays are standardized but it is important that this process is done at national level.

In quantifying the landings of other mixed species, it is also recognized that there may be a need to consider sampling for length compositions as well as species composition as there may be occasions when the length structure represented in “mixed” differs from that in the species specific landings. An example is shown below (Figure 2.1.1) where the length structure for *Lophius* sp. from identified landings and “mixed landings” is demonstrably different. When drawing up their concurrent sampling programme, countries also have to consider sampling some of the groups of “mixed species” as they may contain species which are required to be sampled.

PGCCDBS was of the opinion that the outcomes of the intersession work indicated that methods of estimating the landings of individual species from identified groups of “mixed species” were well established and could be used on a routine basis by following procedures identified (in the working documents and summaries) by the participating countries. Each country is now in a position to estimate landings of individual species from grouped “mixed species” landings and should continue to work on developing their estimation procedures, taking into account spatial and temporal issues where relevant.

For countries that have not yet completed the implementation studies, it is suggested that they continue with their work, taking into account the outcomes presented to PGCCDBS (Annex 13).

It was agreed by PGCCDBS that there was no need for a specific workshop to address this matter.

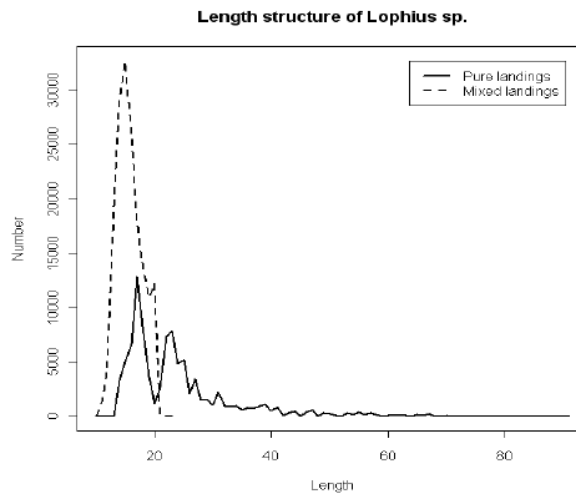


Figure 2.1.1. Comparison of the length structure of *Lophius* sp. between the pure and mixed landings.

2.1.2 National protocols for sampling length frequencies of landings, using the MSP for length

A minimum sampling protocol (MSP) for sampling lengths of fish landed for sale, was agreed and adopted at the 2008 meeting of PGCCDBS (ICES 2008b). During discussions, it became apparent that there were some basic differences between Member States in what was actually collected and supplied to assessment working groups (AWG).

These differences posed some questions - were the data comparable, biased, partial etc.? How accurate were they? Should they be used together or assessed separately?

Meanwhile, PGCCDBS had recommended that workshops be held to

- Evaluate and Estimate Accuracy in fisheries data used for AWGs. (WKACCU, Oct. 2008)
- Methods to evaluate and estimate the precision of fisheries data for assessment (WKPRECISE, Sept. 2009)

FRS agreed to construct and circulate a short questionnaire about sampling procedures and data treatment, including the gathering and processing of data.

Outcome: 21 institutes replied.

It was apparent that, for example, the procedures used by some MS to define a “sample” or the fact that not all the size categories of fish landed are routinely sampled (meaning the full length range is not available) may cause bias.

The set of questions and answers were provided to members of WKACCU who considered them during the workshop.

List of questions

- 1) Does temporal stratification exist in your sampling programme? – If so, by what period (daily, monthly, quarterly or annually)
- 2) Is sampling random or structured (random = different sampling days and different boats targeted. Structured = often same boats sampled / usually sampling done on same day every week or month).
- 3) Does spatial stratification exist in your sampling programme?
- 4) If yes, what are the area definitions?
- 5) How many samples are expected (or targeted) by strata?
- 6) Is each strata sampled?
- 7) How are missing strata catered for?
- 8) Is every size category of a species (landed by a single boat) measured?
- 9) Are full boxes sampled (i.e. not only part of a full box)?
- 10) If not, what is typical sample size?
- 11) Are the boxes randomly sampled – i.e. not always the 1st box in a row or stack?
- 12) If sub-sampled, are length numbers raised to (1) boat or (2) fishery level?
- 13) What is the method used for length measurement – e.g. to the cm below, to the fork of tail, pre anal fin length etc. Please specify
- 14) Are total landed weights of each category recorded by sampling team?
- 15) If not, by which source are total landed weights (by category) provided?
- 16) Is a weight / length relationship routinely used to establish sampled weights?
- 17) Is target species recorded?

2.1.3 Minimum Sampling Protocol for Age Calibration

A minimum sampling protocol for age calibration has been developed based on the EFAN/TACADAR outcome (see PGCCDBS 2006 report).

1. Written Protocol

- 1.1. Develop a written protocol for each type of Calcified Structure (CS) preparation and species.

2. Fish Sampling

- 2.1. Define measurements, e.g. total length to 0.5 cm below, whole weight +/- 5g.
- 2.2. Specify all the required additional information, e.g. species, area, date, fishing gear, sex, maturity, etc. (minimum = species, area and date of capture).

3. Selection of CS

- 3.1. Determine which calcified structures are to be used e.g., otoliths, illicia.
- 3.2. Identify the preferred method of otolith removal for the fish species.

4. Collecting CS Samples

- 4.1. Specify cleaning method, e.g. removing blood/tissue before drying.
- 4.2. Transport and storage must prevent damage and deterioration.
- 4.3. Moisture content should be controlled, e.g. store in a cool dry place.

5. CS Preparation

- 5.1. Identify the most appropriate preparation, e.g. sectioning, burning/staining.

6. Equipment Maintenance and Set Up

- 6.1. Ensure equipment is serviced regularly and correctly maintained.
- 6.2. Set up microscope for each individual reader before age reading.
- 6.3. Ensure work position is comfortable and there is sufficient time read the CS.

7. Calibrated Image of CS

- 7.1. Use a computer connected to a digital camera fitted on a binocular microscope.
- 7.2. Define a standard set-up for each species. Make sure light settings, magnification and equipment are standardised to the highest degree possible.
- 7.3. Prepare images for each otolith and for each viewing method used (using reflected light and/or transmitted light).
- 7.4. Calibrate each image by adding a scale bar (e.g. 2mm for *Pollachius virens* otoliths) and save the image using the unique CS sample ID number in the file name.

8. Age Reading

- 8.1. Log on to the database if using electronic data storage.
- 8.2. Follow the protocol. Check sample ID and otolith ID.
- 8.3. Define growth rings (translucent or opaque) and reading axes.
- 8.4. Apply criteria for rejection of CS, e.g. badly damaged or crystalline otoliths.
- 8.5. Apply criteria for the identification of false rings, e.g., juvenile growth.
- 8.6. Apply criteria for counting the valid annual rings (growth zones).
- 8.7. Apply birthday criteria for estimating age, usually 1 January.
- 8.8. Apply criteria to for the interpretation of *annuli* in relation to the 'birthday' of a fish (e.g. quarter 3 'pre-birthday' *annuli* in young fish, missing *annulus* in first quarter if protocol requires counting of opaque bands).
- 8.9. Apply criteria to recognise incomplete growth rings in older fish.
- 8.10. Consider an initial 'blind' reading before looking at the biological data, (e.g. length, sex, maturity, etc.). This may help to increase age reader precision.
- 8.11. Record the age, otolith edge growth and confidence in the age reading.
- 8.12. The integrity of the links between the data and original CS material must be maintained. Data edits must be backed-up and traceable. Keep original records.
- 8.13. Annotate the calibrated images with the positions of the *annuli*.

9. Quality Assurance

- Develop a written protocol.
- Ensure age readers follow the written protocol.
- Allow adequate time for readings and re-readings.
- Provide advice on other potential age reading problems.
- Provide advice on using length, weight & maturity when reading CS.
- Use a glossary (e.g. EFAN/TACADAR).
- Develop and implement a training programme.
- Back up all electronic data and edits. Keep all paper records.

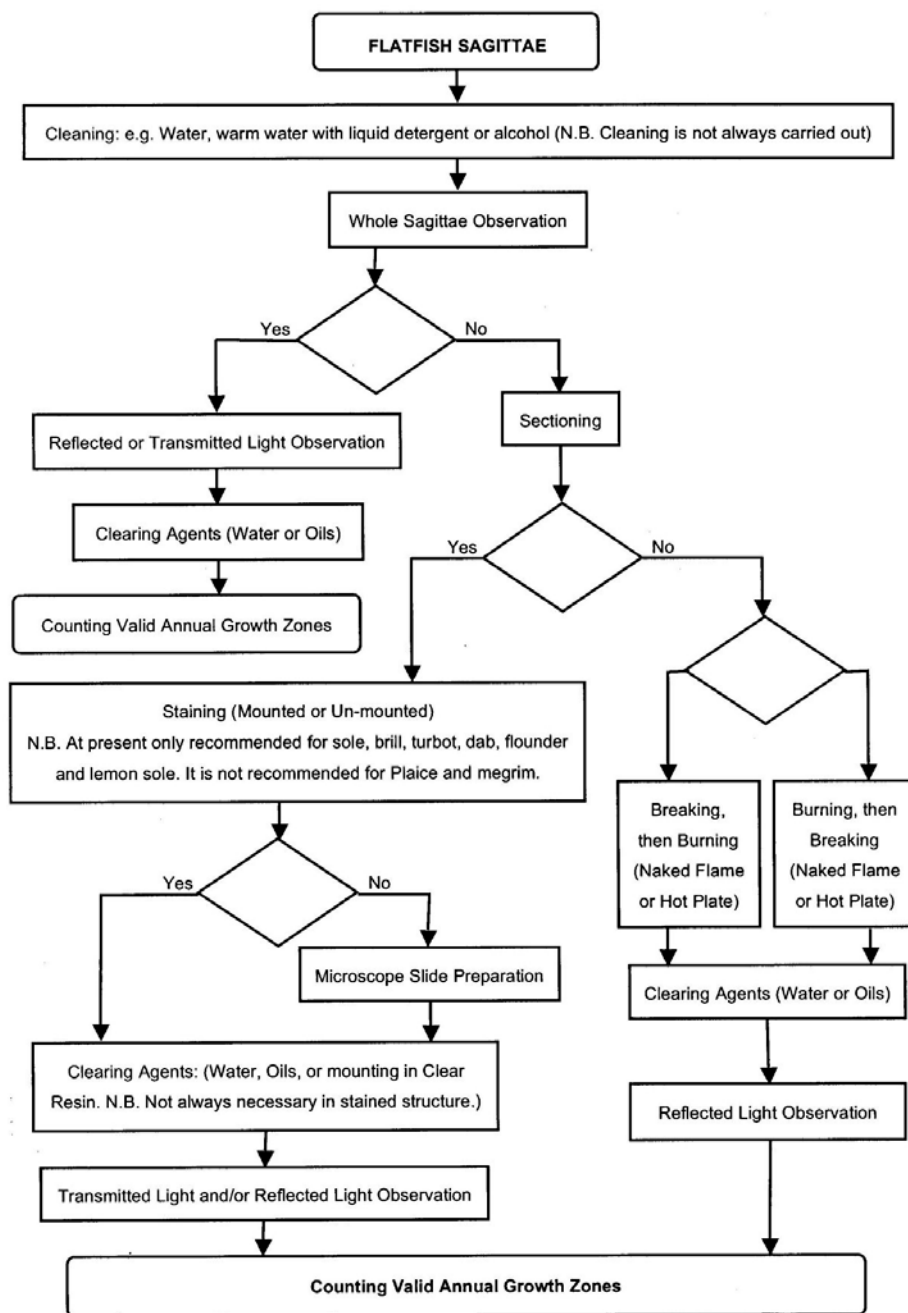


Figure 2.1.3.1. Methods used to prepare and observe the otoliths of flatfish species (Pleuronectiformes) for age reading (Reference: fig. WG2-7 from the final TACADAR Report)

10. Quality Control

- Good conservation of CS is essential: Some CS will be re-read at intervals to monitor age reader precision. If the condition of the CS has deteriorated significantly compared with a previous reading, the two readings cannot be compared to measure change in age reader precision.
- Monitor age reading precision. If there is only one reader for the species, he should as a minimum, monitor changes in their own precision by regularly re-reading a sample of the CS. Return statistics on precision to age readers.
- Material of known age (usually from mark/recapture experiments) is rare. Ensure that age readers have the opportunity to take part in CS exchanges and Age Calibration Workshops (ACWK).
- Revise the written protocol as new information becomes available, e.g. mark and recapture information from new research, or experience gained at an ACWK.
- Review methodology: A wide variety of techniques are used across European institutes for the preparation and age reading of otoliths of the same fish species. Fig. WG2-7 from the final TACADAR Report (Anon. 2006) shows some of the methods used to prepare and observe the otoliths of flatfish species (Pleuronectiformes), for age reading (Figure 2.1.3.1).

2.1.4 Age readers forum

PGCCDBS feels that it is important to respond to feedback received from those engaged in age reading across Europe, and to establish a web based age readers' forum. The forum would be used as a "One Stop Shop" for all those involved in age reading. The forum would provide an important resource for training of new age readers, as well as providing opportunities for sharing existing age reading manuals, established standard operating procedures, standardising preparation and interpretation methods. It is proposed that the forum would include but not be limited to the following information:

- The contact details and a mailing list of those engaged in age reading of the different species.
- The guidelines for exchanges and workshops established by the PGCCDBS.
- Age reading manuals/SOP's.
- Descriptions of preparation methods for the different calcified structures.
- Annotated images of agreed ages resulting from any exchanges or workshops.

The appropriate location for such a forum is still open to discussion. It was felt that an ICES SharePoint site may be a way forward, and this option is currently being tested (<http://groupnet.ices.dk/AgeForum/default.aspx>).

2.1.5 Editing the Hake Cooperative Research Report

The first age calibration related ICES Cooperative Research Report, No. 294, Hake age estimation: state of the art and progress towards a solution, has been edited and submitted to ICES for publication. CRR No. 294 was edited by Carmen Piñeiro, (IEO) C.O. de Vigo, Cristina Morgado, (ICES) Copenhagen, Maria Sáinza, (IEO) C.O. de Vigo and Willie McCurdy, (AFBI) Belfast.

It is very likely that most or all of the editors will have no previous experience of editing an ICES Cooperative Research Report. An early meeting of the editors is highly recommended to discuss and agree the detail of the CRR structure, task distribution and the completion date. Regular progress reviews are very valuable. The ICES view of an age calibration CRR is clear: age calibration ICES CRR's must not just publish a group of old workshop reports. They should be an update on the current status of ageing for the species (or group of species) together with a summary of the latest workshop report. The suggested maximum length for an age calibration ICES CRR is 40 pages.

The challenges facing the editorial varied considerably. Editing should be controlled by a check-out or circular editing strategy. Reviewing the Exchange and Workshops is self-explanatory, but as all the other sections of the age calibration CRR were largely based on these same reports, it was difficult to avoid repetition in the early stages. The complex nature of hake age reading in Europe, necessitated a very deep revision of reports, publications and gray literature. Other species may not have same challenge to move from a 'slow growth' hypothesis to a 'fast growth' one, but each age calibration ICES CRR will have its own equally difficult challenges. Otolith workshops are very important scientific meetings that usually are documented as grey literature – it is time to change that.

2.1.6 COST project (Common Open Source Tool for raising and estimating properties of statistical estimates derived from the Data Collection Regulation)

The objective of the study is to develop a Common "Open Source" Tool (COST) for assessing the accuracy of the biological data and parameters estimates collected for stock assessment purposes within the framework of the Data Collection Regulation. The tool consists of R libraries allowing to import and handle fisheries data (COST-core), to explore the data (COSTeda), to estimate the parameters and related precision (COSTdesign & COSTbayes) and finally to do simulation (COSTsim). The R libraries and manuals will be available on the Deliverables page as and when they are developed.

The project will be finished in May 2009 and the tools will then be available for use.

<http://wwz.ifremer.fr.cost>

Objectives

As a response to the lot N°2 of the call for tenders FISH/2006/15, the common "open source" tool-box will consist of different packages that will develop validated methods to investigate and estimate parameters for (i) discard volume, (ii) length and age structure of catches and landings, and (iii) biological parameters such as growth, maturity and sex-ratio. Where appropriate, the estimates will be calculated according to one out of a fixed number of agreed raising procedures, based on the methods already developed by some Institutes.

Linkage with ICES end-users will be consolidated in close cooperation with ICES in order to facilitate their use by the stock assessment working groups. The definitions and methods will be in line with those described and summarised in the report of the ICES Workshop on Sampling Design for Fisheries Data ([ICES 2005](#)).

According to the tender document, the packages should include:

- Data administration;
- Exploratory data analysis;
- Parameter estimation and associated precision;
- Simulations.

The main tasks should be as follows:

- 1) Propose a common format of datasets comprising all the variables needed to raise the data to the population level and estimate statistical properties (existing formats such as Fishframe will be considered)
- 2) Based on the common format, propose exploratory analysis of the most disaggregated data to enable the search for outliers, misallocated data and allocation of samples per strata
- 3) Based on the common format, develop algorithms and implement software programs to estimate the statistical properties at a strata level and at the population level
- 4) Based on the common format, develop algorithms and implement software programs to account for missing data and account for external errors
- 5) Based on the common format, develop algorithms and implement software programs to enable the investigation of the number of samples and the number of individuals to sample to achieve a target precision

The development of the common "open source" tool-box should take into account the recommendations from the 2006 ICES Planning Group on Commercial Catches Discards and Biological Sampling (ICES 2006) and from the 2005 ICES Workshop on Sampling Design for Fisheries Data (ICES 2005).

The outcomes of the project should include:

- Report summarising the data
- Graphs of the Exploratory analysis results
- Raised estimates (volume of discards raised by trips, by total landings and/or by an auxiliary variable, length and age structure of catches, biological parameters) by agreed strata associated with their precision estimates
- Report summarising precision estimates and quality indicators

- Simulation analysis to investigate the optimal sampling intensity to achieve a target precision
- Manuals (COST reference manual, COST Tutorial and COST User Manual)

Methodology

Constitution of a core team

To answer such a technical call for tenders involving very precise expertise, there were two alternatives, namely (i) chose a very compact core team and developers or (ii) open the door to a variety of expertise from different geographical regions. The first alternative would have been an easy and efficient way to carry out the work but it is the second alternative that has been chosen to guarantee (i) that all the country and/or regional specificities would be considered, (ii) ensure that the methods developed correspond to the needs of those countries and (iii) ensure the widest dissemination of knowledge. The counterpart of this choice is that the management package including the work of the core team and the beta-testing of the methods takes a substantial part of the overall budget.

Area coverage

The COST methods will develop validated methods to investigate and estimate sampling indicators for (i) discards, (ii) length and age structure of catches and landings, and (iii) biological parameters such as growth, maturity and sex-ratio from all the geographical regions covered by the DCR. In COST, there are experts from the Baltic, the North Sea, the Atlantic and the Mediterranean, in order to ensure the complete coverage of the European continental waters.

2.1.7 WebGR project

The objective of the WebGR project is to develop a set of web services to support the organization and data analysis of calibration workshops, both for age and maturity information, implemented in a coherent tool installable as a website. The website consists of a repository of images, a set of web forms to run a calibration exercise online, a reporting module with the most common statistical analysis and import/export modules to manage images and results. The software has a creative commons license (Open Source) to promote transparency, technology transfer and peer review; and allow the scientific community to get involved in further developments, like linkage to statistical analysis engines, or any other specific features.

Under the scope of WebGR, a workshop contains several calibration exercises and each calibration exercise contains individual and group calibrations, that are carried out in a loop until the objectives are achieved (Figure 2.1.7.1).

The core of the WebGR workshop paradigm is based on the hierarchical structure of the workshop, seen as an operational unit, where several objectives like age or gonad calibration of several stocks may exist simultaneously and require the comparison of readers at distinct levels (e.g. institute, experts, stock assessment input providers, etc.). Each objective must be clearly identified and defined and a specific calibration exercise is then carried out following a statistically sound design. Each calibration exercise is organized in a sequence of individual and group classifications that can be carried out for as long as necessary. In some cases the first individual exercise is sufficient, as is the case of stocks without problems regarding criteria interpretation, or it may be very complex and require several group discussions followed by individual exercises to make sure the interpretation is correct.

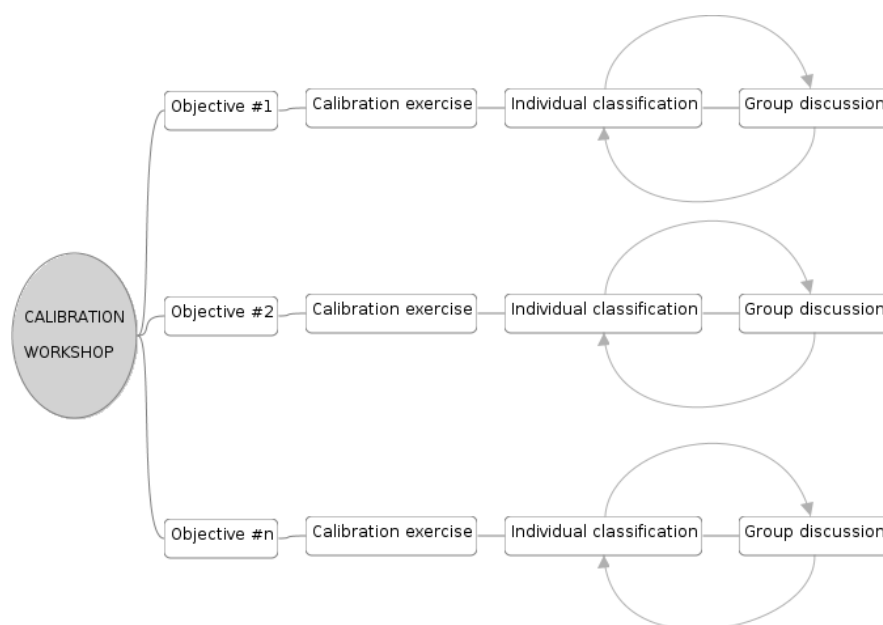


Figure 2.1.7.1. WebGR calibration workshop

2.1.8 Otolith exchanges carried out 2008/2009

Mackerel

At the PGCCDBS meeting in March 2008, mackerel, Skip Jack mackerel and Spanish mackerel were identified as potential candidates for international otolith exchanges. Fisheries Research Services (FRS) in Aberdeen, Scotland, undertook to initially contact all institutes to establish whether age readers considered the exchanges necessary and to get agreement on who would participate.

Outcome: mackerel (*Scomber scombrus*) was necessary; Skip Jack mackerel is from the *Trachurus* family and should be dealt with separately; Spanish mackerel is only fished by Spain and Portugal and a small exchange should be arranged by those countries alone.

FRS then undertook to arrange and manage the exchange. 13 institutes/countries agreed to take part in the age reading of mackerel. 195 pairs of otoliths were prepared (mounted in resin and photographed). Most otoliths were supplied by FRS from fish caught in 2006 - 2008 in ICES Sub-areas IV, VI and VII. To ensure full fishing area coverage, small sets of otoliths were also donated by Spain (AZTI and IEO) and Portugal (IPIMAR) from ICES Sub-areas VIII and XI.

Interim results: By February 2009, eight institutes had read the otoliths and provided the ages. Early analysis showed that the % agreement so far is very poor, ranging from 53% to 79%. Even without the age readings from the remaining institutes, it would appear that an age reading calibration workshop is necessary. It is hoped that the exchange will be concluded by May 2009 and the analysis and results made available soon after.

Haddock

PGCCDBS (2008, Section 8.1.4) identified that haddock was one of the species that needed to be evaluated under their timetable for otolith exchange and workshops. It was agreed that during 2008, a small scale otolith exchange should be conducted with a view to determining the need for a larger scale exchange followed by a workshop. United Kingdom (Scotland and Northern Ireland) agreed to contact the named otolith readers in each country involved in haddock age determination in order to canvas their views about an exchange and consider the timescale involved. It was decided that the exchange should include otoliths from two regions:

- North Sea and West of Britain
- North East Arctic

Having identified all the relevant participants, Scotland prepared the material required and also decided to include images of the samples with a view to circulating these along with the actual sample otoliths. However, this activity took considerably longer than expected, resulting in delays in all relevant material being distributed. The material from the North Sea and West of Britain is now in circulation with the expectation that results will be available for analyses in autumn 2009. As the samples for the North East Arctic were restricted to broken otoliths only, PGCCDBS was of the opinion that a new set of sample otoliths be prepared so that participating countries could read them by their preferred method. It was agreed that no images were required for this small scale exchange to continue.

The results of the exchanges will be presented to PGCCDBS in 2010 for consideration.

Eel

The Workshop on Age Reading of European and American Eel [WKAREA] is currently being prepared by exchanging electronic pictures of otolith samples. The aim is to collect material to address specific questions to be debated during the workshop.

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

3.1 Assessment Working Group (AWG) and Workshops (WKs) recommendations

The Group reviewed AWG and WK reports with respect to recommendations addressed to PGCCDBS and only focused on recommendations clearly spelt out.

Table 3.1. Recommendations from ICES Assessment Working Groups and Workshops, and PGCCDBS comments.

AWG	Recommendation	PGCCDBS comments
HAWG	HAWG recommends that all metiers with substantial catch should be sampled (including by-catches in the small meshed fishery). (see Section 2.2.2).	This is a matter for the relevant RCM's, to address when considering the harmonization and coordination of National Programmes. ACOM members (Norway) also need to consider this when setting annual sampling programmes.
HAWG	HAWG encourages further examination of the observed interannual variability in maturity ogive using appropriate scientific methodology (see Section 3.4).	Handled by WKMOG
HAWG	HAWG recommends a workshop on the identification of clupeid fish larvae to ensure data quality. This WS should especially deal with possible sources of misidentification of sprat, herring and other clupeid larvae	This recommendation was also referred to PGIPS, and PGCCDBS was of the opinion that PGIPS was the appropriate group to assess this request.
WKARFLO	WKARFLO recommends that the manual on age determination of Baltic flounder should be updated annually. The work should be coordinated within the WGBIFS and results should be reported to the PGCCDBS	PGCCDBS discussed this recommendation and await the report (or comments) from WGBIFS.
WKARFLO	WKARFLO encourages that national laboratories establish reference collections of otoliths with known age (tagging results) or of otoliths with unknown age but displaying typical growth patterns. Images of these otoliths should be made available to flounder age reader experts	WebGR may be a future tool for management of reference collection but PGCCDBS noted that the Age Reading Forum may be suitable for this purpose in the meantime. National Laboratories should make use of the existing age reader contacts to facilitate exchange of current material.
WKARBS	WKARBS recommends to hold the next Workshop latest in 2011 (the application for the workshop should be submitted in the beginning of 2010).	Workshop to be held in 2011.

WKARRG	WKARRG recommends a second workshop on roundnose grenadier with samples of different stocks and several areas within the same presumed stock (the same stock in believed to cover ICES division Vb and XIIb and sub-areas VI and VII) and a range of size taking including the juvenile and the adult fish. For juveniles, readings from whole otolith and thin slices with various thicknesses (0.2 to 0.4 mm) could be compared. For the adults, methods of polishing or staining could be carried out.	An otolith exchange should be prepared by launching a questionnaire to all institutes with the objective of reviewing which material would be available for the inclusion in a roundnose grenadier otolith exchange (size range, areas, ...). France will take care of carrying out the survey. If there is enough information to address the conditions defined by WKARRG, an otolith exchange will take place at the end of 2009 and early 2010. The analysis of the otolith exchange will ultimately address the need to convene a dedicated workshop.
WKARBH	To hold the next Baltic herring age reading workshop in 2011.	PGCCDBS report of 2007 (Annex 5) indicates a time table for dealing with small scale exchanges and workshops with a small scale exchange envisaged every two years with the possibility of a workshop being offered at least once every four years. To be discussed at PGCCDBS 2010 but would expect a small scale exchange between relevant countries first with results reported to PGCCDBS.
WKROUND	Celtic Sea Cod - Discarding & High grading is poorly documented. There needs to be an evaluation of sampling levels by fleet required to get precise enough discard estimates for stock assessment. Most countries supply discard data to the WG but sampling levels are low and variable for the main fleets catching cod. Discard rates are also highly variable and changing in response to recruitment and management. There may be scope to develop co-operative projects with industry on self sampling, reference fleets etc.	PGCCDBS are aware that this matter is dealt with at RCM's and would remind these groups of their obligations under the DCR. The work of WKUFS (2007) and WKSC (2008) has addressed the issue of co-operative projects and self sampling. Reliable self sampling projects may increase the sampled fraction considerably and hence decrease the raising factors and the need for interpolation/extrapolation.
WKROUND	Celtic Sea Cod- Catch underestimated. Reported landings data and "landings equivalents" since 2003 are thought to be underestimated. It may be possible to get some estimates of what true landings were from diaries or other sources. This is a major source of uncertainty in the assessment. PGCCDBS may be able to recommend ways of estimating uncertainty and bias in the catch data based on the results of WKACCU and WKPRECISE.	PGCCDBS envisages closer linkage for collating the findings of WKACCU and WKPRECISE (September 2009) with the outcomes providing the guidance required. Methods of estimating uncertainty and bias in catch data has been addressed by WKACCU (ICES CM 2008\ACOM:32 – section 4.) and efforts to minimize these needs to be addressed at national or regional level. The results of the implementation studies on mixed species provide an insight into estimating unallocated landings for species that may be landed as "mixed species" or "grouped". Use of VMS data can help with the estimation of catch and effort data (ref. reports of IUU fishing in the Barents Sea).

WKROUND	Celtic Sea Cod- Maturity data not routinely collected. There is evidence from sampling on the Irish “biological survey” that maturity has changed for this stock. The new estimates change SSB by up to 20% which is significant and warrants future monitoring. There is no routine survey during Q1 to provide annual maturity estimates for this or other stocks in the Celtic Sea. Collecting maturity data from commercial fleets will probably be biased and may not be of use to the WG. RCM should consider international co-ordination of maturity sampling and whether a directed survey might be needed. Q1 catch weights might also be improved with a directed survey.	PGCCDBS are aware of this type of problem but feel it has to be addressed at national or regional level. Consideration should be given to obtaining maturity data from observers or purchasing un-gutted fish from commercial vessels (including small fish). This matter was also addressed to RCM.
WKROUND	North Sea Cod - Discard data is not provided by some countries. Some countries are not providing discard data to the working group still including Belgium, France and Sweden. There may be legitimate reason why they are not considered of good enough quality but this should be evaluated and discussed as discard rates appear to be different between countries.	PGCCDBS recognize the issue and are of the opinion that Member States should ensure that any data collected are submitted to AWG as determined by DCR. However it should be noted that Sweden have provided data for the AWG and the reasons for their exclusion are not related to quality but more likely spatial coverage at Regional level. When dealing with Harmonization and Coordination of NP the RCM's, use a ranking system based on level 6 but should also take account of AWG needs at level 7 (species). Although InterCatch will incorporate estimation of discards in the future, when considering task sharing at Regional level countries need to consider spatial and temporal issues as well as National practices when setting up bi-lateral agreements.
WKROUND	North Sea Whiting (IV and VIId) – For around 30% of the landings discard estimates are not available. (this is also a problem for STECF) French Discard data missing should be provided. Discard data are not provided for other countries that have significant amount of catch.	See above comment relating to North Sea Cod - Discard data.
WKROUND	Eastern Baltic cod - Unreported landings Unreported landing is decreasing recently but still problematic for the quality of the assessment. Together with age readings inconsistencies, unreported landings are the major source of uncertainty in the assessment PGCCDBS may be able to recommend an approach to estimate uncertainty and bias in the catch based on results of WKACCU and WKPRECISE.	See above comments relating to Celtic Sea Cod- Catch underestimated.
WKROUND	Eastern Baltic cod - Discards estimates. Discard sampling does not cover all areas. Sampling levels are low and variable.	Should be addressed at RCM. Comments indicated above for North Sea cod are also relevant.

WKROUND	Eastern Baltic cod - Seal and fishing interaction. Since the beginning of the '90, grey-seal stocks have increased and thus predation on cod, herring and Baltic salmon has increased. Grey-seals-fishery interaction (gillnetting, trapnets) should be investigated and the effects of predation evaluated.	PGCCDBS are aware that several observer sampling programmes already record instances when seals are captured and are of the opinion that the collection of such data adds value to the DCR. PG encourages all countries to record these data but is of the opinion that collation of these data needs to be handled at regional level (if required). Predation by seals is not part of the DCR and needs to be evaluated in dedicated projects.
WKROUND	Eastern Baltic cod - Age reading inconsistencies. Although several age reading workshop were carried out in the past, there is no agreement on a standard age reading criterion between Baltic countries. A project on alternative methodologies is going on, but it seems that there is no obvious solution for this because of lack of validation for age/otolith. Historic length composition data should be available. A workshop devoted to compile length composition data is recommended.	Given that the requirement is for a workshop exploring the possibility of length based assessments, this matter should be referred to ACOM.
WKROUND	All stocks- Spatial data and information on sampling coverage and precision needs to be provided and if possible used in the assessment. The results of COST and the new regional co-ordinated Database should help here. All countries should make an effort to populate these with the necessary retrospective data.	PGCCDBS (2008, Table 6.1) Suggested quality indicators of protocol compliance, bias and precision relating to sampling coverage which were incorporated in a scorecard system developed by WKACCU. This should be taken into account and the Test scorecard should be tested at all Benchmark WK's with feedback provided to PGCCDBS. Completion of COST should provide the tools to consider appropriate spatial coverage, by various options, tabular, graphically and by map. However this will require the support of relevant countries in data provision and management. This issue will also be addressed at the ASC 2009 in the theme session on Quality Assurance. Until such time as COST delivers the relevant tools, stock coordinators should adopt the data table templates (PGCCDBS, 2008 - Tables 3.2 and 3.3) in order to provide summarized overview of sampling coverage. The PG recommends that the scorecard developed by the WKACCU to detect bias in key parameters of importance in stock assessments should be tested at benchmark workshops.

3.2 Assessment Working Group Contact Person

It was clear to PGCCDBS that the procedures previously adopted for providing feedback to and from assessment groups was not functioning as well as had been envisaged. It is widely accepted that for the role to operate effectively, it would be beneficial for the contact person to be closely linked to the relevant benchmark- and assessment group and if possible be involved in the coordination and planning work through PGCCDBS or the RCM's. In several cases AWG's, Benchmark WK's and PGCCDBS were in a position to nominate a contact person and these are indicated in Table 3.2.1. Where this has not been done the contact person must be identified by the AWG Chair, no later than the first day of the AWG or Benchmark WK meeting by considering the following criteria.

The contact person should be:

- An active member of the relevant assessment group and the benchmark WKs related to the AWG stocks;
- 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 to assist in the identification of a suitable contact person, PGCCDBS have produced a table (Contact person link, Annex 5) identifying the current members attending PGCCDBS and their involvement in the AWGs as well as the RCMs they may participate in. 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 or Benchmark WK 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 4) and that this is included in the report of the AWG or Benchmark WK;
- 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;
- Should work in cooperation with ICES secretariat.

The ICES Secretariat should compile the relevant comments from AWG's (and Benchmark WK) and forward these to RCM's, PGCCDBS, ACOM members and 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 AWG's are addressed at the earliest opportunity. The RCM's should then advise PGCCDBS of their actions in addressing relevant issues and indicate where further action is required from PGCCDBS.

PGCCDBS recommends that AWG's complete and include in the report the Table – "Stock Data Problems Related to Data Collection" (Annex 4) as part of their generic ToR b) "Update, quality check and report relevant data for the working group: iv) Propose specific actions to be taken to improve the quality of the data (including improvements in data collection."

Table 3.2.1. Contact person assigned to Expert Groups

Expert Group	Identified contact person	e-mail
<u>AFWG</u>	Åge Fotland	<u>Aage.Fotland@imr.no</u>
<u>HAWG</u>	Lotte Worsøe Clausen	<u>law@aqua.dtu.dk</u>
<u>NWWG</u>		
<u>WGBAST</u>	Tapani Pakarinen	<u>tapani.pakarinen@rktl.fi</u>
<u>WGNAS</u>		
<u>WGBFAS</u>	Henrik Degel	<u>hd@aqua.dtu.dk</u>
<u>WGHMM</u>	Ernesto Jardim	<u>ernesto@ipimar.pt</u>
<u>WGCSE</u>	Mike Armstrong	<u>mike.armstrong@cefas.co.uk</u>
<u>WGNSSK</u>		
<u>NIPAG</u>		
<u>WGWIDE</u>	Jens Ulleweit	<u>jens.ulleweit@vti.bund.de</u>
<u>WGANSA</u>	to be selected during WGANSA meeting	
<u>WGDEEP</u>	Neil Campbell	<u>campbelln@marlab.ac.uk</u>
<u>WGEEL</u>	Allan Walker	<u>alan.walker@cefas.co.uk</u>
	Willem Dekker	<u>willem.dekker@wur.nl</u>
<u>WGEF</u>		
<u>WKMIXFISH</u>		
<u>WKFLAT</u>	Joel Vigneau	<u>joel.vigneau@ifremer.fr</u>
<u>WKROUND</u>	Colm Lordan	<u>colm.lordan@marine.ie</u>
<u>WKSHORT</u>		

3.3 InterCatch issues

PGCCDBS were asked to comment on a correspondence received from InterCatch which provided an insight into their current assessment of how they have prioritised requests for modifications accompanied by Table 3.3.1 showing the current “wish list” describing the task, priority set, requester etc.

Until now, the ICES Secretariat has worked from the following prioritised list of requests:

- 1) Internal conversion of programming code
- 2) Id no. 1 Easy revision/updates of previous years catch data
- 3) Id no. 3 Discard 1st part
- 4) Id no. 8 Tuning fleets, WEST and Maturity
- 5) Id no. 6 Age-length keys conversion
- 6) Id no. 3 Discard 2nd part

On discussing the above priorities, PGCCDBS was of the opinion that the work on Age-length keys conversion should be elevated and that 3 other topics were identified which were of relevance. Further to this PGCCDBS noted that in InterCatch there is no facility available for allocating biological data (numbers at age and mean weight at age) for a country that has not provided discard data. At this stage a series of calculations would need to be done out with InterCatch to create an estimate of weight discarded for the given Fleet. The biological data from sampled strata could then be applied to the newly created header and species information data.

PGCCDBS were strongly of the opinion that the improvement of InterCatch needs to be addressed with urgency.

It was generally felt that interface issues relating to “user friendly” should not impinge on priorities allocated to the “wish list” but should be one of the criteria for setting future priorities. Once the current work of WKACCU and WKPRECISE (September 2009) have been reported, PGCCDBS should consider how to incorporate the findings into InterCatch. A specific term of reference will be proposed on implementation of QAF and development of InterCatch in order to allow InterCatch to deliver reports relevant to QAF.

Suggested list by PGCCDBS for prioritising requests:

- 1) Internal conversion of programming code
- 2) Id no. 1 Easy revision/updates of previous years catch data
- 3) Id no. 3 Discard 1st part (including discard issue identified above)
- 4) Id no. 6 Age-length keys conversion
- 5) Id no. 8 Tuning fleets, WEST and Maturity
- 6) Id no. 3 Discard 2nd part
- 7) Interface issues according to Table 3.3.1
- 8) QA (taking into account the outcomes of WKACU and WKPRECISE (September 2009))
- 9) Id no. 9 Historic data

PGCCDBS considered the priorities attached to requests shown in Table 3.3.1 but felt it was inappropriate to reassign priorities to all tasks at this meeting. However, if the priority criteria suggested by PGCCDBS is taken into account, InterCatch can reallocate priorities accordingly.

Table 3.3.1. List of outstanding requests and priority allocated by InterCatch

Id no.	Description of task	Task type	Priority 1 P is highest	Priority accord. request.	Requester	Date	Development task size
1	Revision/updates of previous years catch data easy, so it is possible for a stock coordinator, SC, to update several years' data in an easy and fast way. The SC should import updated CATON and adjusted CANUM values if sample data exists.	Func. & def.		1 P	ICWK Cyprus	2008 03 02	Big
2	Imported catch overview list of all imported data for a specific stock (All years, with a filter). Output in a file the stock overview list including the functionality of the filter	Func. & def.		2 P	ICWK Cyprus	2008 03 02	Medium
3	The discard request is split in two parts: It should be possible to borrow age compositions from previous years and take a mean. Maybe including a discard rate for imported CATONs so discard CATONs automatically are calculated. When age-length conversions are included it should also be possible to borrow age-length keys from previous years for discard.	Func. & def.		3 P	AMAWGC ICWK Cyprus Malta	2008 02 29 2008 03 02 2007 03 05	Big
4	Quality indicators on stock weight, sex ratio, maturity and CPUE should be included. (Variance values should be included in the import.)	Func. & def.		2 P	AMAWGC	2008 02 29	Big
5	Mixed fisheries overviews of catches and effort by fleet/fisheries. Mixed fisheries should be the same and included in InterCatch	Func. & def.		4 P, 1 P	AMAWGC, ICWK Malta	2008 02 29, 2007 03 05	Medium
6	Age-length key conversion included into InterCatch. So length based sample data across nations can be converted to age based data.	Func. & def.		1 P	AMAWGC ICWK Cyprus	2008 02 29 2008 03 02	Big

7	Export data from InterCatch in InterCatch format, so data values could be corrected by SC and re-imported right away by the SC	Func. & def.		1 P	ICWK Malta	2007 03 05	Medium
8	Tuning fleets, WEST and Maturity data must for documentation reasons be imported and exported together with the other Lowestoft files.	Survey data		1 P	ICWK Cyprus, Malta	2008 03 02 2007 03 05	Medium
9	Historic data should be imported into InterCatch. This should maybe be answered by AMAWGC and ICES Sec	Func. & def.		3 P	ICWK Cyprus Malta	2008 03 02 2007 03 05	Big
10	Backup files which the data submitter would have access to, if overwriting was done by mistake	Func. & def.			ICWK Cph	2007 03 29	Big
11	Higher flexibility in the allocation options: IC should be able to allocate sample data from the previous year to recent years catch, regardless of origin.	Func. & def.			ICWK Cph	2008 02 01	Medium
12	Fleet year to year mapping when fleets changed definition and export splitting criteria change a page to map exports from year to year.	Fleet def & export			HKN	2006 10 12	Big
13	Non-ICES WG must be able to use IC for Data Coll. reg. or STECF. Investigate how (check; a new Assignment type, security and access)	Func. & def.			DTU Aqua	2006 09 26	Big
14	Copying allocations should be made more intuitive	Func. & def.			ICWK Malta	2007 03 05	Medium
15	When aggregating over the total stock the new aggregation algorithms should be made and it should be possible to select between them	Func. & def.			ICWK Malta	2007 03 05	Medium
16	Splitting facility for the catches of herring in Subdivisions IIIa and 22-24 should be established in correspondence with the involved SCs (Spring spawners and autumn spawners.)	Splitting			ICWK Cph HAWG	2008 02 01 2007 03 22	Big
17	More export formats	Export					Medium

18	New system in the InterCatch system, where catch data on statistical rectangles are imported, stored and extracted for mixed fisheries. The catch data must refer to the same fleets as in InterCatch, but InterCatch must not aggregated these high resolution area catches. The catches must not interact with InterCatch. Tasks to develop: 1 Import module addition development, 2. New database importer, stratum tables.	Mixed fisheries			AMAWGC	2006 02 01	Big
19	Split of combined age distributions into male and female. Same philosophy as for Herring splitting and Elasmobranch.	Splitting			Henrik S., Sieto V., Steve F.		Big
20	InterCatch should automatically fill in the new ICES standard EC data sheet with basic assessment data overview.	Fleet def & Export		1 P	RCM North Sea PGCCDBS	2006 09 26 2008 06 16	Medium
21	Manage allocation schemes must be more user-friendly.	Interface					Medium
22	Plot and calculate best fitted curve for originally sampled mean weight at age, so the imported sampled mean weights are automatically the best fitted curve and it is done inside InterCatch. ()	Func. & def.			Ian Holmes Willy van hee WGSSDS	2007 06 26	Big
23	Change the import format so it becomes easier to set up for the users.	Import format					Big
24	Remove import format redundancy	Import format					Big
25	SOP correction inside InterCatch as an option	Editing					Medium
26	WGEF Elasmobranch request a functionality where a key is calculated from some sample data (a total of 5 species of rays) then the key is applied on the total of the ray-group. Then total ray-group catch is split in to species. This is a variation of herring splitting.	Splitting			Henk Hessen	2006 06 20	Big

27	Import catches to a combination of several areas across already existing subareas. Could be done now if all SC can agree on which parent area an area must belong to. Multiple parents are very difficult to handle.	Func. & def.			Steve Flatman	2006 08 01	Big
28	More persons must be able to set up and test different allocation schemes.	Func. & def.			Asta G.		Medium
29	Unit field for SampledCatch. Unit: tonnes, kg or percentage.	Func. & def.					Medium
30	Overview of Assignments, Status Tasklogs and allocation schemes	Func. & def.					Medium
31	Manual weighting value stays in the field, it should be cleared after being applied	Interface		3 P	ICWK Cyprus	2008 03 02	Small
32	Allocation scheme 'New' button at the bottom should not be displayed before the user have selected a workspace and clicked 'Ok', otherwise the Allocation scheme is not saved	Interface		3 P	ICWK Cyprus	2008 03 02	Small
33	Good to be able to select output units for CANUM (thousands), WECA (kg), WEST	Func. & def.		3 P	ICWK Cyprus	2008 03 02	Small
34	The menu system needs a little clarification to make it easier to navigate.	Interface		4 P	ICWK Cyprus	2008 03 02	Small
35	Feedback text from InterCatch in the part where allocation schemes are setup/copied would make it more clearly for the user what has happened.	Interface		4 P	ICWK Cyprus	2008 03 02	Small
36	In the import part (DATSU interface) the selection list boxes should remember what was selected last time.	Interface		4 P	ICWK Cyprus	2008 03 02	Small

37	Reminder text for using the refresh button F5 on all pages.	Interface		4 P	ICWK Cyprus	2008 03 02	Small
38	Output with text from the export form, eg. Areas are aggregated using VII f	Export			ICWK Cph	2007 03 29	Small
39	Mark of uploads made since last time the stock coordinator went in and did a extraction of the species to stock	Func. & def.			ICWK Cph	2007 03 29	Small
40	Improve the length-based data handling	Func. & def.		1 P	ICWK Cph 2	2008 11 04	Small
41	InterCatch should be made more intuitive. Many improvements can be made that require little effort.	Func. & def.		2 P	ICWK Cph 2	2008 11 04	Small
42	There could be more information in the email sent to the stock coordinator after a catch data file has been imported. It could be useful to attach the imported data file to the email to the stock coordinator	Import		3 P	ICWK Cph 2	2008 11 04	Small
43	Diagram showing where the user is in the process and the next step. Warnings could pop up when changing working status between Trial and Final working status	Func. & def		3 P	ICWK Cph 2	2008 11 04	Medium
44	Automatically paste of output tables into word document/report	Output		3 P	ICWK Cph 2	2008 11 04	Small

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

4.1 Review DCR and changes in other data collection systems with regard to data availability and quality for stock assessments

PGCCDBS noted that the new Data Collection Framework from 2009 onwards has resulted in changes to national sampling programmes that could potentially impact the continuity of data series used in stock assessments. The new data may be statistically better than before, but also may be consistently different in some respects. Potential issues to consider could include the following:

- Previous stock-based sampling schemes may have been subject to more-or-less consistent sampling biases that are reduced by including more highly stratified metier-based sampling from 2009 onwards. This may result in different fleet-aggregated length compositions than would have been obtained had the previous scheme still been in place. Unless very subtle, this could lead to problems such as retrospective bias in stock assessment models.
- In some cases, sampling schemes may now include previously non-sampled metiers, or exclude previously sampled metiers, which might also lead to apparent changes in overall fishery selectivity and resultant problems with stock assessment models, depending on the selectivity of the metiers.
- Based on trials of concurrent length sampling by Member States in 2007, WKISCON (2008) showed that considerable additional time would be required to concurrently sample species-rich landings ashore. This could result in fewer landings being sampled unless additional resources are allocated. It could also result in over-sampling of vessels that habitually land well in advance of a market (perhaps because they fish closer to port) to ensure adequate time to complete the concurrent sampling.
- There is a lack of clear guidelines for the statistical basis for the merging of metiers, or the collapsing of temporal or spatial strata, in the event of inadequate numbers of trips being sampled. This could lead to inappropriate or inconsistent methods being adopted with consequences for accuracy.

PGCCDBS recommends that Member States evaluate potential changes to the continuity of their stock assessment fishery data sets caused by the new DCR sampling schemes from 2009 onwards. A suitable approach could be developed around the framework for bias and precision evaluation developed by WKACCU and COST, expanded where appropriate, and applied to data collected in 2009 compared with similar evaluations for 2008 and earlier data. In some cases, it may be possible to create comparative data sets from the new DCR sampling in 2009 that are equivalent to what would have been obtained from pre-2009 schemes (e.g. by excluding data from minor metiers not previously sampled), to evaluate the potential changes in assessment data. The evaluations should be supplied to ICES stock managers when Member States provide national assessment data for 2009, so that the assessment Working Groups can be made aware of features of the data that could explain unusual assessment model results, or to allow them to carry out sensitivity tests.

4.2 Review RCM/LM reports with regard to recommendations to PGCCDBS

The Liaison Meeting (LM) is aiming at maintaining communication between the different RCMs and at ensuring that recommendations from RCMs requiring wider participation are effectively dealt with. Recommendations covering methodological issues and proposals for workshops are forwarded to the PGCCDBS. The 2008 RCM work was discussed at the LM meeting in February 2009. As the LM was held just a few days prior to the PGCCDBS, no report was available for review by PGCCDBS. However, LM addressed a couple of methodological issues directly to PGCCDBS.

Group	Recommendation	Follow-up responsibility
RCM NS&EA	In order to improve the quality of the harmonisation process and the consistency in decision making, protocols should be established describing the evaluation process and quality checks to be carried out by RCM on the NPs. Also the protocol would specify guidelines for decision making by RCM aiming at achieving a standard approach for standard situations.	PGCCDBS/PGMED
LM response	LM recommends PGCCDBS/PGMED to develop methodologies needed for conducting statistical analysis on merging metiers and fleet segments, between and within countries.	

PGCCDBS considers this work as essential for the implementation of the EU Data Collection Framework and agrees with the LM response. PGCCDBS is of the opinion that this recommendation is best dealt with in a dedicated workshop, PG therefore proposes to organise a workshop addressing the following issues (see full WK proposal in Annex 9):

- a) Review methods used by Member States for merging fleet metiers for fishery sampling
- b) Review statistical methods for metier merging, using case studies.
- c) Develop guidelines for merging fleet metiers for sampling, at national and regional scale.
- d) Develop guidelines for collapsing under-sampled strata for data analysis.

Group	Recommendation	Follow-up responsibility
RCM NS&EA	The RCM NS&EA recommends setting up a workshop on combining age-length keys to harmonise methodologies.	PGCCDBS/PGMED
LM response	LM endorses the recommendation for addressing this issue during the forthcoming PGs meeting	

The EU Data Collection Framework encourages the increasing development of collaborative age sampling schemes between member states. This requires appropriate quality assurance of the data while minimising the variance and risk of bias for the purpose of stock assessment. In order to address this recommendation appropriately, PGCCDBS proposes to organize a workshop to answer this request.

However, PGCCDBS suggests that this problem should be dealt with in a wider context and therefore proposes that the workshop aims at the design of regional age sampling schemes, while taking into account both current, well established, methodologies as well as alternative methods to estimate the age composition from length data. See full WK proposal in Annex 9.

Group	Recommendation	Follow-up responsibility
All RCM's	The RCM NS&EA recommends that the Commission and STECF take note of the concerns with regards to the quality of some of the transversal variables related to fishing effort, and recommends that an assessment of the quality of the data be made before any use of if it.	PGCCDBS/PGMED
LM response	LM stresses the importance of this issue, pointed out by all RCMs. As regards the methodological problems, LM recommends the PGs to clearly define the situation and propose a way forward. The outcomes of the PGs should be considered by SGECA to ensure that this topic is addressed in a similar way following both biological and economic perspectives.	

EU logbooks contain both mandatory and non-mandatory fields for entering specified forms of fishing effort data. Effort (e.g. days at sea) can also be derived from fishing operation information on the logbooks. However, some important aspects of fishing effort, particularly for fixed gears, are not available from EU logbooks, and historically, vessels below a specified length have not been required to provide logbook data. For these vessels, collection of effort data may require suitably designed surveys.

The appropriate definition of fishing effort is largely determined by the purpose for which the data are required. In the fisheries science community, fishing effort data are used for a wide range of purposes, and the nature of the data required also varies. In some cases, the effort data alone are not sufficient, and additional information is needed to help interpret the trends observed. Table 4.2.1 provides typical examples of the use of effort data, together with the type of data required, additional trip variables needed, and additional information required for interpretation of the effort data. The table also indicates if data are not available exhaustively from logbooks.

PGCCDBS recommends that STECF reviews the requirement for recording of each effort variable according to the current and potential future regional requirements of the end users of the data.

Table 4.2.1. Requirements for fishing effort data of relevance for PGCCDBS (may not be exhaustive).

Use of data	Main user groups	Type of effort data currently used	Additional trip variables required	Additional information needed for interpretation	Important data not available exhaustively
Computation of effort and CPUE series for stock assessment	ICES Expert Groups	Days fished; Hours fished; Days or hours corrected for fishing power. Various fixed-gear effort (e.g. total length of nets; nos. pots/traps/hooks; soaking time)	Gear codes/mesh; Date; Vessel size; Fishing location (various geographic scales); Species compositions	Changes in gear design / efficiency / catchability; species targeting	Data for <10m vessels; or additional gear & fishing operation variables and changes over time.
Monitoring trends in fishing effort in relation to recovery plans	STECF / SGRST	kW-days; GT-days.	Gear codes/mesh; Species composition & derogations; Vessel size; Fishing location (ICES Div.)	Changes in gear design / efficiency / catchability	Data for <10m vessels; additional gear & fishing operation variables and changes over time.
Raising at-sea sampling data to fleet level	ICES Expert Groups; STECF	Trips; Hours or days fished; Fixed gear effort (e.g. total length of nets etc.)	Gear codes/mesh; Date; Vessel size; Fishing location; Auxiliary variables e.g. vessel size/power	Bias and precision	Data for <10m vessels; additional gear & fishing operation variables
Ecosystem indicators	ICES Expert Groups, STECF	Spatial and temporal distribution of fishing effort; aggregation of fishing activity	Gear codes/mesh; Date; Fishing location (ICES rectangle; VMS); Vessel size	VMS filtering for fishing operations.	Haul positions for non-VMS vessels

Use of data	Main user groups	Type of effort data currently used	Additional trip variables required	Additional information needed for interpretation	Important data not available exhaustively
Spatial management e.g. evaluation of closed areas	ICES Expert Groups; STECF; RACs and other stakeholder gps	Days; hours fished; quantities of fixed gears;	Gear codes/mesh; Date; Vessel size; Fishing location (various geographic scales incl. VMS); Species targeting	VMS filtering for fishing operations.	Haul positions for non-VMS vessels
Bio-economic modelling	ICES Expert Groups; STECF; RACs and other stakeholder gps	Days; hours fished; fuel consumption; quantities of fixed gears	Gear codes/mesh; Date; Vessel size; Fishing location (various geographic scales incl. VMS); Species targeting.	VMS filtering for fishing operations.	Data for<10m vessels; additional gear, fishing operation and economic variables and changes over time. Haul positions for non-VMS vessels
Interpretation of tag returns	ICES Expert Groups	Days; hours fished;	Gear codes/mesh; Date; Vessel size; Fishing location (various geographic scales incl. VMS)		Data for<10m vessels; Haul positions for non-VMS vessels
Data Collection Framework metier ranking	Member States; RCMs; STECF	kW-days	Gear codes/mesh; Date; Vessel size; Fishing location (DCF fishing grounds); Species targeting.		Data for<10m vessels

4.3 Develop strategy for data collection for ecosystem indicator on discards

One of the new subjects within the current DCF is the obligation for MS to collect data for a list of ecosystem indicators. This list encompasses indicators like e.g. mean maximum length of the fish, distribution of fishing activities and discard rates of commercially exploited species (EC Decision 2008/949/EC, App. XIII). For the latter, PGCCDBS received a request from DG MARE, via ICES, to build up a time series for the discards indicator.

The basis for this time series could be the discard data collected by MS under the previous DCR, which came into action in 2002. Several attempts have been made to summarise discard estimates for the European fleets, but at present no such overview exists.

To address the request by DG MARE, PGCCDBS identifies several steps that need to be taken:

- compilation of a European meta data overview on all available discard data;
- evaluation of the quality of the existing data taking the outcomes of WKACCU, WKPRECISE and COST-project into account;
- identification of the population of quality-checked discard data on which an ecosystem indicator could be based;
- Development and evaluation of methods for calculating a discards indicator that is sensitive to changes in discard rates and robust to changes in data collection;
- Compilation of supporting information to allow interpretation of the trends in the overall indicator.

The PGCCDBS realizes that the different steps probably are most efficiently tackled within a workshop. The full workshop proposal is given in Annex 9. The PGCCDBS however also realizes that earlier attempts to summarise discard data on a European level clearly have revealed the complexity of the subject. In order for the workshop to be successful, the PGCCDBS thereby wishes to stress that there are prerequisites:

- It must be ensured that the data (by trip level) needed by the workshop are accessible for the workshop
- Participants need to do intercessional work (compilation of meta data, evaluation of quality (guidelines to be provided by the WK Chair) prior to the meeting
- Participation of experts from different scientific backgrounds (discards, statistics, ecosystem indicators) are needed

4.4 Methodological Workshops carried out in 2008

4.4.1 Workshop on Implementation Studies on Concurrent Length Sampling [WKISCON]

This workshop has been dealt with at the last PG meeting already. For a summary, see PGCCDBS 2008 report (ICES 2008b).

4.4.2 Workshop on Maturity Ogive Estimation for Stock Assessment [WKMOG]

Following the recommendation of PGCCDBS (ICES 2007a), a Workshop on Maturity Ogive Estimation for Stock Assessment (WKMOG) (ICES 2008c) was held in Lisbon (Portugal), 3–6 June 2008, as part of ongoing ICES work to improve data collection, methodology and quality assurance. The objectives were to establish, if not a common method for raising, at least a set of best practices to be used when producing estimates from maturity data and to give participants the opportunity to address specific issues related to their maturity sampling and estimation approaches. The Terms of Reference were, in brief: a) Review the data structures and agree on a format for analysis purposes; b) Investigate differences in raising procedures in use by different countries, compare results, identify advantages and limitations; c) Propose best practices for summarizing and reporting the results.

Guidelines

A set of guidelines for maturity sampling, estimation and reporting is given in the report conclusions and in Annex 10 to this report. These build on the work of the ICES Workshop on Sexual Maturity Sampling (WKMAT) (ICES 2007b) and complement the minimum international protocols for age and maturity calibration from PGCCDBS. The guidelines include an interpretation of how to calculate DCR precision levels for maturity estimates, based on the mean confidence interval width.

The report also provides a considerable list of references concerning geographic and temporal variation in maturity; methods and models; validation of maturity; variables influencing maturity and other relevant topics.

Data

The FishFrame/COST data format was selected and successfully used as an exchange format for maturity data. It has the benefits of being open source and actively maintained. Potential developments to the format were identified and have been incorporated by the developers where appropriate. Code was developed to convert from DATRAS output format to the FishFrame/COST data format.

Methods

Currently accepted practice is to use Binomial generalized linear models (GLMs) with logistic link for maturity ogive modelling and Sex-Maturity-Age-Length-Keys for raising estimates. Methods were reviewed and detailed information on raising procedures and countries' methods provided. Comparisons between different countries' approaches showed results were very similar. The report demonstrates how the GLM models can be used to evaluate differences between age classes, sexes, areas or years and suggests alternative approaches if model fit is poor. For example, standard logistic curves are demonstrated to give substantially biased estimates if skipped spawning is a significant issue. In this case, three-parameter logistic curves will be more suitable. The link between maturity estimates and stock assessment was also considered with illustrations of the effect on SSB of bias and variability in maturity estimates.

There is the opportunity to advance current practice by developing models that more fully include the sampling and spatial structure of the data. Also, several approaches of estimating precision for maturity-at-age are available but there is no widely used method. Analytical approaches need testing and bootstrap procedures that resample individual fish may violate the assumption of independent sampling units. Re-sampling stations is reasonable, although issues arise if estimates show spatial trends or correlations between stations.

4.4.3 Workshop on Fishers Sampling of Catches [WKSC]

A workshop (WKUFS) on selfsampling by fishers was held in Bergen, Norway in 2007 (ICES 2007c). At this workshop it was decided that it would be useful to have a follow-up workshop that would expand on the topics covered in 2007, go into more detail on sampling strategies and determine the amount of information in particular datasets. It was observed during the 2007 workshop that to assess a fishery it is necessary to determine the biological characteristics, such as age and length distributions, of the commercial catch. In addition, estimates of the amount of discards will lead to more accurate assessments, as will information about effort, fishing efficiency and fleet behaviour. Using scientists to collect information on commercial catches is usually not costeffective. Currently there is ongoing effort worldwide to develop programmes to use fishers to self-sample their catches.

Surveys and experiments conducted by fishing vessels may complement studies and scientific surveys conducted by research vessel and in some cases provide a cost-effective alternative to research surveys. The use of fishing vessels can facilitate synoptic surveys because the fishing fleet covers large areas, and can be an effective platform for experimental studies, with more flexibility than research vessels, which generally are committed to routine surveys. When fishing vessels are used for marine abundance surveys and other scientific studies, it is crucial that the selection of stations and protocols for biological sampling be conducted according to proven statistical principles. When trawl surveys conducted by fishing vessels use standard designs such as stratified random or systematic selection of stations, then the mean catch per area swept provides an estimate of relative abundance. Also, sampling by fishing vessels (using trawls, traps, or other gears) at fixed stations, or at a combination of fixed and random stations, may prove effective for monitoring trends in abundance.

The workshop reviewed and when appropriate updated the 2007 summaries of some self-sampling programs conducted in various countries. Based on this latest review, six themes were still found to be of major importance for designing and implementing a self-sampling programme: creating incentives for fishermen, communication, confidentiality, financing, training, and survey design

The sampling schemes should not be static but should be adapted to prevailing conditions. The practice of science, which is not perfect, should constantly be critiqued and then improved. The fishers would be an important source of information on how the programmes could be improved to more closely reflect the reality in the sea. It was emphasized that for each programme the effective sample size is a more meaningful statistic than just giving the sample size. This is because fish caught together are more similar than those in the entire catch, i.e. there is positive intracluster correlation. It follows that samples of animals caught in clusters will generally contain much less information on the population structure than an equal number of fish sampled at random, that is the effective sample size is much smaller than the number of animals sampled. This implies that in general it is best to collect a few fish from as many clusters as possible.

Finally, to keep a dialogue among scientists working on self-sampling programs going, it was decided to construct an Internet website for self-sampling. At this site scientists can answer survey questions which will describe their self-programs and whom to contact for more specific information. This should provide valuable resource for both ongoing and start-up self-sampling programs.

4.4.4 Workshop on Methods to Evaluate and Estimate the Accuracy of Fisheries Data used for Assessment [WKACCU]

The workshop on methods to evaluate and estimate the accuracy of fisheries data used for assessment [ICES WKACCU] was held in Bergen, Norway, from 27–30 October 2008. Accuracy of fisheries statistics used for assessment is determined by amount of bias and the precision of key parameters. The WKACCU workshop focused on the identification of sources of bias in parameters and data collection procedures to assess national level fisheries statistics, and thus did not fully address the accuracy. While precision in fisheries statistics can be improved by increasing the sample sizes in data collection programs, this is generally not the case with bias. Bias is a systematic departure from the true values caused by non-representative data collections and other persistent factors, and can generally not be quantified because the true values seldom are known. The workshop therefore concluded that the focus should be to minimize or eliminate sources of bias by developing and following sound field data collection procedures and analytical methods. The workshop also emphasized the importance of applying unbiased estimators that accounts for the survey sampling design employed in data collections. Analyses of data from multi-stage sampling, such as length and age samples, must account for clustering effects to avoid biased estimates of length and age compositions.

A practical framework for detecting potential sources of bias in fisheries data collection programs was developed during the workshop. The framework focused on bias in key parameters of importance in stock assessments: A) Species Identification; B) Landings Weight; C) Discard Weight; D) Effort; E) Length Structure; F) Age Structure; G) Mean Weight; H) Sex-ratio; and I) Maturity Stages. Several indicators were identified to detect bias in each of these parameters.

A simple score-card was applied to indicators of bias for a suite of parameters that are important for stock assessments. The scorecard can be used to evaluate the quality of data sources used for stock assessments, and to reduce bias in future data collections by indentifying steps in the data collection process that must be improved.

An application of the scorecard to the data collection program for the Norwegian Northeast Arctic saithe fishery in 2007 suggested that the system is practical and useful. It is recommended that more fisheries be evaluated to develop the scorecard further. Figure 4.4.4.1 gives an overview of typical steps taken from sampling to stock assessment and the sources of error at each step.

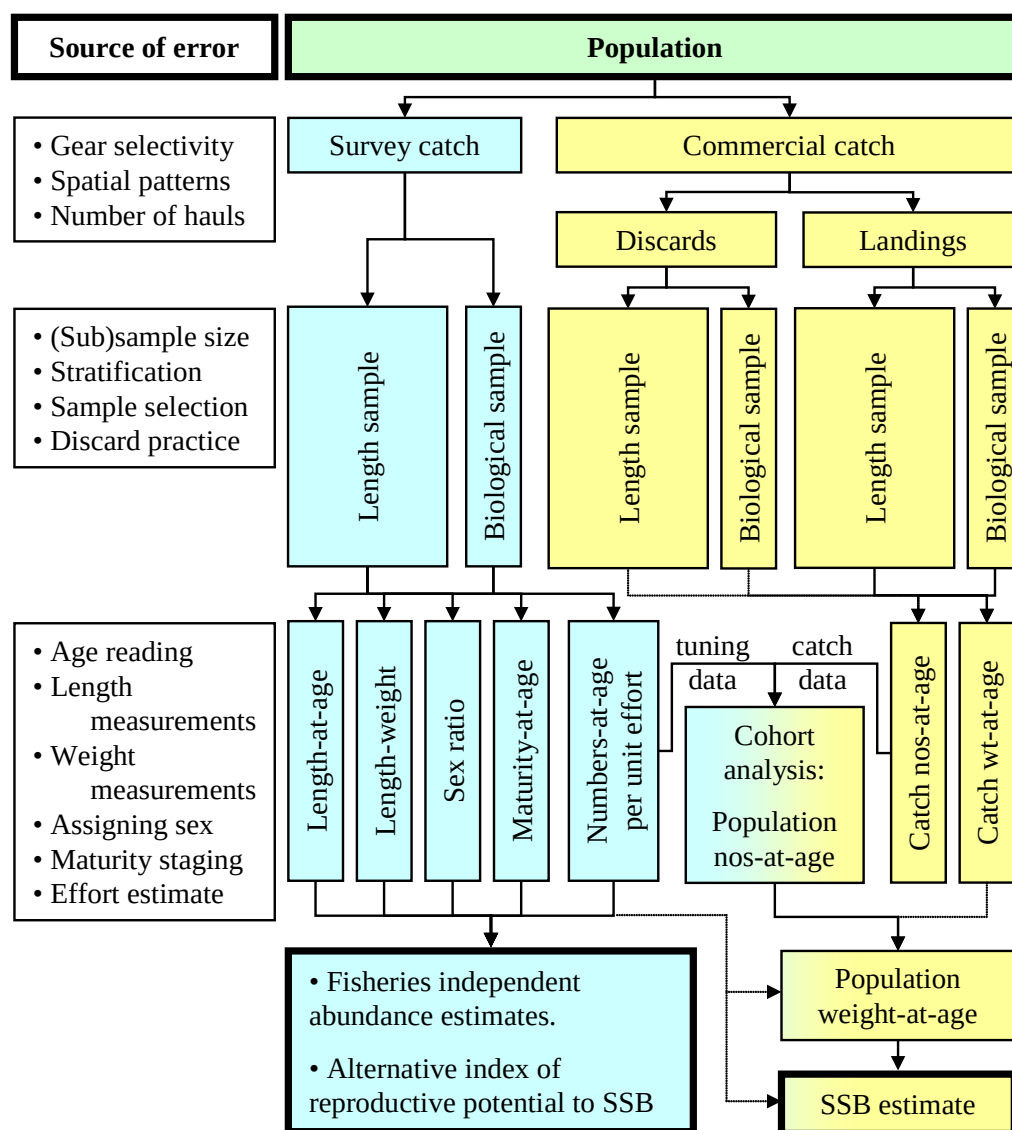


Figure 4.4.4.1. Diagram of some steps involved in data collection and analysis of fisheries data and the sources of error at each step of the process. Blue cells signify survey data, yellow cells refer to commercial data (from Gerritsen 2007).

4.4.5 Recommendations - Methodology workshops

PGCCDBS carried out a review of the reports concerning the recommendations made within the methodology workshops held in 2008 and relevant projects.

4.4.5.1 WebGR

WebGR is a web tool for maturity staging and age reading calibration exercises. The tool is currently being developed within an EU tender project and the progress was reported during the PGCCDBS (section 2.1.7). No specific recommendations towards data collection were put forward, but the applicability and good use of WebGR relies on following up several recommendations and guidelines already adopted by PGCCDBS. A list of specific requirements for WebGR will be developed within the EU project.

Recommendations by PGCCDBS on future use of WebGR

It is recommended to use WebGR - as soon as it has been fully tested - in all calibration workshops because it can greatly improve the experimental design, the consistency and comparability between calibration exercises, the quality of the report, and the accessibility of workshop data and images.

It is recommended that the WebGR is hosted and maintained by ICES.

It is recommended that ICES propagates but does not obligate the use of WebGR at age reading and maturity staging workshops.

When a calibration workshop has been held, it is recommended to submit a standardised (across all WKS) summary output, aiming at facilitating the use of data/results from age calibration exercises in the AWGs.

4.4.5.2 WKACCU (Cluster sampling) - Workshop on Methods to evaluate and estimate the bias of fisheries data used for assessment

We very rarely, if ever have a random sample of individual animals but in practice fish are sampled from clusters of individuals. For example, fish that are caught together at a station form a cluster. Other examples of sampling clusters are; the fish caught during a fishing trip, the fish in a particular market and the fish in a processing plant. From each cluster, fish for aging, measuring, etc. are selected, i.e. such data are often generated by two-stage cluster sampling. If the sample consists of a total of m fish from n clusters, then the individual animals are not a random sample from the entire population. This is because animals caught together tend to be more similar than animals in the entire population (i.e. there is positive intra-cluster correlation). The practical implication of positive intra-cluster correlation is that a sample of animals caught in clusters will generally contain much less information on the population structure than an equal number of fish sampled at random, i.e. the effective sample size is much smaller than the number of animals sampled. If estimates of the variance and mean are based on the assumption that the sample is random, then these estimates will generally be biased.

The PG recommends that in the future, appropriate data should be collected and the cluster size recorded from which a sample was taken. This facilitates the generation of unbiased estimates along with appropriate estimates of precision. In general, it is best to collect a few fish for aging from as many clusters as possible. When presenting the results, the effective size should be reported since it is much more informative than the total number of fish sampled.

The PG recommends that countries consider the effect of intra cluster correlation when completing their length based concurrent sampling programmes, and attempt to attain length samples from as large a numbers of “clusters” as possible.

The PG recommends that the score-card developed by the WKACCU to detect bias in key parameters of importance in stock assessments should be tested at benchmark workshops.

4.4.5.3 COST (Common Open Source Tool for raising and estimating properties of statistical estimates derived from the Data Collection Regulation)

The objective of the COST project is to develop a common "open source" tool for assessing the accuracy of the biological data and parameters estimates collected for stock assessment purposes within the framework of the Data Collection Regulation (see section 2.1.6). The tool consists of R libraries allowing to import and handle fisheries data (COSTcore), to explore the data (COSTeda), to estimate the parameters and related precision (COSTdesign & COSTbayes) and finally to do simulation (COSTsim). The R libraries and manuals will be available on the Deliverables page as and when they are developed.

COST Recommendations (by RCM NA, RCM NS&EA and RCM Baltic)

PGCCDBS agrees and supports the recommendations below:

- MS should anticipate the work with COST functions by importing their data in the COST environment using the Standard Data exchange Format.
- A hands-on workshop on the COST project tools should be planned. For the preparation of this workshop, MS should prepare their data in a specified exchange format and gain first experience with the analysis tools.
- Working on the data 2008 with the COST functions is highly advisable in order to prepare for a 2010 workshop and the broad use of COST on 2009 data.

Organizing this workshop earlier (in 2009) raises concern about the efficacy of the workshop since participants might not be experienced enough in handling COST methods, potentially wasting valuable time re-arranging their data into the suitable format. In the meantime, **PGCCDBS recommends** that interested people can start using COST when available (the main package is available now but the programme should be fully operational during Q3 2009), in this way contributing to an efficient workshop in 2010.

4.4.5.4 Workshop on Fisheries Sampling of Catches [WKSC]

Below are the recommendations from the WKSC (ICES 2008d). **PGCCDBS recommends** that an analysis on the effectiveness of self sampling programmes versus traditional observer programmes be conducted. The outcomes of this analysis would be useful to determine whether or not the PG should encourage the use of such programmes in the future. It is anticipated that many aspects of this analysis will be addressed at the upcoming conferences; The 6th International Fisheries Observer and Monitoring Conference, USA 2009 and also the ICES Conference to be held in Galway in 2010.

In the meantime, the report from the 2008 WKSC concluded that six themes are still very important when designing and implementing a self sampling programme (SSP). These themes are: creating incentives for fishermen, communications, confidentiality, financing, training and survey design. These themes are addressed at length throughout the report. The following are the main recommendations from the report:

- It was recommended that self sampling schemes should not be static but should adapt to prevailing conditions.
- It was emphasised that for each programme, the effective sample size is a more meaningful statistic than just using sample size. This is because fish caught together are more similar than those in the entire catch, i.e. there is positive intracluster correlation. This implies that it is better to collect a few fish from as many clusters as possible.
- Communications should be personal and often and it is recommended that one person should form the point of contact for all communications regarding the SSP. There should be a report back every 3 – 6 months and a meeting including all the participants at least annually.
- SSP should be complimented with observer coverage on the participating vessels. These observer trips serve the dual purpose of quality controlling the data collection and also re – training the crews of the participating vessels to ensure correct self sampling procedures are adhered to.

The WKSC also outlined important considerations for designing Self Sampling Surveys, These include the following:

- Aims
- Survey Design
- Financing a SSP
- Confidentiality
- Training
- Quality

When using commercial vessels for marine abundance surveys and other scientific studies, it is crucial that the selection of stations and protocols for biological sampling be conducted according to proven statistical principles. When trawl surveys conducted on commercial vessels use standard design such as stratified random or systematic selection of stations, then the mean catch per area swept provides an estimate of relative abundance. Also sampling by fishing vessels at fixed stations, or at a combination of fixed and random stations, may prove effective for monitoring trends in abundance.

4.4.5.5 Suggestions for changes in data collection

The PGCCDBS discussed the following points for further consideration and action.

(1) Development of guidelines for the evaluation of the quality of age readings to be used in stock assessment.

The suggestion here is to develop guidelines similar to those already developed for exchanges and workshops. The general content of this guideline would encompass but not be limited to following headings.

A) Should this be done on the national or international level?

Suggestion:

- national: annually.
- international: only after exchanges/workshops → specific criteria required

B) Criteria should include check for compliance to previous WK conclusions on procedures which are critical for the outcome of age determinations. For example:

- structure used (e.g. otoliths vs scales in sea bass, otoliths vs illicia in monkfish)
- preparation method used (e.g. sections is essential in older plaice)

C) Criteria should include quantitative estimates of

- Include evaluation of how accuracy and precision is presented, simplifying the presentation of the statistics used.
- Stock specific thresholds.

D) Feed outcome of the evaluation of age readings into AWG through stock coordinator.

This work is further pursued as intersession work, see section 5.5.1.

(2) Development of precision estimates for age-length keys and the use of these estimates in stock assessments

→ To be dealt with in the upcoming WKPRECISE and WKDRASS.

(3) Age validation and image analysis

Collating the recommendations from the expert workshops on age determinations it became apparent, that often are these workshops very efficient in ironing out disagreements in age determinations and identifying sources of disagreement, however, often does these achievements not mitigate through to the various laboratories in the long term and thus the need for reoccurring workshops arise, reiterating the work already done.

The PG considers that a step forward to facilitate the application of the results achieved by these age determinations expert workshops is to encourage development of quantitative methods which can support and reduce the subjectivity in the ageing process and in the end possibly validate the age determinations. Such research should combine development of methods (preparations, microscopy, image analysis, etc.) and validation of age structures through various otolith analysis and/or preferably known-age material.

Acknowledging the costs of such work both in terms of time and consumables, the PG suggests that a way forward would be to encourage application of image analysis combined with the possibility to use measurements and other tools in the reading process both during workshops and in routine age determinations in the laboratories. This would decrease the subjectivity in the ageing process and aid in the interpretation of otoliths with deviating structures. Additionally, a certain degree of flexibility in the sampling regimes allowing for special sampling of e.g. a cohort of a species throughout a year for analysis of the timing of the formation of the age structures, otolith edge analysis and the like would greatly improve the quality and precision of age determinations.

If the workshop is inconclusive, e.g. Baltic sprat example, then the next step must be a validation study. The validation study is considered to be complimentary to the calibration workshops. The workshop report is reviewed at the PG and it is here that a proposal for a validation study should be approved. The process for the inclusion of a validation study in the PG list of recommended projects is to prepare a Title, Duration and Objectives of the project. The project proposal is then submitted to the RCM to the Liaison Meeting for approval. See section 1.8 for a first study proposal.

(4) Moving Beyond Recommendations

The PGCCDBS has existed for 8 years and has achieved many things in terms of establishing international cooperation, improving the overall sampling schemes for assessment of stocks all over Europe and has been very important in increasing quality and precision in the data collection. Many of the past recommendations put forward by the PG have been taken further and have resulted in the establishment of many expert groups which in turn have resulted in new methodology and ideas/recommendations for further improvement on various areas.

However, it must be acknowledged that recommendations put forward, often end up being stated repeatedly without any action being taken. Often national laboratories are reluctant to implement new ideas due to resource limitations, internal politics or because the message in the recommendations does not reach beyond the PG report. Considering the well established cooperation between laboratories through the PG and the system to follow recommendations put forward, cooperation among national labs and between these and the PG should improve the implementation of PG's recommendations. However, in some cases changes reach beyond the national laboratories and need to be implemented by different lines of commands, e.g. through ICES ToR's.

4.5 Maturity Calibration Workshops carried out in 2008

4.5.1 Workshop on Small Pelagics (*Sardina pilchardus*, *Engraulis encrasicolus*) maturity stages [WKSPMAT]

During the meeting all the WKSPMAT ToRs were addressed and fulfilled jointly with the participants producing a new common to all institutes classification scale for macroscopic maturity stages for anchovy (*Engraulis encrasicolus*) and sardine (*Sardina pilchardus*). A conversion table from the other used scales (old) to the new common scale was also provided. Common problems in macroscopic stage assignment were outlined and possible solutions were also provided. A reference image collection was build up thanks to the contribution of all the participants' institutes. Laboratory exercises were carried out to standardise the staging criteria among different labs, and results and comments are also added to the present report. A frozen image collection was also presented as annex because many times no other changes are available than work with frozen specimens. Histological validation and stage description scales were also addressed outlining the differences/similarities among the two analysed species. The participants feel to overcome all the aims of the workshop and suggested future activity or meetings in order to improve standardisation among scientists which work in this field.

d bTable 4.5.1.1. Anchovy and Sardine Maturity Stage Key used by different Institutes, protocol maturity stage key and maturity stage key proposey WKSPMAT.

New Stage N°	Status	Name of the New Stage ⁽¹⁾	FRIS ⁽²⁾	ISMAR ⁽³⁾ ***	AZTI		IEO ⁽⁶⁾	COC-IEO ⁽⁷⁾	IFREMER ⁽⁸⁾	IAMC ⁽⁹⁾
					(E. E.) ⁽⁴⁾	(S. P.) ⁽⁵⁾ ***				
1	Inactive	IMMATURE OR RESTING	Immature-Virgin	Immature	Immature or Rest	Immature	Virgin and Rest	Virgin	Virgin/Immature	Virgin and Resting
			Virgin-developing		Beginning of maturation				Resting	
2		DEVELOPING	Recovering	Maturing Virgin and Recovering Spent	In Maturation	Early Ripening	Developing	Maturing and Recovering Spent	Developing/ Maturing	Developing
3	Active	IMMINENT SPAWNING	Maturing	Ripening	Pre-spawning	Late Ripening/Partly Spent (Early)	Pre-spawning and Recovering	Pre-spawning	Pre-spawning	Pre-spawning
4		SPAWNING	Mature/Spawner	Ripe	Spawning	Ripe	Spawning	Spawning	Spawning	Spawning
5		PARTIAL POSTSPAWNING	Spent	Ripe	Partly Spent	Partly Spent (Late)	Partial Postspawning	Post-Spawning	Partial Postspawning	Partial Postspawning
6	Inactive	SPENT	Resting	Spent	Full Spent and Resting	Spent/ Recovering	Ultimate Postspawning	-	Degenerating	Ultimate Postspawning

⁽¹⁾ Annex 4 - WKSPMAT Maturity Stage key; ⁽²⁾ Annex 4 - Anchovy maturity Stage key from FRIS; ⁽³⁾ Anchovy - Sardine maturity Stage key from ISMAR; ⁽⁴⁾ Annex 4 - Anchovy maturity Stage key from AZTI (anchovy) ; ⁽⁵⁾ Annex 4 - Anchovy maturity Stage key from AZTI (sardine); ⁽⁶⁾ Annex 4 - Anchovy maturity Stage key from IEO; ⁽⁷⁾ Annex 4 - Anchovy maturity Stage key from COC-IEO; ⁽⁸⁾ Annex 4 - Anchovy maturity Stage key from IFREMER; ⁽⁹⁾ Annex 4 - Anchovy maturity Stage key from AZTI (PIL); *Modified Pinto&Andreu (1957) scale; ** Key of Arriaga et al., 1983; *** Walsh scale (1992); **** Holden and Raitt (1974).

PGCCDBS reviewed the report of the species-specific workshop held in 2008 (WKSPMAT). The comments from PGCCDBS in relation to the recommendations of this workshop are provided in table 4.5.1.2.

Table 4.5.1.2. Review of recommendations from WKSPMAT.

Workshop acronym	Recommendation of Workshop	Comments of PGCCDBS
WKSPMAT	It is recommended to perform at least one more of this kind of workshop increasing the number of participating countries and adding other commercially important pelagic species as: <i>Sardinella aurita</i> , <i>Trachurus sp.</i> and <i>Scomber sp.</i>	<i>Trachurus sp.</i> and <i>Scomber sp.</i> maturity staging was done in WKMSMAC 2007, and no need for further WKs is found. WKSPMAT should justify sufficiently the need of a WK on <i>Sardinella aurita</i> . Several countries have participated in the WK, with several laboratories within each country. The countries that have not participated in the workshop should start to use the agreed maturity stage.
WKSPMAT	It is also recommend to conducted regular exchange among institutes, with images from fresh gonads and histological preparation.	Agree

WKSPMAT	The institutes that only work with frozen specimens have to consider that: frozen sample colour may be misleading, as well as the meaning of flaccidity of tissues. It's very important to have a big reference collection and to compare the frozen gonads aspect with fresh gonads aspect very often. Within this meeting a reference collection for frozen specimens was also provided; its use is strongly recommended.	Agree
WKSPMAT	The common scale produced by the working group would be used by all the involved countries and would be promoted also to other non- EU countries which share the studied resources with EU members (i.e north African countries, Turkey, etc.)	Agree
WKSPMAT	Histology is an important tool to achieve on a consensus maturity stage description and classification.	Agree, although this is more a conclusion than a recommendation.
WKSPMAT	When the macroscopic classification of some specimens is not clear, it is recommended to use the stereomicroscope on a small piece of gonad. Moreover if it is not enough, to collect the gonad for histological analysis.	Agree. Additionally, an optimal sample size should be determined when histological analysis has to be made. Given the cost of such analysis not all doubtful samples may have to be collected.
WKSPMAT	Histology on females should be undertaken to assess the differences between immature and resting stages, and to derive correction factor to apply to % macroscopic stages. This work would be carried out from samples collected mainly during the spawning season (period used for the maturity ogive estimation).	Agree. Additionally, given the cost of such analysis, an optimal sample size should be determined when histological analysis has to be made.
WKSPMAT	Histology on males should be undertaken to validate the macroscopic classifications, mainly in the differentiation between immature and mature.	Agree.
WKSPMAT	Maturity ogives should only be based on data collected during the peak of the spawning season considering geographical variation, because it is impossible to macroscopically distinguish immature and resting females. The proportion of resting females during the peak of the spawning season is lower than the rest of the year.	Agree.

4.6 Age Calibration Workshops carried out in 2008

4.6.1 Workshop on Age Reading of Baltic sprat [WKARBS]

The Workshop on age reading of Baltic sprat was held in Klaipeda, Lithuania on 16-19 March, 2008. Ten readers from seven countries attended the workshop, namely, Estonia (1), Germany (2), Latvia (2), Lithuania (1), Poland (1), Russia (1) and Sweden (2). All of them participated in the exchange of otolith samples before the workshop and they are responsible for preparation of national assessment data.

The Baltic sprat age determination was only very occasionally a subject of scientific discussion on an international forum. In 2004 exchange of sprat otolith samples between the age determination experts of Baltic sprat was initiated by Baltic Sea Regional project (BSRP). As a result 8 sprat otolith samples were prepared and started their circle around the Baltic Sea. The results of the exchange were discussed at a Workshop in Danish Institute for Fisheries Research, Charlottenlund, Denmark in January 2006. It was concluded at the workshop that the main reason for differences in age determination was the counting of winter rings in the external part of otolith starting with the 3rd winter ring and for older fish the difference in the resulting ages was rather large. It was agreed that the age determination of sprat should be performed with microscopes using magnification till 100x. It was decided to continue exchange of otolith samples and in 2006-2008 in total 7 national otolith samples comprising 342 otoliths have been treated in the national laboratories around the Baltic Sea.

The analysis of the age readings exchange results was performed using methods developed by Eltink *et al.* (2000). The results of comparison of age determination revealed significant improvement in comparison with the previous exchange carried out in 2004-2005. This could be result of discussions at the Workshop 2006 as well as the implementation of the same standards in relation to microscopes and used magnification. According to Wilcoxon signed rank test the average disagreement between all individual readings of the readers had decreased from 65.2% till 29.9%. The agreement between readers on average for all the samples had increased from 58.3% till 72.3%. However the coefficient of variation in 4 samples from 7 stayed high over 20% and on average for all the samples combined was 25.9%.

The age reading results of the otolith samples in the exchange were discussed at the Workshop. The otoliths from the exchange samples were observed on the screen. The main reason for different age determination was considered distinction of the winter rings in the otoliths of older fish (3+) which are situated in the external part of the otolith. It was concluded that more often readers underestimate the age.

Two new otolith samples collected in 2007 were prepared for the workshop. The age determination was performed by nine age readers; one of them could be regarded as inexperienced. The percentage agreement slightly increased in comparison with the results of the exchange and was in the range of 53.3% till 96.0% and on average 76.1% and coefficient of variation decreased and was in the range of 1.2% till 28% and on average 17.1%. It could be considered that 4-5 readers are rather consistent in age determination of sprat while few readers probably are not very confident that manifested itself in underestimation of age in exchange and overestimation at the workshop (Figure 4.6.1.1).

Common philosophy for the age determination of sprat was not agreed at the workshop. One opinion considered that otoliths belonging to one sample should have similar otolith structure and this should be especially taken into account in the relation to width of the last annual ring or when otoliths are collected in autumn the width of the opaque zone (summer zone) which is on the edge of otolith. The opposite opinion considered that the growth of sprat and consequently the resulting annual ring could be very different. As a justification for that served the long spawning period of sprat which could result also in substantial differences in the length of feeding season that subsists growth of sprat. Age readers were encouraged to record any peculiarities in otolith structure which had regular character and thus could be helpful in age determination.

The participants of the workshop considered that it would be necessary to continue the exchange of otolith samples and to meet regularly every third year.

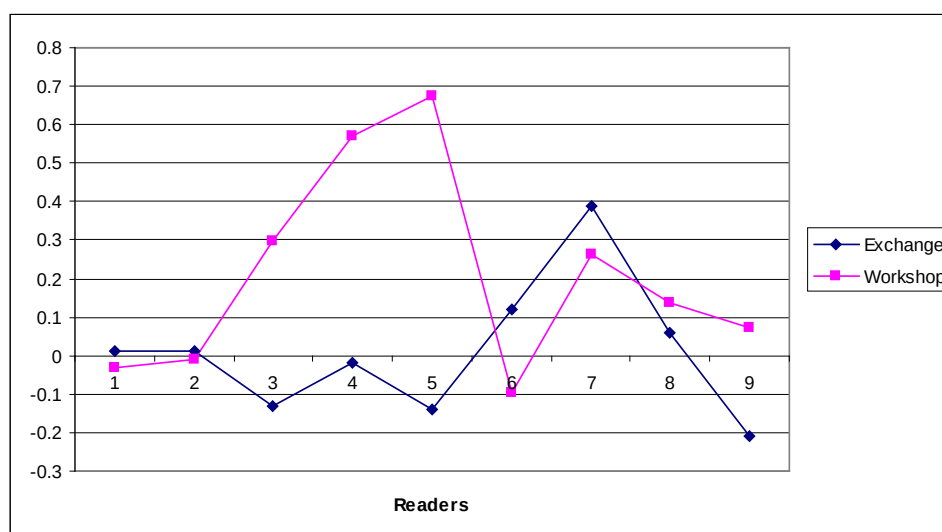


Figure 4.6.1.1. Relative bias in age determination of Baltic sprat by reader in otolith samples treated during the Exchange and at the workshop.

4.6.2 2nd Workshop on Age Reading of Flounder [WKARFLO]

Descriptions of national sampling and age determination protocols were updated.

The results of the otolith exchange from 2007-8 were presented and discussed (ToR a). Some of the more troublesome otoliths were discussed and agreement made on the age.

An experiment to read the age of Baltic flounder using broken and burnt samples was conducted and the results discussed (ToR b). This experiment showed that this method had some problems with agreement.

A reading experiment to assess the influence of knowledge of fish length on age determination was carried out and the results discussed (ToR c). Results suggest that no readers relied on the length to infer the age of the fish.

Two presentations on development of an otolith “calendar” were discussed and an agreed way forward was established.

A presentation on the freeware GIMP imaging software provided a new way forward for image analysis, which would replace the need to buy expensive software and overcomes the problems of which version of software to use.

An updated manual (ToR d) was discussed and amendments were agreed.

A presentation and discussion of the setting up of national reference collections and reading of historical data provided agreement on a way forward (ToR e and f). Further work is required to establish the amount of time this would take and if the necessary people were available to complete this work.

Conclusions and recommendations from the workshop experiences as a whole were discussed and agreements made.

4.6.3 Workshop on age reading of Baltic herring [WKARBH]

The Workshop on age reading of Baltic herring was held in Riga, Latvia on 9-13 June, 2008. Fourteen readers from seven countries attended the workshop, namely, Denmark (1), Estonia (1), Finland (1), Germany (2), Latvia (3), Lithuania (2) and Sweden (4). Nine of them were experienced readers the data of whom are used for preparation of national assessment data while 5 readers were inexperienced.

The experienced readers have started the cooperation in 1997 as members of Baltic Herring Age Reading Study Group and had two workshops in 1998 and 2000 and afterwards the study group was dissolved in 2001. However, the regular exchange of otolith samples was continued. The otolith exchange results of 5 otolith samples in 2005-2007 were thoroughly discussed at the Workshop. The problematic otoliths were observed on the screen beginning with younger ages and finishing with the older ages. In general in most of the cases the agreed age coincided with the modal age. The following main reasons for different interpretation of herring age were detected:

- 1) Distinction between false and true winter rings that is more often important in the first and second annual growth zones;
- 2) Distinction and counting of winter zones on the edge (rostrum) for older fishes.

The agreement between readers on average for all the samples was 80.4%, although for 4 samples from 5 the agreement was below 80%. The average coefficient of variation for all the samples was 14.2%. Although it should be noticed that in 4 samples from 5 the coefficient of variation was close to 10% and in one sample it was very high – 32.8%.

This discussion served as a basis for development of the Manual for Age Determination of Baltic Herring which is included in the Report of WKARBH.

Four new Baltic herring otolith samples in total of 200 otoliths were prepared for the workshop. The age determination was performed by 8 experienced age readers who have participated in the exchange and 4 inexperienced readers. Two separate analyses of the age determination results were performed using spreadsheet developed by Eltink *et al.* (2000). One included all readers and other included only experienced readers. For expert readers the average agreement with the modal age was in the range from 82.4% till 91.5% and on average 86.9%. The coefficient of variation varied from 4.0% till 11.5% and on average was 6.4%. The opinion of the Baltic herring age reading experts at the Workshop was that the achieved levels of agreement and coefficient of variation correspond to desirable levels in age determination of Baltic herring (Figure 4.6.3.1).

However, for younger age groups (1-3 old herring) agreement of 95-100% percent would be necessary and achievable. The age determination results were discussed and the problematic otoliths were observed on the screen. In these samples the main reason for different interpretation of herring age was distinction between false and true winter rings.

The participants of the workshop considered that it would be necessary to continue the exchange of otolith samples and to meet regularly every third year. The next workshop is recommended to be held in 2011.

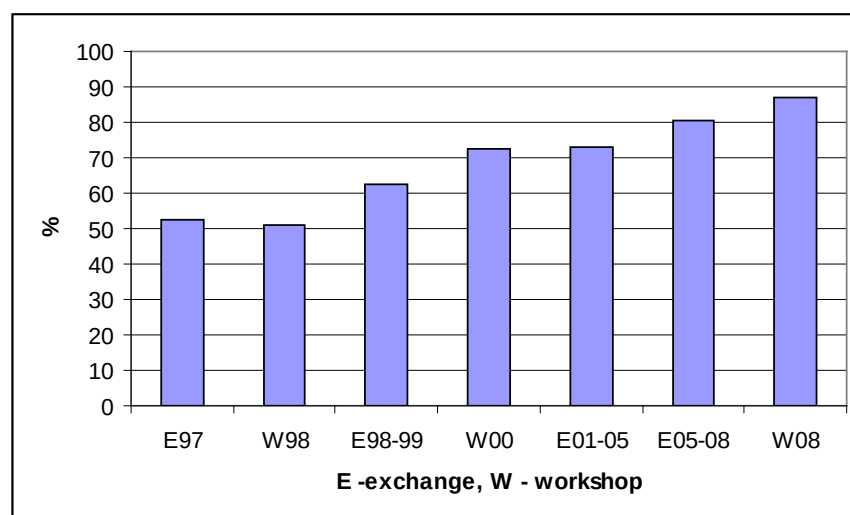


Figure 4.6.3.1. Average agreement in age determination of Baltic herring in samples treated during exchanges and workshops in 1997-2008.

4.6.4 Workshop on Age Reading of Turbot [WKART]

The PGCCDBS meeting in Valetta, Malta, March 2007 (ICES 2007a), identified turbot (*Psetta maxima*) as a species requiring an ageing workshop to evaluate and improve the age interpretation based on stained slides of the otoliths. One of the main difficulties in reading turbot-otoliths is the interpretation of the first annual ring, causing uncertainty among the readers during the exchange. Because validated otoliths or agreed reference collections do not exist at present, the final debate on whether or not the first ring is indeed the first annual ring is still ongoing. The workshop therefore dedicated its effort to conclude to a common interpretation of this particular ring and thus improve the agreement among readers. The WKART could build on the results of the otolith exchange organized in 2004 and was the first ageing workshop for turbot.

Two otolith sets were included in the workshop: a North Sea turbot set (N=110), and a Baltic turbot set (N=96). Thirteen readers out of six countries attended the workshop: Belgium (3), France (2), Germany (2), The Netherlands (2), UK (1), Sweden (2) and Latvia (1). Unfortunately, the Baltic otolith set was lost after the exchange and only the photographs remained as the basis for further investigation. The two regions, North Sea and Baltic Sea, were treated separately as the particularities between the datasets from the regions were too different. Also, these areas comprise different stocks so the combination is clearly to be avoided.

A manual on the preparation of turbot otoliths has been compiled, and documented with a reference set of annotated images. This document can be used as a guideline and can form the template for discussion when refining the interpretation of the growth pattern and for identifying gaps and opportunities concerning the current knowledge of the age estimation of turbot.

WKART used ORACLE for analysing the results which is an improved version of the Eltink spreadsheet (Eltink et al. 2000) and has been evaluated by the PGCCDBS 2008.

The overall agreement rate of the North Sea sample was 82.8%. The range of agreement with the modal age was 70.5–91.1%. The overall agreement rate of the Baltic sample was 71.6%. The range of agreement with the modal age was 55.8–87.4%. The lower score for the Baltic area originates mostly from the poor quality of the image set. Furthermore, the Workshop participants were formed out of two clearly separated Expert Groups i.e. the North Sea and the Baltic Sea. Using results from age readers who are not familiar with the selected area, clouds the agreement within the area.

The overall results for this first turbot age reading workshop were evaluated by the participants as positive. For the North Sea area, expert readers should be able to reach an agreement of more than 90%. This indicates that the age estimation of turbot can be highly precise when the agreed interpretation is used, and applied on sufficient samples of good quality. For the Baltic area, the results are more in the range of 70–80% but this is probably caused by the poor quality of the images and the reduced quality of the dataset especially the lack of younger ages.

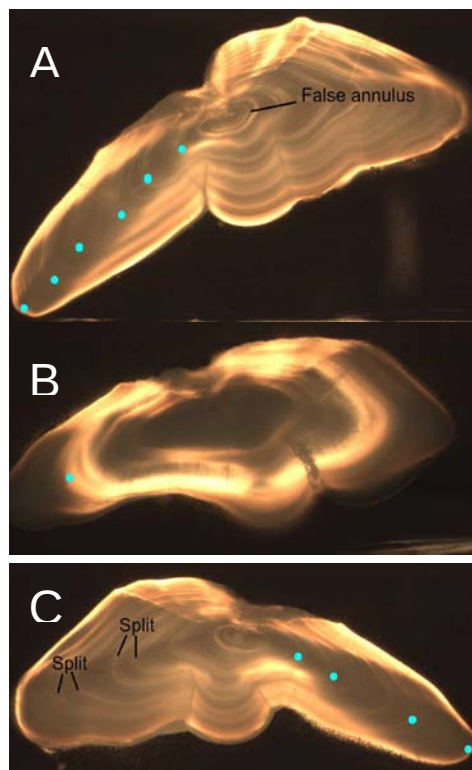
The final recommendations of WKART were 1) Compare different methods for the preparation of otoliths to determine a standard international procedure, 2) Use the (Dutch) North Sea otolith set as an international approved set, 3) Complete the (Swedish) Baltic reference set with younger ages, 4) Build a collection of otoliths that documents the edge growth, 5) Organize a new exchange for the Baltic, and 6) Compile certified otoliths to determine the status of the first ring.

4.6.5 Workshop on Age Reading of North Sea Cod [WKARNSC]

The overall result of the workshop exercises is that there are significant variations in North Sea cod age estimates between readers. Both low precision, and relative biases between readers were found and overestimation of fish ages seems to be the problem. The image analysis exercise clarified that the lack of agreement can be referred to the perception of the first age structure (O1) and the very widespread appearance of some age structures resulting in several translucent bands within one year (Figure 4.6.5.1). Exploring the application of image analysis, the group agreed that applying such tools in the routine age estimation of North Sea cod may prove very valuable. It gives the opportunity to use metrics to rule out doubt when defining the age structures to count and also gives a very useful exchange tool for the individual readers both within and between laboratories.

The workshop achieved quite a lot in terms of ironing out, through discussion and calibration, some of the major problems in ageing otoliths of North Sea cod. The group reached agreement on a definition of an ageing protocol/guidelines mentioned in the present report and the aim is to employ these guidelines to eliminate some of the problems with e.g. split rings in the otolith structures.

A collection of Agreed Age cod otoliths were started at the workshop. The reference collection will have to be expanded considerably through exchange of otoliths and images. 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 measurements of O1, typical distances between age-structures, edge development over season, and general growth curves for the sub-stocks of cod in the North Sea.



A. A false translucent ring near the centre can be confused with the first annulus. The false ring is generally thinner and well defined, approximately 1 mm diameter, compared to the approximately 2 mm diameter and less well defined first annulus.

B. The first translucent annulus is deposited in late autumn and often completed before New Year. Thus, there can be quite wide opaque marginal increment in quarter 1 for young cod, which can be misinterpreted as being deposited the previous summer.

C. Multiple translucent banding within an annual structure can occur within the same otolith. This can also re-occur for several years. Counting the multiple translucent bands as annuli will result in overestimated fish age. Split rings are often confused with true annuli when interpreting the growth struc-

Figure 4.6.5.1. Cod otolith images showing the identified sources for variability of age estimates.

4.6.6 Workshop on Age Determination of Redfish [WKADR]

The WKADR held in Nanaimo, Canada, from 2-5 Sep 2008 was a follow-up of the 2006 WKADR with a clear focus on analysing the results of the otolith exchanges carried out in 2007-2008 and identifying the sources of error in age determination. In addition, improvements in age reading methodology and quality assurance/quality control of redfish age reading were discussed based on working examples.

The workshop showed significant progress in the correspondence between readers, especially when using only clear-pattern otoliths and comparing the most experienced readers (Fig. 4.6.6.1). With regard to selecting only clear structures, however, the possible bias in age distribution should be investigated.

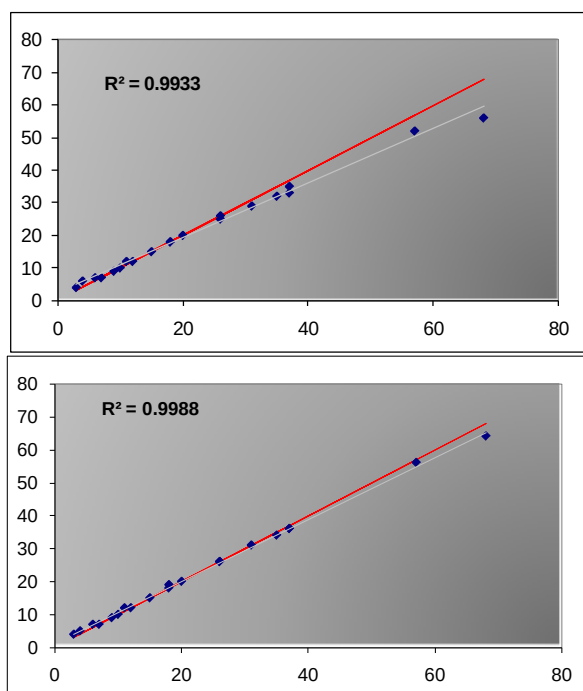


Fig. 4.6.6.1. Improvement in age reader correspondence when using a sub-set of *Sebastes marinus* and *S. mentella* otoliths with clear growth patterns, using all readers (left, CV=15.5%) and the five most experienced readers (right, CV=9.0%). The axis labelling is showing the age estimates (years), and the 1:1 equivalence (red line) as well as the regression (grey line) of data is given with the corresponding regression coefficient (R^2).

The report has not been finalised yet, but a series of recommendations has been agreed:

- 1) Improve binocular/microscope equipment quality, especially to obtain large magnification (100x minimum, 200x recommended) with sufficient clarity, using 20x oculars. Light should be sufficient, preferably using fibre optics.
- 2) Each country should measure the first three annuli in 10 otoliths for a number of stocks, and containing several year classes, following specific guidelines given in the report.
- 3) For production ageing, the recommended otolith preparation method should be break-and-burn, following the guidelines described in the report.
- 4) Harmonisation of the age reading across stocks and species should be continued following the guidelines, and through short-term exchanges among labs.
- 5) Create a reference collection within each lab for their specific stocks, and their pictures should be transferred to an image collection to be uploaded on a webpage with sufficient metadata (technical & biological information).
- 6) For stock assessment and regular precision monitoring, the proposed confidence index should be used.

The PG reviewed all expert workshops on methods and age determination carried out during 2008 as listed in the sections below. For each of these workshops, the presenters of their outcome were asked to provide 3 presentation slides for the respective stock assessment WG and benchmark workshop. These slides are available on the PG SharePoint and will be forwarded to the respective Expert Group by the ICES Secretariat.

4.6.7 Recommendations - Age calibration workshops

A general trend in all recommendations from the age calibration workshops were to continue the knowledge exchange established during the workshops to keep a momentum of the process of quality assurance of age determinations of the actual species and increase the precision of the age distributions submitted to the assessment working groups by participating laboratories.

While many of the age calibration workshop recommendations were quite specific to the species they dealt with, some overarching recommendations were common across all the workshops reviewed. These are presented below. **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 (ICES 2008b).

- 1) Continuation of otolith sample exchange or regular otolith sample exchange (WKARBH, WKARBS, WKART).
- 2) Workshops once in three years (WKARBH, WKARBS) or according to recommendations of PGCCDBS or survey WG.
- 3) The knowledge on fish biology and its connection with the formation of otoliths is very important for age readers therefore studies on otolith formation in general and physiology/growth/behaviour in relation to otolith structure is recommended for all age readers (WKARNSC, WKARBS, WKARFLO2).
- 4) The incorporation of Age Reading Manuals (Guidelines) produced at the workshops into the national ageing manuals (WKARNSC).
- 5) Recommendation to use image analysis in the process of ageing (WKARNSC).
- 6) Recommendation to establish international otolith image reference collection (WKART, WKARNSC).

5 Agree a workplan for 2010 for further developing and finalising standards and best practices for sampling commercial fisheries (ToR d)

Based on the experiences gained at the age reading workshops and otolith exchange programmes carried out since the PGCCDBS meeting in 2008, the PG reviewed the Guidelines for Otolith Exchanges. The PG found that the work that has to be put into the organisation and preparation of an otolith exchange exercise using the present guidelines, may delay and complicate the accomplishment of the exchange. It was agreed that a three step approach would ease and speed up the process.

The three step approach is:

- 1) A “small” otolith exchange programme. Images are not required for small exchanges. Suggested sample size is 3-5 otoliths for each length class in each quarter to be sampled (e.g. Q1 and Q3/Q4). If two methods are used for age reading, e.g. sectioning and breaking otoliths, a collection of each type of preparation should be included in the exchange.
- 2) If the result of the “small” exchange programme shows that the percentage of agreement is not acceptable, a “full” otolith exchange programme is launched where images are required. Where two methods are used for age reading, e.g. sectioning and breaking otoliths, the option should be available for all readers to read both the broken and the sectioned otoliths. The readers should record their normal method of reading.
- 3) If the outcome of the “full” exchange programme shows significant disagreement in the age determination, a workshop has to be established.

5.1 Age determination guidelines

The guidelines for otolith exchanges have been updated taking into account last years’ proposal. The document is included in Annex 11 and must be distributed to all future workshop chairs together with the ICES guidelines for chairs, so that there is assurance of some consistency.

5.2 Otolith exchange programme and Workshop planning

PGCCDBS updated the age reading long term planning table, see Annex 8.

According to the DCR (Commission Decision 2008/949/EC) the various fish and shellfish species are divided into three groups.

- Group 1:** Species that drive the international management process including species under EU management plans or EU recovery plans or EU long term multiannual plans or EU action plans for conservation and management based on Council Regulation (EC) No 2371/2002 of 20 December 2002 on the conservation and sustainable exploitation of fisheries resources under the common fisheries policy,
- Group 2:** Other internationally regulated species and major non-internationally regulated by-catch species,
- Group 3:** All other by-catch (fish and shellfish) species. The list of Group 3 species shall be established at the regional level by the relevant regional coordination meeting and agreed by STECF.

All group 1 and group 2 fish species has been included in Annex 7. As age determination of the group 3 species is not required these species was not taken into account by the PGCCDBS.

Annex 7 shows that focus on age determination has been on a limited number of species, as these species have been the commercially most important species and for which scientific advice has been given for a number of years.

The PGCCDBS discussed how to deal with all the species for which age determination routinely if ever have been carried out. The PG agreed the following approach to be implemented:

1. If an analytical assessment for a species is carried out and advice is given a “small” otolith exchange programme has to be carried out every three years.
2. If no analytical assessment is not carried out but advice is given.

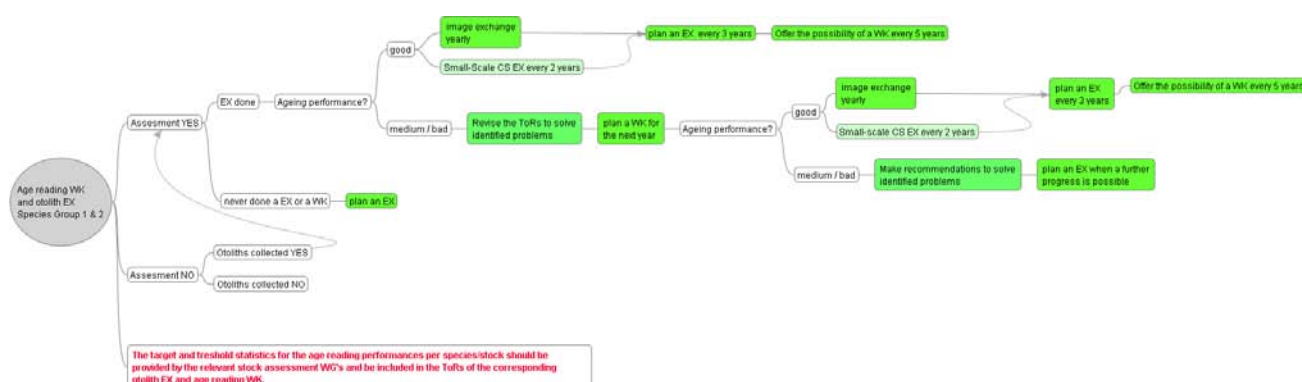


Fig. 5.2.1. Procedure for planning otolith exchanges and workshops.

At present, there are no objective criteria for classifying ageing performance into 'good', 'medium' or 'bad'. Intersessional work is encouraged and suggestions for criteria will be discussed at the next PG meeting.

5.3 Otolith exchanges for 2009/2010

5.3.1 Angler and Black-bellied Angler

The last angler (*Lophius* spp.) otolith exchange took place in 2001 and the last black-bellied angler (*L. budegassa*) otolith exchange took place in 2004. Landa *et al.* (2008), however, noted that previously used ageing criteria are not accurate. Small-scale exchanges are therefore recommended for 2011, when new ageing criteria are expected.

5.3.2 Blue whiting

The last blue whiting otolith exchange took place in 2004. A full pre-workshop exchange is recommended. The exchange will be organised in 2009-2010. Hans Høie (Norway) will act as coordinator for the exchange and workshop.

5.3.3 Brill

The last brill otolith exchange took place in 2005. A small-scale exchange is recommended and will be carried out in 2010. Annemie Zenner (Belgium) will act as coordinator for the exchange.

5.3.4 North Sea cod

The last North Sea cod otolith exchange took place in 2005/2006. A small-scale exchange is recommended for 2009-2010. Hans Høie (Norway) will act as coordinator for the exchange. Help from other countries to section the otoliths and to provide otolith material would be necessary.

5.3.5 North Sea sole

The last sole otolith exchange took place in 2005. A small-scale exchange is recommended for 2010. Mark Etherton (UK) will act as coordinator for the exchange.

5.3.6 Baltic Turbot

The last Baltic Turbot otolith exchange took place in 2004. A small-scale exchange was recommended by WKART 2008 and will be carried out in 2010. A Black Sea turbot sample should be included in this exchange. Lotte Worsøe Clausen (Denmark) will act as coordinator for the exchange.

5.3.7 Roundnose grenadier

The last roundnose grenadier otolith exchange took place in 2006. A small-scale exchange was recommended by WKARRG 2007. An otolith exchange should be prepared by launching a questionnaire to all institutes with the objective of reviewing which material would be available for the inclusion in a roundnose grenadier otolith exchange (size range, areas, ...). France will take care of carrying out the survey. If there is enough information to address the conditions defined by WKARRG, an otolith exchange will take place at the end of 2009 and early 2010. The analysis of the otolith exchange will ultimately address the need to convene a dedicated workshop.

5.3.8 Dab

There has not been any dab otolith exchange so far. Therefore, a full pre-workshop exchange is recommended for 2009. Christoph Stransky (Germany) will act as coordinator for the exchange.

5.3.9 Spanish mackerel

Spanish mackerel is only fished by Spain and Portugal and a small exchange should be arranged by those countries alone.

5.4 Workshop proposals

As an outcome of the 2009 PGCCDBS recommendations, a number of workshops have been suggested to be established. They are given in Annex 9.

Maturity staging workshops

For new species where no mature data exists there is no need for calibration workshops and laboratories should use standard protocols developed at WKMAT (ICES 2007b).

For species where maturity data already exists and discrepancies have been found among laboratories, there is a clear need of workshops on maturity staging. However, given the high number of species requested to collect maturity data, for the time being only species where annual maturity data is requested by DCF, it is suggested to hold a workshop, potentially herring, sprat, blue whiting, Greenland halibut, redfish, salmon, scabbardfish, alfonsino, grenadier, orange roughy, megrim.

Considering the above, PGCCDBS recommends holding the following workshops in 2010:

1. Workshop on Sexual Maturity Staging of Redfish and Greenland Halibut
2. Workshop on Sexual Maturity Staging of Herring and Sprat

In conjunction with the PGMed, two further maturity staging workshops are recommended for 2010 (see Annex 9):

1. Workshop on Sexual Maturity Staging of Elasmobranchs
2. Workshop on Sexual Maturity Staging of Cephalopods

PGCCDBS recommends also investigating the need on holding maturity staging workshops in 2011-12 regarding:

1. Workshop on Sexual Maturity Staging of Blue Whiting
2. Workshop on Sexual Maturity Staging of Megrin
3. Workshop on Sexual Maturity Staging of Deep-sea species
4. Workshop on Sexual Maturity Staging of Salmon

5.5 Intersession work

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

5.5.1 Follow-up of results from age reading workshops

Evaluate (develop guidelines to improve) the use of results from age calibration exercises in assessment working groups. This task will be co-ordinated by Lotte Worsøe Clausen (Denmark) and Loes Bolle (The Netherlands).

5.5.2 Testing the effects of using sex-maturity-age-length keys (SMALKs)

The effects of using sex-maturity-age-length keys (SMALKs) will be tested by using 3-4 case studies, considering the outcome from the FRESH network (see section 6.2). This task will be co-ordinated by Fran Saborido-Rey (Spain).

5.5.3 Developing a statistical tool for determining maturity staging correspondence

For ageing data, statistical tools have been established to test the bias and precision between age readers, but for maturity staging, such tools have to be developed (see section 6.3). This task will be co-ordinated by Fran Saborido-Rey (Spain), David Maxwell (UK) and Ernesto Jardim (Portugal).

6 Finalize the protocol guidelines for maturity staging workshops (ToRe)

6.1 PGCCDBS Guidelines for Workshops on Maturity Staging

The Guidelines for Workshops on Maturity Staging, drafted at last year's PG meeting (ICES 2008b), were finalised (Annex 12). In addition to topics to consider before and at the workshop, guidelines are given for collecting maturity data and histological analyses for maturity workshops.

6.2 Network of European and North-Atlantic researchers in Fish Reproduction and Fisheries (FRESH)

Fish Reproduction and Fisheries (FRESH) is a COST Action establishing a network of European and North-Atlantic researchers to co-operate on the improvement of i) knowledge on fish reproduction in relation to fisheries and ii) current assessment methodology in order to promote sustainable exploitation of marine fish resources. The Action form a focal point for the disparate national, European and North-American research initiatives in this research area. Further, it aims to assist in the development of future marine policy objectives, such as the recovery of overexploited fish stocks.

The objectives of FRESH are:

- 1) To establish a network of researchers, including assessment scientists and reproduction biologists, with the common interest to improve the assessment methodology for the sustainable exploitation of marine fish resources.
- 2) Coordinate current and future research on fish reproduction as applicable to fisheries assessment and management to develop common sampling and technical protocols, and improve methodology.
- 3) Coordinate national sampling programs to improve maturity data availability for a range of different stocks.
- 4) Promote the implementation of stock reproductive potential into current stock assessment and advice to improve fisheries management.
- 5) Dissemination of progress within this field to both the network and to the wider scientific community and end-users via open public meetings and conferences, scientific missions and website.

For the work developed at PGCCDBS, objectives 2 and 3 are relevant. In particular one of the deliverables of Working Group 2 of FRESH ("Improving estimates of stock reproductive potential: Standardizing sampling procedures and methods across North Atlantic and Mediterranean") is to produce a Methodology manual for maturity, fecundity and egg production studies. Members of PGCCDBS are welcome to participate in this manual, which will be regularly reported to PGCCDBS to standardize between both (PGCCDBS and FRESH) the data collection, maturity staging and estimation of maturity ogives.

More information on FRESH can be found at <http://www.fresh-cost.org>.

6.3 Recommendation from PGCCDBS

- It is necessary to develop statistical tools for comparison of maturity stages assignments of samples at workshops to assess the significance of agreement/disagreement among laboratories
- It is highly recommended that Benchmark WKs should evaluate sex separated maturity ogives for each stock, where ogives are available, when estimating SSB. This task may be developed in connection with the FRESH Action (see section 6.2).
- For new species where no mature data exists there is no need for workshops and laboratories should use standard protocols developed by WKMAT (ICES 2007b), until more specific and agreed protocols exist for the concerned species/stocks.
- Workshops on species following different reproductive strategies should be initiated, such as viviparity and hermaphroditism in fishes, crustacean and cephalopods.

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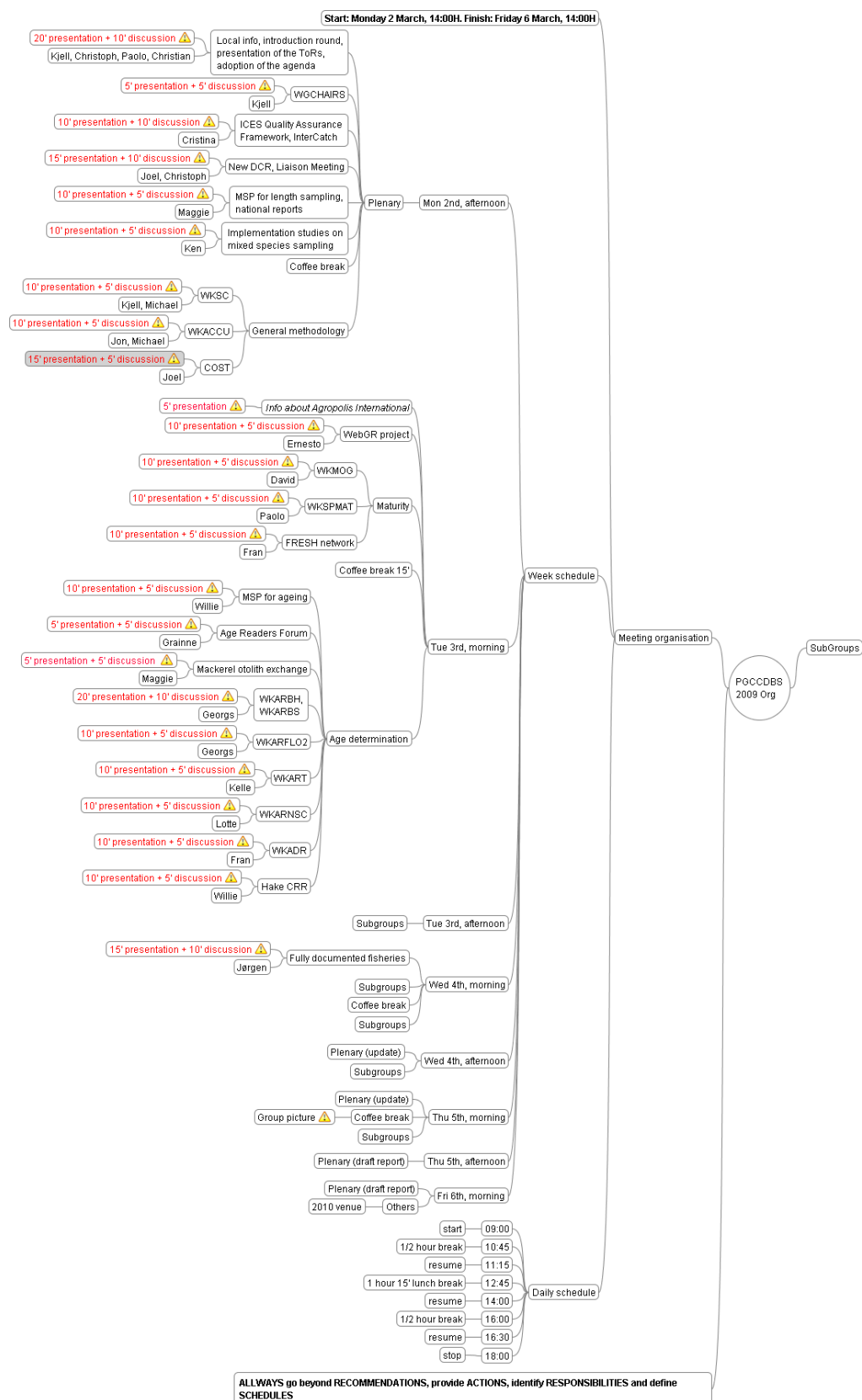
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Annex 2: Agenda



Annex 3: PGCCDBS terms of reference for the next meeting

The **Planning Group on Commercial Catches, Discards and Biological Sampling** [PGCCDBS] (Co-Chairs: Christoph Stransky, Germany, and Kjell Nedreaas, Norway) will meet 1–5 March 2010, 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 to be proposed for implementation within the EU Data Collection Regulation and national centres responsible for sampling commercial catches;
- c) 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;
- d) Report on the implementation of the Quality Assurance Framework (QAF) into stock assessments and advise on the further development of Inter-Catch,
- e) Review available methods and equipment to improve the data collection from fisheries. Report on the effectiveness of self sampling programmes versus traditional observer programmes.
- f) Agree a workplan for 2011 for further developing and finalising standards and best practices for sampling commercial fisheries;

PGCCDBS will report for the attention of ACOM by 20 March 2010.

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 Regulation (EC Reg. 199/2008, 665/2008 and Decision 2008/949/EC). 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 Data Collection Regulation (DCR) and DG Mare is a member of PGCCDBS to ensure proper coordination with the DCR 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 DCR work plans. The meeting is placed in xxxx, xxxx, as this meeting shall be held in parallel with the corresponding 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:	Travel costs will be eligible for participants from Member States of the European Union through the EU Data Collection Framework.
Linkages to advisory committees:	ACOM
Linkages to other committees or groups:	SciCom
Linkages to other organizations:	DG Mare (DCR)

Annex 4: REPORT FROM THE ASSESSMENT WORKING GROUPS/BENCHMARK WORKSHOPS-PGCCDBS CONTACT PERSONS Stock Data Problems Relevant to Data Collection – [Examples]

Stock	Description of Data Problem	How to Be addressed?	By who
North Sea Cod	Discard data is not provided by some countries. Some countries are not providing discard data to the working group still including Belgium, France and Sweden. There may be legitimate reason why they are not considered of good enough quality but this should be evaluated and discussed as discard rates appear to be different between countries.	PGCCDBS and North Sea RCM	PGCCDBS and North Sea RCM
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 this WK should provide recommendation on recreational fisheries sampling.	Baltic RCM and PGCCDBS
All stocks	Spatial data and information on sampling coverage and precision needs to be provided and if possible used in the assessment.	??	??

Annex 5: List of members attending the PGCCDBS and their involvement in assessment working groups, benchmark workshops and regional coordinating meetings.

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Annex 7: List of species with indications on the frequency of otolith exchanges and workshops

Species (Eng.)	Species (Latin)	Super Area	Area/Stock	Species group	Assessment	Previous exchanges	Previous workshops	Workshops 2009/2010	Exchanges proposed by PGCCDBS 2009	Workshops proposed by PGCCDBS 2009	Ageing performance
Atlanto-Scandian herring	<i>Clupea harengus</i>	Area I and II	I, II, V	G1	yes		1999				good
Blue whiting	<i>Micromesistius poutassou</i>	Area I and II	I-IX, XII, XIV	G1	yes	see NEA			yes (GE, NO)		medium
Capelin	<i>Mallotus villosus</i>	Area I and II	I, II	G2	yes						good
Cod	<i>Gadus morhua</i>	Area I and II	I, II	G1	yes	2006	2006		x ³	x ³	good/medium ²
Deep sea Redfish	<i>Sebastes mentella</i>	Area I and II	I, II	G1	yes	see NEA					bad
European Eel	<i>Anguilla anguilla</i>	Area I and II	I, II	G1	yes			WKAREA, FR (2009)			not known
Golden Redfish	<i>Sebastes marinus</i>	Area I and II	I, II	G1	yes	see NEA (Deep Sea Red)					not known
Greenland halibut	<i>Reinhardtius</i>	Area I and II	I, II	G1	no	see NEA			yes (RCM NA)	yes (RCM NA)	bad
Haddock	<i>Melanogrammus</i>	Area I and II	I, II	G1	yes	see North Sea					good
Horse mackerel	<i>Trachurus trachurus</i>	Area I and II	IIa, IVa, Vb, VIa, VIIa-c, e-k, VIIIabde	G2	yes	see NEA (IIa, IVa, Vb, V)					medium
Mackerel	<i>Scomber scombrus</i>	Area I and II	II, IIIa, IV, V, VI, VII, VIII, IX	G1	yes	see NEA					medium
Saithe	<i>Pollachius virens</i>	Area I and II	I, II	G1	yes	see North Sea					good
Salmon	<i>Salmo salar</i>	Area I and II	I, II	G1	yes	see Baltic					good
Tusk	<i>Brosme brosme</i>	Area I and II	I, II	G2	no						not known
Brill	<i>Scophthalmus rhombus</i>	Baltic	22-32	G2	no	see North Sea					not known
Cod	<i>Gadus morhua</i>	Baltic	22-24/25-32	G1	yes	2004-2005 (SE), 2006	2001, 2005 (LT), 2006 (PL)				bad
Common Whitefish	<i>Coregonus lavaretus</i>	Baltic	IIIId	G2	no						not known
Dab	<i>Limanda limanda</i>	Baltic	22-32	G2	no	see North Sea					good
European Eel	<i>Anguilla anguilla</i>	Baltic	IIIb-d	G1	yes			WKAREA, FR (2009)			not known
Flounder	<i>Platichthys flesus</i>	Baltic	22-32	G2	no	2006	2006 (GE), 2007 (SE),				good
Herring	<i>Clupea harengus</i>	Baltic	25-32	G1	yes	2001, 2003, 2005, 2006	1998 (LV), 2000 (FI),				good
Perch	<i>Perca fluviatilis</i>	Baltic	IIIId	G2	no						not known
Pike	<i>Esox lucius</i>	Baltic	IIIId	G2	no						not known
Pike-perch	<i>Stizostedion lucioperca</i>	Baltic	IIIId	G2	no						not known
Plaice	<i>Pleuronectes platessa</i>	Baltic	22-32	G2	no	see North Sea					good
Salmon	<i>Salmo salar</i>	Baltic	22-31 / 32	G1	yes	2002, 2003, 2005	2002, 2003, 2006 (LV)				good
Sea trout	<i>Salmo trutta</i>	Baltic	22-32	G2	yes						bad/medium
Sole	<i>Solea solea</i>	Baltic	22	G1	no	see North Sea (IV)					good
Sprat	<i>Sprattus sprattus</i>	Baltic	22-32	G1	yes	2004, 2007, 2008-...	2006 (DK), 2008 (LT)		exchange going on	2011	good
Turbot	<i>Psetta maxima</i>	Baltic	22-32	G2	no	2004	2008 (BE)		2010 (WKART)		not known
Alfonsinos	<i>Beryx spp.</i>	NEA	all areas, excluding X and IXa	G1	no						bad
Alfonsinos	<i>Beryx spp.</i>	NEA	IXa and X	G1	no						bad
Anchovy	<i>Engraulis encrasicolus</i>	NEA	IXa (only Cádiz)	G1	yes	see NEA (VIII)					good
Anchovy	<i>Engraulis encrasicolus</i>	NEA	VIII	G1	yes	2001 (ES), 2005	2002 (ES), 2006 (ES)	WKARA, IT (2009)			good
Anglerfish	<i>Lophius piscatorius</i>	NEA	IV, VI/VIIb-k, VIIIabd	G1	yes	see North Sea			yes	yes	bad
Anglerfish	<i>Lophius piscatorius</i>	NEA	VIIIC, IXa	G1	yes	see North Sea			yes	yes	bad
Argentine	<i>Argentina spp.</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV	G2	no						not known
Birdbeak dogfish	<i>Deania calcea</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV	G1	no						not known
Black-bellied angler	<i>Lophius budegassa</i>	NEA	IV, VI/VIIb-k, VIIIabd	G1	no	2001, 2004	1991 (FR, ES), 1997 (FR, ES, PT), 1999 (PT), 2		yes	yes	bad
Black-bellied angler	<i>Lophius budegassa</i>	NEA	VIIIC, IXa	G1	no	see NEA (IV, V, VII, VI)			yes	yes	bad
Blonde ray	<i>Raja brachyura</i>	NEA	all areas	G1	no						not known
Blue jack mackerel	<i>Trachurus picturatus</i>	NEA	X	G2	no						not known
Blue ling	<i>Molva dypterygia</i>	NEA	all areas, excluding X	G1	no						not known
Blue ling	<i>Molva dypterygia</i>	NEA	X	G1	no						not known
Blue whiting	<i>Micromesistius poutassou</i>	NEA	I-IX, XII, XIV	G1	yes	2003, 2004 (DK)	2005 (DK)		yes (GE, NO)		medium
Bluemouth rockfish	<i>Helicolenus dactylopterus</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV	G2	no						not known
Brill	<i>Scophthalmus rhombus</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV	G2	no	see North Sea			small exchange (BE)		good
Capelin	<i>Mallotus villosus</i>	NEA	XIV	G2	yes						good
Cod	<i>Gadus morhua</i>	NEA	Va/Vb/VIa/VIb/VIIa/VIIe-k	G1	yes	2006 (IE)					good
Cod (Greenland Cod)	<i>Gadus morhua</i>	NEA	XIV	G1	yes				yes (IS, GE, GL)	yes (IS, GE, GL)	not known
Conger	<i>Conger conger</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX, XII,XIV	G2	no						not known
Conger	<i>Conger conger</i>	NEA	X	G2	no						not known
Cuckoo ray	<i>Raja naevus</i>	NEA	all areas	G1	no						not known
Dab	<i>Limanda limanda</i>	NEA	VIIe/VIIa,f-h	G2	no	see North Sea			yes (WGNEW)	yes (WGNEW)	good
Deep sea Redfish	<i>Sebastes mentella</i>	NEA	ICES Sub areas V, VI, XII, XIV & NAFO SA	G1	yes	2000-2003 (GE), 2007	1983 (GE), 1984 (GE)				bad

Species (Eng.)	Species (Latin)	Super Area	Area/Stock	Species group	Assessment	Previous exchanges	Previous workshops	Workshops 2009/2010	Exchanges proposed by PGCCDBS 2009	Workshops proposed by PGCCDBS 2009	Ageing performance
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European Eel	<i>Anguilla anguilla</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G1	yes				WKAREA, FR (2009)			not known
Forkbeard	<i>Phycis phycis</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G2	no							not known
Four-spot megrim	<i>Lepidorhombus boschii</i>	NEA	VIIIc, IXa		G1	no	2004 (ES)	1997 (ES)					
Golden Redfish	<i>Sebastes marinus</i>	NEA	ICES Sub areas V, VI, XII, XIV & NAFO SA	see NEA (Deep Sea Red)	G1	yes							not known
Greater Forkbeard	<i>Phycis blennioides</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G2	no							not known
Greenland halibut	<i>Reinhardtius</i>	NEA	V, XIV/VI		G1	yes	2005	1996 (IS), 2006 (CA)			yes (RCM NA)	yes (RCM NA)	bad
Grey gumard	<i>Eutrigla gurnardus</i>	NEA	VIIId,e		G2	no							not known
Gulper shark	<i>Centrophorus granulosus</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G1	no							not known
Haddock	<i>Melanogrammus</i>	NEA	Va/Vb	see North Sea	G1	yes							good
Haddock	<i>Melanogrammus</i>	NEA	VIIa/VIIb/VIIc/VIIId-k	see North Sea	G1	yes							good
Hake	<i>Merluccius merluccius</i>	NEA	IIIa, IV, VI, VII, VIIlab / VIIId, IXa		G1	yes	1994 (FR,ES), 1997 (PT)	1997 (ES), 1999 (ES),	WKAHE, ES (2009)		2009-....		bad
Herring	<i>Clupea harengus</i>	NEA	VIIa/VIIb/VIIc, VIIId/VIIe/VIIIf	see North Sea	G1	yes							good
Horse mackerel	<i>Trachurus trachurus</i>	NEA	IIa, IVa, Vb, VIIa, VIIb-c, e-k, VIIIdabde/X		G2	yes	2005 (NL), 2006	1999 (NL), 2006 (NL)					medium
Horse mackerel	<i>Trachurus trachurus</i>	NEA	VIIId, IXa	see NEA (IIa, IVa, Vb, V)	G2	yes							medium
John Dory	<i>Zeus faber</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G2	no							not known
Leafscale gulper shark	<i>Centrophorus squamosus</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G1	no							not known
Lemon sole	<i>Microstomus kitt</i>	NEA	all areas		G2	no							medium
Ling	<i>Molva molva</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G2	no							not known
Mackerel	<i>Scomber scombrus</i>	NEA	II, IIIa, IV, V, VI, VII, VIII, IX		G1	yes	2008-.... (going on)	1995	WKARMAC, 2010 (UK)				medium
Meagre	<i>Argyrosomus regius</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G2	no							not known
Mediterranean horse	<i>Trachurus mediterraneus</i>	NEA	VIII, IX		G2	no							not known
Megrim	<i>Lepidorhombus</i>	NEA	VI/VII, VIIIdab/VIIId, IXa		G1	yes	1997, 2003, 2004 (PT)	1997, 2004 (ES)					medium
Orange roughy	<i>Hoplostethus atlanticus</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G1	no							not known
Other rays and skates	<i>Rajidae</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G1	no							not known
Plaice	<i>Pleuronectes platessa</i>	NEA	VIIa/VIIb/ VIIIfg	see North Sea	G1	yes							good
Plaice	<i>Pleuronectes platessa</i>	NEA	VIIId/VIIb-k/ VIIId, IX, X	see North Sea	G1	no							good
Pollack	<i>Pollachius pollachius</i>	NEA	V,VI,VII (excl. VIIId), VIII, XII,XIV		G2	no							not known
Pollack	<i>Pollachius pollachius</i>	NEA	IX, X		G2	no							not known
Portuguese dogfish	<i>Centroscymnus coelolepis</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G1	no							not known
Pouting	<i>Trisopterus spp.</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G2	no							not known
Red gumard	<i>Aspitrigla cuculus</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G2	no							not known
Roundnose grenadier	<i>Coryphaenoides rupestris</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G1	no	2005 (FR), 2006 (FR)	2006 (FR), 2007 (FR)					bad
Saithe	<i>Pollachius virens</i>	NEA	Va/Vb/IV, IIIa, VI	see North Sea	G1	yes							good
Saithe	<i>Pollachius virens</i>	NEA	VII, VIII	see North Sea	G2	yes							good
Salmon	<i>Salmo salar</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV	see Baltic	G1	no							good
Sandeel	<i>Ammodytidae</i>	NEA	VIIa	see North Sea	G2	no							good
Sardine	<i>Sardina pilchardus</i>	NEA	VIIIdab/VIIId, IXa		G1	yes	2004 (PT)	2001 (RU), 2005 (PT)					medium
Scabbardfish	<i>Aphanopus spp.</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G1	no	1998-1999 (ES)	2000					bad
Sea bass	<i>Dicentrarchus labrax</i>	NEA	V,VI,VII (excl. VIIId), VIII, X, XII,XIV		G2	no	1997-1998 (ES)						medium
Sea bass	<i>Dicentrarchus labrax</i>	NEA	IX	see NEA (V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV)	G2	no							medium
Sea bream	<i>Pagellus bogaraveo</i>	NEA	IXa, X		G1	no							not known
Sea breams (in plural)	<i>Sparidae</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G2	no							not known
Silver scabbardfish	<i>Lepidopus caudatus</i>	NEA	IXa		G2	no							not known
Smoothhead	<i>Alepocephalus bairdii</i>	NEA	VI, XII		G2	no							not known
Sole	<i>Solea solea</i>	NEA	VIIa/VIIIfg	see North Sea (IV)	G1	yes							good
Sole	<i>Solea solea</i>	NEA	VIIIdc / VIIIdjk / IXa / VIIId	see North Sea (IV)	G1	no							good
Sole	<i>Solea solea</i>	NEA	VIIId	see North Sea (IV)	G1	yes							good
Sole	<i>Solea solea</i>	NEA	VIIIdab	see North Sea (IV)	G1	yes							good
Spanish mackerel	<i>Scomber colias</i>	NEA	VIII, IX		G2	no							not known
Spotted ray	<i>Raja montagui</i>	NEA	all areas		G1	no							not known
Spurdog	<i>Squalus acanthias</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G1	no							not known
Striped red mullet	<i>Mullus surmuletus</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G2	no	2006-2007		WKACM, FR				medium/bad
Thickback Sole	<i>Microchirus variegatus</i>	NEA	V,VI,VII (excl. VIIId), VIII, IX,X, XII,XIV		G2	no							not known
Thornback ray	<i>Raja clavata</i>	NEA	all areas		G1	no							not known
Turbot	<i>Psetta maxima</i>	NEA	all areas	see North Sea	G2	no							good
Wedge sole	<i>Dicologlossa cuneata</i>	NEA	VIIId, IX		G2	no							not known
Whiting	<i>Merlangius merlangus</i>	NEA	VIII/IX, X	see North Sea	G2	no							good/medium
Whiting	<i>Merlangius merlangus</i>	NEA	Vb/VIIa/VIIb/VIIc/VIIId-k	see North Sea	G1	no							good/medium
Witch flounder	<i>Glyptocephalus</i>	NEA	VI, VII		G2	no							not known
Wreckfish	<i>Polyprion americanus</i>	NEA	X		G2	no							not known

Species (Eng.)	Species (Latin)	Super Area	Area/Stock	Species group	Assessment	Previous exchanges	Previous workshops	Workshops 2009/2010	Exchanges proposed by PGCCDBS 2009	Workshops proposed by PGCCDBS 2009	Ageing performance
Anglerfish	<i>Lophius piscatorius</i>	North Sea	IIIa, IV, VI	G1	yes	2001	1999 (PT), 2002, 2004 (PT)		yes	yes	bad
Argentine	<i>Argentina spp.</i>	North Sea	IV	G2	no						not known
Black-bellied angler	<i>Lophius budegassa</i>	North Sea	IV, VIId	G1	no				yes	yes	bad
Blue ling	<i>Molva dypterygia</i>	North Sea	IV, IIIa	G1	no						not known
Blue whiting	<i>Micromesistius poutassou</i>	North Sea	I-IX, XII, XIV	G1	yes				yes (GE, NO)		medium
Bluemouth rockfish	<i>Helicolenus dactylopterus</i>	North Sea	IV	G2	no						not known
Brill	<i>Scophthalmus rhombus</i>	North Sea	IV, VIId	G2	no	2004, 2005 (NL)			small exchange (BE)		good
Catfish	<i>Anarhichas spp.</i>	North Sea	IV	G2	no						not known
Cod	<i>Gadus morhua</i>	North Sea	IV, VIId, IIIa	G1	yes	1997-1998 (SC), 2000	2001, 2008 (DK)		yes	2012 (WKARNSC 2008)	good
Cuckoo ray	<i>Raja naevus</i>	North Sea	IV, VIId	G1	no						not known
Dab	<i>Limanda limanda</i>	North Sea	IV, VIId	G2	no				yes (WGNEW)	yes (WGNEW)	good
Deep sea Redfish	<i>Sebastes mentella</i>	North Sea	IV	G1	no						bad
Deepwater shark	Shark-like <i>Selachii</i>	North Sea	IV	G1	no						not known
European Eel	<i>Anguilla anguilla</i>	North Sea	IV, VIId	G1	yes			WKAREA, FR (2009)			not known
Flounder	<i>Platichthys flesus</i>	North Sea	IV	G2	no						good
Forkbeard	<i>Phycis phycis</i>	North Sea	IV	G2	no						not known
Four-spot megrim	<i>Lepidorhombus boscii</i>	North Sea	IV, VIId	G2	no						
Greater Forkbeard	<i>Phycis blennoides</i>	North Sea	IV	G2	no						not known
Greenland halibut	<i>Reinhardtius</i>	North Sea	IV	G2	no				yes (RCM NA)	yes (RCM NA)	not known
Grey gurnard	<i>Eutrigla gurnardus</i>	North Sea	IV	G2	no						not known
Haddock	<i>Melanogrammus</i>	North Sea	IV, IIIa	G1	yes	2008-... (going on)					good
Hake	<i>Merluccius merluccius</i>	North Sea	IIIa, IV, VI, VII, VIIIab	G1	yes						bad
Herring	<i>Clupea harengus</i>	North Sea	IV, VIId, IIIa	G1	yes	2004	2005 (FI)				good
Horse mackerel	<i>Trachurus trachurus</i>	North Sea	IIa, IVa, Vb, VIa, VIIa-c, e-k, VIIIabde/IIIa,	G2	yes						medium
John Dory	<i>Zeus faber</i>	North Sea	IV, VIId	G2	no						not known
Lemon sole	<i>Microstomus kitt</i>	North Sea	IV, VIId	G2	no						medium
Ling	<i>Molva molva</i>	North Sea	IV, IIIa	G2	no						not known
Mackerel	<i>Scomber scombrus</i>	North Sea	II, IIIa, IV, V, VI, VII, VIII, IX	G1	yes						medium
Megrim	<i>Lepidorhombus</i>	North Sea	IV, VIId	G2	yes						medium
Norway pout	<i>Trisopterus esmarki</i>	North Sea	IV, IIIa	G2	yes						good
Other rays and skates	<i>Rajidae</i>	North Sea	IV, VIId	G1	no						not known
Plaice	<i>Pleuronectes platessa</i>	North Sea	IV	G1	yes	2003	2003		2009-... (PGCCDBS 2008)	2010 (PGCCDBS 2008) (NL)	good
Plaice	<i>Pleuronectes platessa</i>	North Sea	VIIId	G1	yes						good
Red gurnard	<i>Aspitrigla cuculus</i>	North Sea	IV	G2	no						not known
Red mullet	<i>Mullus barbatus</i>	North Sea	IV, VIId	G2	no	2006-2007		WKACM, FR (2009)			medium/bad
Roughhead grenadier	<i>Macrourus berglax</i>	North Sea	IV, IIIa	G2	no						bad
Saithe	<i>Pollachius virens</i>	North Sea	IV, IIIa, VI	G1	yes	2007 (FR)					good
Salmon	<i>Salmo salar</i>	North Sea	IV	G1	no						good
Sandeel	<i>Ammodytidae</i>	North Sea	IV	G2	yes	2005 (DK), 2006 (DK)	2005 (DK), 2006 (DK)				good
Sea bass	<i>Dicentrarchus labrax</i>	North Sea	IV, VIId	G2	no						medium
Small sharks	Shark-like <i>Selachii</i>	North Sea	IV, VIId	G1	no						not known
Sole	<i>Solea solea</i>	North Sea	IV	G1	yes	2001 (UKE), 2006	2002 (UK-E), 2005 (UK-E)		yes (GE)		good
Sole	<i>Solea solea</i>	North Sea	VIIId	G1	yes						good
Spotted ray	<i>Raja montagui</i>	North Sea	IV, VIId	G1	no						not known
Sprat	<i>Sprattus sprattus</i>	North Sea	IV/VIIde	G1	yes	1994, 1996, 2001, 200	1992, 1994, 2004 (NO)				good
Spurdog	<i>Squalus acanthias</i>	North Sea	IV, VIId	G1	no						not known
Starry ray	<i>Raja radiata</i>	North Sea	IV, VIId	G1	no						not known
Striped red mullet	<i>Mullus surmuletus</i>	North Sea	IV, VIId	G2	no						not known
Thornback ray	<i>Raja clavata</i>	North Sea	IV, VIId	G1	no						not known
Tub gurnard	<i>Tripla lucerna</i>	North Sea	IV	G2	no						not known
Turbot	<i>Psetta maxima</i>	North Sea	IV, VIId	G2	no	2005 (NL), 2008	2008 (BE)				good
Tusk	<i>Brosme brosme</i>	North Sea	IV, IIIa	G2	no						not known
Whiting	<i>Merlangius merlangus</i>	North Sea	IV, VIId	G1	yes	1999, 2004 (SC)	1997 (ES), 1998 (DK), 1999 (UK), 2000, 2005 (UK)				good/medium
Witch flounder	<i>Glyptocephalus</i>	North Sea	IV	G2	no						not known
Blue whiting	<i>Micromesistius poutassou</i>	Skag +Kat	I-IX, XII, XIV	G1	yes				yes (GE, NO)		medium
Brill	<i>Scophthalmus rhombus</i>	Skag +Kat	IIIa	G2	no				small exchange (BE)		good
Cod	<i>Gadus morhua</i>	Skag +Kat	IV, VIId, IIIaN	G1	yes						good
Cod	<i>Gadus morhua</i>	Skag +Kat	IIIaS	G1	yes						good
Dab	<i>Limanda limanda</i>	Skag +Kat	IIIa	G2	no				yes (WGNEW)	yes (WGNEW)	good
European Eel	<i>Anguilla anguilla</i>	Skag +Kat	IIIa	G1	yes			WKAREA, FR (2009)			not known

Species (Eng.)	Species (Latin)	Super Area	Area/Stock		Species group	Assessment	Previous exchanges	Previous workshops	Workshops 2009/2010	Exchanges proposed by PGCCDBS 2009	Workshops proposed by PGCCDBS 2009	Ageing performance
Grey gurnard	<i>Eutrigla gurnardus</i>	Skag +Kat	IIIa		G2	no						not known
Haddock	<i>Melanogrammus</i>	Skag +Kat	IV, IIIa	see North Sea	G1	yes						good
Hake	<i>Merluccius merluccius</i>	Skag +Kat	IIIa, IV, VI, VII, VIIIab	see NEA	G1	yes						bad
Herring	<i>Clupea harengus</i>	Skag +Kat	IV, VIIId, IIIa/22-24, IIIa	see North Sea	G1	yes						good
Mackerel	<i>Scomber scombrus</i>	Skag +Kat	II, IIIa, IV, V, VI, VII, VIII, IX	see NEA	G1	yes						medium
Norway pout	<i>Trisopterus esmarki</i>	Skag +Kat	IV, IIIa		G2	yes						good
Plaice	<i>Pleuronectes platessa</i>	Skag +Kat	IIIa	see North Sea	G1	yes				2009-... (PGCCDBS 2008)	2010 (PGCCDBS 2008) (NL)	good
Roundnose grenadier	<i>Coryphaenoides rupestris</i>	Skag +Kat	IIIa	see NEA	G2	no						bad
Saithe	<i>Pollachius virens</i>	Skag +Kat	IV, IIIa, VI	see North Sea	G1	yes						good
Sandeel	<i>Ammodytidae</i>	Skag +Kat	IIIa	see North Sea	G2	no						good
Sharks	<i>Squalidae</i>	Skag +Kat	IIIa N		G1	no						not known
Sole	<i>Solea solea</i>	Skag +Kat	IIIa, 22	see North Sea (IV)	G1	yes				yes (GE)		good
Sprat	<i>Sprattus sprattus</i>	Skag +Kat	IIIa	see North Sea	G1	no						good
Turbot	<i>Psetta maxima</i>	Skag +Kat	all areas	see North Sea	G2	no						good
Whiting	<i>Merlangius merlangus</i>	Skag +Kat	IIIa	see North Sea	G2	yes						good/medium
Witch flounder	<i>Glyptocephalus</i>	Skag +Kat	IIIa		G2	no						not known

¹ validation showed ageing was wrong² regular annual exchanges and workshops between Norway and Russia³was suggested by PGCCDBS 2008, but never organised

[illegible]

[illegible]

Annex 9: Workshop proposals

Joint ICES-STEFC Workshop on methods for merging fleet metiers for fishery based sampling [WKMERGE]

The Joint ICES-STEFC Workshop on methods for merging fleet metiers for fishery based sampling [WKMERGE] (Co-Chairs: Mike Armstrong*, UK, and Jon Helge Vølstad*, Norway) will be established and take place at ICES HQ, 20-23 April 2010, to:

- 1) Review methods used by Member States for defining fleet metiers and for merging metiers for fishery sampling
- 2) Review statistical methods for metier merging, using case studies.
- 3) Develop guidelines for merging fleet metiers for sampling, at national and regional scale.
- 4) Develop guidelines for collapsing under-sampled strata for data analysis.

WKMERGE will report by May 2010 for attention of PGCCDBS, RCMs, STECF/SGRN; ACOM

Supporting information

Priority:	Essential
Scientific justification:	This Workshop is essential for the implementation of the EU Data Collection Framework (DCF; Council Regulation (EC) No 199/2008 and EC Decision 2008/949/EC), in particular for the second phase (2011-2013). The DCF requires Member States to collect concurrent length composition data for all or a predefined assemblage of species, simultaneously in the catches or landings of vessels, for nationally important fleet metiers identified using a ranking system according to landings, value or effort. Decision 2008/949/EC states that <i>"In order to optimise the sampling programmes, the metiers defined in Appendix IV (1 to 5) may be merged. When metiers are merged (vertical merging), statistical evidence shall be brought regarding the homogeneity of the combined metiers. Merging of neighbouring cells corresponding to fleet segments of the vessels (horizontal merging) shall be supported by statistical evidence. Such horizontal merging shall be done primarily by clustering neighbouring vessel LOA classes, independently of the dominant fishing techniques, when appropriate to distinguish different exploitation patterns. Regional agreement on mergers shall be sought at the relevant regional coordination meeting and endorsed by STECF."</i> The North sea and Eastern Atlantic regional coordination Meeting in 2008 noted that Member States had proposed their own mergers, based on implementation constraints (availability of fisheries statistics, reduction of strata size, etc.) or on a scientific <i>a priori</i> grouping (e.g. gear types OTB and PTB, OTM and PTM, etc.). The RCM NS&EA was of the opinion that this way of merging metiers is acceptable given the obligation to have a pragmatic start of the new sampling programmes. However it was advised that the scientific evidence for metier mergers required by the new DCF needs to be evaluated once the first datasets are available, i.e. from 2010 onwards. It was recommended that the ICES PGCCDBS could be helpful in discussing the appropriate ways of carrying out these scientific analyses. The proposed joint ICES-STEFC workshop is required to ensure that Member States are defining fleet metiers in a consistent manner and are adopting the most appropriate methods for identifying metiers to be merged. It is essential that metier definition and merging are done in such a way that the resulting merged metiers can be combined easily across Member States for analysis. The procedures adopted should lead to the optimum stratification of sampling for reducing bias and variance, and should draw on previous experience elsewhere in defining metiers.

Priority:	Essential
	In addition to providing guidelines for merging of metiers prior to sampling, the Workshop will also provide advice on robust methods for collapsing poorly sampled strata prior to data analysis. To ensure an efficient and successful meeting, participants will be asked to prepare the following material for the meeting: 1. All Member States participants to provide a Working Document describing the basis for national metier definition and merging in 2009&2010; 2. Identified participants to prepare European case studies for examining applications of metier-merging methods. The PGCCDBS will liaise with RCMs to identify suitable case studies. The data for these case studies are to be available at the Workshop in the COST format. 3. Results of relevant metier-merging applications outside of Europe
Resource requirements:	
Participants:	Should include a cross section of end-users including stock assessment scientists; STECF; Commission; statisticians
Secretariat facilities:	
Financial:	None
Linkages to advisory committees:	ACOM
Linkages to other committees or groups:	Expert WGs
Linkages to other organizations:	NEAFC?

Workshop on the Design of Regional Age Sampling Schemes [WKDRASS]

The ICES Workshop on the Design of Regional Age Sampling Schemes [WKDRASS] (Max Cardinale*, Sweden) will be established and take place at ICES HQ, XX-XX June (4 days), 2010 to:

- a) a) Review existing methods used by ICES Expert Groups for estimating age compositions of international fishery catches from national sampling schemes
- b) Develop guidelines for setting up collaborative age sampling schemes - taking into account cluster sampling and effective sample size, spatial and gear-related variability in the probability of age at length, desired precision, requirements for sex-disaggregated data, and data management requirements.
- c) Compile information on alternative methods to estimate the age composition from length data and evaluate the data requirements for these methods

WKDRASS will report by July 2010 for attention of ACOM, PGCCDBS; RCMs; STECF/SGRN; ACOM

Supporting information

Priority:	Essential
Scientific justification:	The EU Data Collection Framework encourages the increasing development of collaborative age sampling schemes between member states. This requires appropriate quality assurance of the data while minimising the variance and risk of bias for the purpose of stock assessment. The Workshop will consider the appropriateness of existing sampling schemes and methods for estimating the age compositions for national and international fishery catches, and highlight important problems such as small effective sample size in relation to age diversity. The workshop will then develop guidelines for establishing collaborative sampling schemes, starting from the user-requirements for sampling coverage and precision by age, and identifying the steps that need to be taken to develop sampling schemes that take into account cluster sampling and effective sample size, spatial and gear-related variability in the probability of age at length, requirements for sex-disaggregated data, and requirements for data management. The effective sample size for estimates of proportions at age or length is a better measure of the information content than the actual number of fish sampled for age and length. The effective sample size takes into account that length and age samples are nested within primary sampling units (ports, trips, hauls), and also accounts for stratification and the number of primary sampling units sampled. The Workshop will also report on potential alternatives to the standard age-length key approach, for example using model-based approaches to quantify spatial or gear-related effects on the probability of age at length in samples, and identify the data requirements for such approaches.
Resource requirements:	
Participants:	
Secretariat facilities:	
Financial:	None
Linkages to advisory committee:	ACOM
Linkages to other committees or groups:	Stock assessment Expert WG and PGCCDBS
Linkages to other organizations:	RCMs and STECF/SGRN

Joint ICES-STECF Workshop on the implementation of the Common Open Source Tool (COST) [WKCOST]

The joint ICES-STECF Workshop on the implementation of the Common Open Source Tool (COST) [WKCOST] (chair: Joël Vigneau*, France) will be established and take place in Nantes, France, 13-16 April 2010, to:

- a) Present the COST R bundle and the links between COST and other software projects, namely FishFrame, InterCatch, and FLR;
- b) Import data sets into R under the COST data structure;
- c) Explore data using the methods implemented in COST;
- d) Estimate parameters for stock assessment using the methods implemented in COST;
- e) Visualising data with COST;
- f) Expanding COST.

WKCOST will report by XX May 2010 for attention of ACOM.

The possibility of holding the WKCOST as a Training Course under the new ICES Training Programme is currently being discussed and will be decided by the ACOM meeting in September 2009 in consultation with Training Committee.

Supporting information

Priority:	Essential
Scientific justification:	Issues about quality assurance are included in the current MoU between EC and ICES committing ICES to communicate any problems regarding data collected under the DCF Council Regulation (EC) No 199/2008 and EC Decision 2008/949/EC), and be responsible about the quality control of the aggregated data used for assessment. As part of this quality assurance, the approach proposed by PGCCDBS is based on a set of quality indicators computed for each parameter available for stock assessment. Three indicators are proposed (ICES CM 2007/ACFM:09): compliance with protocols, coverage of the sampling achieved and precision of the estimates. These quality indicators are under development in ICES within two dedicated workshops, WKACCU in 2008 that has dealt with the first two indicators and WKPRECISE in 2009 that will deal with the last one. The European project COST (http://www.ifremer.fr/cost) financed through the call for proposal FISH/2006/15 – lot 2, has developed R packages dedicated to raising and estimating statistical properties of data used for assessment. As such COST is an open source tool, integrating all the needs identified for the preparation of data for stock assessment, once the data has been collected. These needs include 1. quality checks, exploratory analysis and validation of datasets as suggested by WKACCU 2. analysis of the stratification and possibility to re-stratify the dataset in relation to the demand, as required by the DCF i.e. merging métiers, areas (see proposal for WKMERGE). 3. raising procedures and precision estimates for (a) volume of discards (following closely the recommendations of the ICES WKDRP, 2007) (b) length and age structures of catches and landings (c) biological parameters such as mean weight at length/age, maturity at length/age and sex-ratio at length/age

Priority:	Essential
	Variances are estimated for each estimates, i.e. for every length and age classes in each of the strata. The forthcoming WKPRECISE will have the task of proposing a single precision indicator for each of the parameters, and COST has anticipated this in the structure of its resulting objects. It should then be an easy task to implement the WKPRECISE recommendations in COST as soon as they are known. COST has been designed to be used by responsible of field sampling for validating and optimizing their sampling plan, and to be used by stock coordinators for the preparation of data for stock assessment. To that aim, COST includes exportation methods to FLR and to InterCatch. The use of COST tools by the largest number of scientists is to be promoted, although much caution must be brought to the efficiency of the training workshop.
Resource requirements:	Proper training facilities are required as well as sufficient facilities concerning network connections.
Participants:	It is expected that this workshop will attract a lot of participants. Therefore, it is suggested to choose participants with R programming skill and the potential to be COST contact persons in their respective countries. For ensuring the efficiency of the workshop, a maximum of two persons per participating countries should be strictly fixed. To ensure an efficient and successful meeting, participants will be asked to prepare datasets following the COST data exchange format in advance of the meeting. Examples of data importation from csv files are available on the COST website.
Secretariat facilities:	
Financial:	None
Linkages to advisory committee:	ACOM
Linkages to other committees or groups:	Assessment Expert Groups, PGCCDBS, WKACCU, WKPRECISE, WKMERGER
Linkages to other organizations:	STECF/SGRN, and all RFMOs using data collected through the DCF : GFCM, ICCAT, IOTC, ...

Workshop on ecosystem indicators of discarding [WKEID]

The ICES Workshop on ecosystem indicators of discarding [WKEID] (Chair: Katja Ringdahl*, Sweden, and Max Cardinale, Sweden) will be established and take place in Lysekil, Sweden, 13-16 September 2010, to:

- (1) Data compilation and quality evaluation
 - a) Compile meta-data to show what data are available on discards in European waters.
 - b) Evaluate the quality of discard data by year, area, fishery and stock.
 - c) Identify the appropriate data for use in developing the indicator
- (2) Evaluation and testing of indicators
 - d) Develop and evaluate methods for calculating a discards indicator that is sensitive to changes in discard rates and robust to changes in data collection.
 - e) Provide the necessary supporting data on discard rates by stock and fishery to allow interpretation of the trends in the overall indicator.
- (3) Draft the advice
 - f) Construct a time series of the following indicators:
 - Discarding rates of commercially exploited species
 - Discarding rates in relation to landed value

WKEID will report by 5 October 2010 for attention of ACOM.

Supporting information

Priority:	Essential
Scientific justification:	The EU Data Collection Framework (DCF; Council Regulation (EC) No 199/2008 and EC Decision 2008/949/EC) requires the collection of data to construct an indicator on the discarding rates of commercially exploited species. The indicator is defined in the DCF as an indicator of the rate of discarding of commercially exploited species in relation to landings. The specified data required are: species, length and abundance of catches and discards based on respectively logbooks and observer trips processed separately. Data are to be linked to the level 6 for the métier classification (Appendix IV (1-5) of 2008/949/EC), meaning that data are required at the level of fishing ground, gear type, mesh band, target species. The DCF specifies collection of data on an annual basis with the exception of those which are specified to be collected at more disaggregated levels. The data specified for indicators in Appendix XIII of 2008/949/EC are to be collected at a national level in order to allow end-users to calculate the indicators at the relevant geographical scale, as given in Appendix II (sub-region/fishing ground, region or supra-region). Regulation 199/2008 requires Member States to collect discards data for métiers where discards are estimated to exceed 10 % of the total volume of catches. Discards will be monitored for the Group 1, 2 and 3 species (defined in Chapter III section B/B1/3 1 (f) of Decision 2008/949/EC) to estimate the quarterly average weight of discards. Furthermore, discards must be the subject of a quarterly estimate of the length distributions when they represent on an annual basis, either more than 10 % of the total catches by weight or more than 15 % of the catches in numbers for the Group 1 and Group 2 species, and — when discards take place for species length ranges which are not represented in the landings, age-reading must take place in accordance with the rules set out in Appendix VII of Decision 08/949/EC.

Priority:	Essential
	The revised DCF from 2009 should not result in major changes in discard collection methods compared to the previous regulations other than the additional stratification by fleet metiers. ICES has received a request from DG Mare on time series of several ecosystem indicators. PGCCDBS is responsible for an indicator concerning discard rates. PGCCDBS considers that a specific workshop on this subject will be the adequate approach to tackle this request.
Resource requirements:	<u>Approach required</u> The Workshop will comprise an initial data compilation and evaluation stage, and a methodological stage. National data will be evaluated for completeness and accuracy, leading to a selection of species and fleet metier data suitable for exploring the development of robust indicators. The methodological step will consider forms of indicator capable of providing accurate trends in discarding rates that are robust to any changes in data collection over time. The construction of an overall indicator of discarding relative to landings will require supporting time-series of discard rates by species and metier so that the reasons for changes in the indicator can be understood. <u>Data requirements</u> A key requirement for the Workshop will availability of all national discards data at the trip level for each geographic region. The data required will be confirmed by the WK chairs but will be expected to include: - Numbers and weight of commercially exploited species discarded by trip, by length class - Numbers and weight of each species retained from each trip (where available) by length class - Trip details: nationality, Level-6 metier details (gear type, mesh size), operational data (year, month, effort [trip duration; hours fished], location data [ICES rectangle; fishing ground; region; supra-region]), sample data (number of hauls per trip and number sampled). Vessel LOA should also be provided. - Fleet transversal data for each country (number of trips, effort [days; hours, where appropriate, landings by species], by year, month and fishing ground), for Level-6 metiers and LOA bands as defined in Appendix IV of Decision 2008/949/EC. Data should be provided in the COST format by mid-June 2010 in response to a call for national data to be issued by ICES together with the EC. All countries included in the data call will be required to supply the data listed above. In addition to the provision of data sets, each country is required to supply a description of the data, and an evaluation of the accuracy of the data sets for each by metier using the approaches recommended by WKACCU and COST.
Participants:	
Secretariat facilities:	
Financial:	None
Linkages to advisory committee:	ACOM
Linkages to other committees or groups:	PGCCDBS and RCMs

Workshop on Age Reading of Greenland Halibut [WKARGH]

The Workshop on Age Reading of Greenland Halibut [WKARGH] (Chair: Ole Thomas Albert, Norway), will be established and take place for 4 days in late 2010 or January-March 2011, to:

- a) Review information on age estimations, otolith exchanges, workshops and validation work done so far.
- 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 stocks.
- c) Report on progress in studies of otolith growth axes based on samples from Greenland halibut injected with OTC or similar substances that makes a mark in the ageing structure.
- d) Report on progress of the compilation of biometrics data of Greenland halibut otoliths from all areas where such information has been collected and analysed.
- e) 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
 - Length distribution in surveys and catches.
- f) To develop mathematical methods for estimating age composition of Greenland halibut catches to be used by ICES WG.
- g) To join international experts on growth, age estimation and assessment in order to progress towards a recommended procedure for future age structured assessments of Greenland halibut.
- h) Based on results, conclusions and recommendations from this workshop to initiate and design an international exchange of otoliths for age reading after the workshop.
- i) Address the generic ToRs adopted for workshops on age calibration (see ['PGCCDBS Guidelines for Workshops on Age Calibration'](#))

WKARGH will report by XXX for attention to ACOM.

Supporting information:

Priority:	Essential. Age determination is an essential feature in fish stock assessment to estimate the rates of mortalities and growth. Assessment of Greenland halibut 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 evaluate available information on otolith growth patterns, age determination issues and the current situation of age estimation of Greenland halibut which has been subject of concern of ICES AFWG and NWWG and make progress towards a solution.
Scientific justification:	Recently, several publications suggest that what is at present the most commonly used age interpretation method for Greenland halibut severely underestimates age of older specimens. The last workshop (St. Johns, 2006) demonstrated that there was no agreement or understanding of the underlying growth patterns of this species. Since then several institutions have conducted tagging programs, ageing structure comparisons, and other work in order to validate seasonal zones in otoliths. Since stock assessments are severely hampered by this lack of clarification, it is appropriate to arrange a workshop where the results of these investigations can be presented and discussed. For the purpose of inter-calibration between ageing labs an appropriate exchange programme with a set of otoliths (images) collected partially from tagging material and from previous WKs will be carried out in the next year. The aim of the workshop is to identify the state of art of age estimation after validation studies conducted so far. To identify the current ageing problems between readers from both stocks using a reference collection. .
Resource requirements:	Before starting the exchange programme, the scientific institutions should make a concerted effort to compile the existing tagging material (digital otolith images) that can be used as a reference collection.
Participants::	In view of its relevance to the DCR, and ICES WG, the Workshop should try to include international experts on growth, age estimation and assessment in order to progress towards a solution.
Secretariat facilities:	
Financial:	None
Linkages to advisory committee:	ACOM
Linkages to other committees or groups:	PGCCDBS, NWWG and AFWG
Linkages to other organizations cost:	There is a direct link with the EU
Secretariat marginal cost share:	

Workshop on Age Reading of Greenland Cod [WKARGC]

The **Workshop on Age Reading of Greenland Cod [WKARGC]** (Chairs: Einar Hjörleifsson, Iceland, and Heino Fock, Germany) will be established and take place in Reykjavík, Iceland, in Feb 2010 (The exact meeting date will be appointed after NWWG 2009), to:

- a) Review information on age estimations, otolith exchanges, workshops and validation work done so far.
- b) Analysis of the results of exchange programme between ageing labs, using a set of otoliths (images) collection partially from tagging material and from previous WK collection with the purpose of inter-calibration age readers involved in Stock assessment.
- c) Report on progress of the compilation of biometrics data of Greenland cod otoliths from 3 stocks (Iceland, Greenland inshore, Greenland offshore).
- d) To revise the age estimation procedures and explore the possibilities to use supplementary information for validating estimated age structures, this include:
 - Otoliths weight distributions
 - Length distributions in surveys and catches.
- e) To develop mathematical methods for estimating Greenland cod catches age composition to be used by ICES WG.
- f) To join international experts on growth, age estimation and scientists involved in assessment in order to progress towards a solution
- g) Address the generic ToRs adopted for workshops on age calibration (see ['PGCCDBS Guidelines for Workshops on Age Calibration'](#))

WKARGC will report by March 2010 for attention of ACOM.

Supporting information:

Priority:	Essential. Age determination is an essential feature in fish stock assessment to estimate the rates of mortalities and growth. Assessment of Greenland cod 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, an otolith exchange programme and WK should be carried out in order to know the current situation of age estimation of Greenland cod which has been subject of concern of ICES WG NWWG and make progress towards a solution.
Scientific justification:	A preliminary exercise between Greenland, Iceland and Germany in reading a test sample of some 200 cod otoliths from Greenland waters revealed considerable differences in results between ageing labs. A working document containing the results from this exercise will be published for the next ICES NWWG meeting in April 2009. For the purpose of inter-calibration between ageing labs an appropriate exchange programme with a further set of otoliths (images) collection partially from tagging material and from previous WKs collection will be carried out for next year. The aim of the workshop is to identify the current ageing problems between readers through a reference collection comprising both broken and transsectioned material. To identify the state of art of age estimation after validation studies conducted so far.
Resource requirements:	Before starting the exchange programme, the scientific institutions should make a concerted effort to compile the existing tagging material (digital otolith images) that can be used as a reference collection.
Participants:	In view of its relevance to the DCR, and ICES WG, the Workshop try to join international experts on growth, age estimation and scientists involved in assessment in order to progress towards a solution.
Secretariat facilities:	
Financial:	None
Linkages to advisory committee:	ACOM
Linkages to other committees or groups:	PGCCDBS, NWWG
Linkages to other organizations cost:	There is a direct link with the EU DCR. Link to NAFO Scientific Council.
Secretariat marginal cost share:	

Workshop on Age Reading of Dab [WKARDAB]

The **Workshop on Age Reading of Dab [WKARDAB]** (Chair: Ulrich Damm, Germany) will be established and take place in Hamburg, Germany, 17-20 Nov 2010, to:

- a) Review information on age estimations, otolith exchanges, workshops and validation work done so far.
- b) Analysis of the results of exchange programme between ageing labs, using a set of otoliths (images) collection partially from tagging material and from previous WK collection with the purpose of inter-calibration age readers involved in Stock assessment.
- c) Report on progress of the compilation of biometrics data of dab otoliths.
- d) To revise the age estimation procedures and explore the possibilities to use supplementary information for validating estimated age structures, this include:
 - Otoliths weight distributions
 - Length distribution in surveys and catches.
- e) To develop mathematical methods for estimating dab catches age composition to be used by ICES WG.
- f) To join international experts on growth, age estimation and scientists involved in assessment in order to progress towards a solution
- g) Address the generic ToRs adopted for workshops on age calibration (see ['PGCCDBS Guidelines for Workshops on Age Calibration'](#))

WKARDAB will report by December 2010 for attention of ACOM.

Supporting information:

Priority:	Essential.
Scientific justification:	Age determination is an essential feature in fish stock assessment to estimate the rates of mortalities and growth. Assessment of dab 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, an otolith exchange programme and WK should be carried out in order to know the current situation of age estimation of dab which has been subject of concern of ICES WGNEW and make progress towards a solution. For the purpose of inter-calibration between ageing labs an appropriate exchange programme with a set of otoliths will be carried out during the second half of 2009. The aim of the workshop is to identify the current ageing problems between readers from both stocks through a reference collection. To identify the state of art of age estimation after validation studies conducted so far.
Resource requirements :	Before starting the exchange programme, the scientific institutions should make a concerted effort to compile existing information on growth and digital otolith images that can be used as a reference collection.
Participants:	In view of its relevance to the DCR, and ICES WG, the Workshop tries to join international experts on growth, age estimation and scientists involved in assessment in order to progress towards a solution.
Secretariat facilities:	
Financial:	None

Priority:	Essential.
Linkages to advisory committee:	ACOM
Linkages to other committees or groups:	PGCCDBS, WGBFAS and WGNEW
Linkages to other organizations cost:	There is a direct link with the EU DCR
Secretariat marginal cost share:	

Workshop on Age Reading of North Sea (IV) and Skagerrak-Kattegat (IIIa) Plaice [WKARP]

The **Workshop on Age Reading of North Sea (IV) and Skagerrak-Kattegat (IIIa) Plaice [WKARP]** (Chair: Loes Bolle, The Netherlands) will be established and take place in IJmuiden (Wageningen-IMARES), The Netherlands, 2-5 November 2010, to:

- a) Review information on age estimations, otolith exchanges, workshops and validation work done so far.
- b) Use WebGR for image annotations and data analyses (provisional, depending on the successful implementation of WebGR)
- c) Address the generic ToRs adopted for workshops on age calibration (see ['PGCCDBS Guidelines for Workshops on Age Calibration'](#))

WKARP will report by 19 November 2010 for the attention of ACOM.

Supporting information:

Priority:	Essential. Age determination is an essential feature in the stock assessment of North Sea plaice and plaice in division IIIa, as age structured models are used to assess the status of the stock. Age composition data are provided by different countries and hence international age reading calibration is required. The previous North Sea plaice workshop was held in 2003, and no information is available on when the last workshop was held for Skagerrak-Kattegat plaice. Therefore a an age reading workshop for these plaice stocks is considered to be due.
Scientific justification:	An otolith exchange will be carried out in 2009 aiming at assessing the current age reading quality and signalling potential age reading problems. The exchange will include otolith sets from both the North Sea and Skagerrak-Kattegat. Digitised images of the otoliths will be used for annotations. The results of the exchange will be analysed prior to the workshop. The primary aim of the workshop is to identify current age reading problems and resolve interpretation differences between readers and laboratories. Furthermore the workshop is responsible for collating information on national procedures, compiling an age reading manual and collating an agreed age reference collection.
Resource requirements:	Before starting the exchange, the participating institutes should make a concerted effort to compile otolith reference sets by area and digitise images of these sets. Specialised equipment is required for microstructure analysis

Participants:	Age readers and scientists involved in otolith research, from institutes engaged in plaice age reading. The countries likely to participate in the plaice exchange and workshop are: The Netherlands, Denmark, Germany, Belgium and Sweden. Other countries which may participate despite the fact that they do not collect plaice otoliths in ICES areas IV and IIIa are France, Ireland and the UK.
Secretariat facilities:	
Financial:	None
Linkages to advisory committee:	ACOM
Linkages to other committees or groups:	Direct link with WGNSSK and PGCCDBS
Linkages to other organizations cost:	Direct link with EU DCR

Workshop on Age Reading of Mackerel [WKAMAC]

The **Workshop on the Age Reading of Mackerel [WKAMAC]** (Chair: Mark Etherton, UK) will be established and take place in Lowestoft, England, 19-23 April 2010, to:

- a) Review information on age estimations, otolith exchanges, workshops and validation work done so far.
- b) Analysis of the results of exchange programme between ageing labs, using a set of otoliths (images) collection partially from tagging material and from previous WK collection with the purpose of inter-calibration age readers involved in Stock assessment.
- c) Report on progress of the compilation of biometrics data of mackerel otoliths.
- d) To revise the age estimation procedures and explore the possibilities to use supplementary information for validating estimated age structures, this include:
 - Otoliths weight distributions
 - Length distribution in surveys and catches.
- e) To develop mathematical methods for estimating mackerel catches age composition to be used by ICES WG.
- f) To join international experts on growth, age estimation and scientists involved in assessment in order to progress towards a solution
- g) Address the generic ToRs adopted for workshops on age calibration (see ['PGCCDBS Guidelines for Workshops on Age Calibration'](#))

WKAMAC will report by May 2010 for attention of ACOM.

Supporting information:

Priority:	Essential. Age determination is an essential feature in fish stock assessment to estimate the rates of mortalities and growth. Assessment of mackerel 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, an otolith exchange programme and WK should be carried out in order to know the current situation of age estimation of mackerel which has been subject of concern of ICES, and make progress towards a solution.
Scientific justification:	For the purpose of inter-calibration between ageing labs an appropriate exchange programme with a set of otoliths (images) collection partially from tagging material and from previous WKs collection will be carried out for next year. The aim of the workshop is to identify the current ageing problems between readers from both stocks through a reference collection. To identify the state of art of age estimation after validation studies conducted so far.
Resource requirements :	Before starting the exchange programme, the scientific institutions should make a concerted effort to compile the existing tagging material (digital otolith images) that can be used as a reference collection.
Participants:	In view of its relevance to the DCR, and ICES WG, the Workshop try to join international experts on growth, age estimation and scientists involved in assessment in order to progress towards a solution.
Secretariat facilities:	
Financial:	None
Linkages to advisory committee:	ACOM
Linkages to other committees or groups:	WGWIDE and PGCCDBS
Linkages to other organizations cost:	There is a direct link with the EU DCR
Secretariat marginal cost share:	

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

A Workshop on Sexual Maturity Staging of Redfish and Greenland Halibut [WKMSREGH] (Chairs: Fran Saborido-Rey, Spain, and Agnes Gundersen, Norway) will be established and take place in Vigo, Spain, for 4 days June 2010 to:

- a) agree on a common maturity scale for Redfish (*Sebastes mentella* and *S. marinus*) and Greenland halibut across laboratories comprising a comparison of existing scales and standardization of maturity determination criteria
- b) reduce sources of error on maturity determination validating macroscopic staging,
- c) establish correspondence between old and new scales to convert time series
- d) propose optimal sampling strategy to estimate accurate maturity ogives.
- e) address the generic ToRs adopted for maturity staging workshops (see ['PGCCDBS Guidelines for Workshops on Maturity Staging'](#))

WKMSREGH will report by July 2010 for the attention of ACOM.

Supporting Information:

Priority:	Essential. 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. Redfish and Greenland halibut species are widely distributed in the North Atlantic with transboundary populations. It is highly recommended to organize this workshop in conjunction with NAFO.
Scientific justification:	Laboratories involved in collection maturity data for the various assessment WG's are using different macroscopic maturity scale for the same species. Even those that use the same scale, may be using slightly different criteria to classify the maturity stages that are more prone to a subjective interpretation. This may lead to bias in the data that may be going to be used, for example, in fisheries stock assessment models, or in any other kind of analysis. Therefore, this workshop has the objective of reaching an agreement on a common scale to be used, but also to define objective criteria to classify the maturity stages of that scale. The expectation of TOR a) is to have a common scale for maturity stage, with a common set of criteria to classify each stage, to be used by all labs. TOR c) is requested to validate with histological analysis the macroscopic maturity stage, mainly stages that are normally incorrectly classified (as resting). TOR c) should be addressed to assess and, if possible to correct, the impact on maturity historical series of the new agreed maturity scale. Finally, TOR d) should consider the ecology of the species, existent 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 setup a sampling plan for collecting samples for to be used during workshop. The sampling will be carried out during 2009. Guidelines on how to prepare the Workshop, as well for collecting maturity data and histological analysis for the Workshop have been prepared and available in the PGCCDBS 2009 report (Annex 12).
Participants:	In view of its relevance to the DCR, the Workshop is expected to attract wide interest from ICES Member States that participate in biological sampling of Redfish and Greenland halibut.

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 Redfish and Greenland halibut, namely AFWG, NWWG and NAFO as well as to survey groups like the PGRS and PGNEACS
Linkages to other organizations:	There is a direct link with the EU DCR.

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

A Workshop on Sexual Maturity Staging of Herring and Sprat [WKMSHS] (Chairs: Jonna Tomkiewicz, Denmark and Gerd Kraus, Germany) will be established and will take place in Copenhagen, Denmark for 4 days October 2010 to:

- a) propose standardised maturity scales for Herring and Sprat for common use among laboratories including a comparison of existing scales and identification of reliable maturity determination criteria for females and males.
- b) reduce sources of error on maturity determination through validation of macroscopic maturity criteria using e.g. histological analysis and light microscopy.
- c) establish correspondence between old and new scales to convert presently applied maturity scales and interpret former time series.
- d) propose optimal sampling strategies and sampling times for accurate classification of maturity and.
- e) define procedures to estimate spawning frequency for sprat for use in the daily egg production method (DEPM).
- f) address the generic ToRs adopted for maturity staging workshops (see ['PGCCDBS Guidelines for Workshops on Maturity Staging'](#))

WKMSHS will report by XX November 2010 for the attention of ACOM.

Supporting Information

Priority:	Essential. Age/size at sexual maturity is a biological parameter used in the calculation of maturity ogives and subsequently of the Spawning Stock Biomass (SSB), while gonadal maturity status is important for the definition of the spawning season of a species, for the monitoring of long-term changes in the spawning cycle, and other research issues focusing on the reproduction biology of fish.
Scientific justification:	Laboratories involved in collection maturity data for the various stock assessment purposes are using different macroscopic maturity scales for the same species. Even those that use the same scale, may focus on slightly different aspects. This may lead to bias of data used in fisheries stock assessment models and other studies on reproduction biology. Therefore, this workshop has the objective to define objective criteria to classify the maturity status and propose reliable common scales to be used by all laboratoires involved with the assessment of herring and sprat in ICES areas. The expectation of TOR a) is to develop a standardised scales and criteria for maturity determination of herring and sprat to be used by all relevant labs. TOR c) is requested to validate the macroscopic maturity stage using histological analysis and light microscopy, with emphasis on developmental stages that are often incorrectly classified (e.g. resting). TOR c) should be addressed to assess the effects of converting historical maturity series to the new standardised maturity scale. TOR d) should consider the ecology of the species, existent surveys, opportunities to include commercial sampling and other considerations to define and recommend the optimal sampling strategy to estimate accurate maturity. Finally, TOR e) should for sprat define procedures to estimate spawning frequency as required for the application of the DEPM that may be successfully applied to sprat as an alternative to catch based stock assessments.
Resource requirements:	Before the Workshop the organising institutes will elaborate a sampling plan to obtain samples for to be application in the workshop. The sampling will be carried out during from August 2009 through July 2010. Guidelines on how to prepare the Workshop, as well for collecting maturity data and histological analysis for the Workshop have been prepared and available in the PGCCDBS 2009 report (Annex 12)
Participants:	In view of its relevance to the DCR, the Workshop is expected to attract wide interest from ICES Member States that participate in biological sampling of Herring and Sprat.
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 Herring and Sprat stock assessment, namely HAWG, WGWIDE and WGBFAS, as well as to survey groups (PGIPS, PGNAPES, WGBIFS).
Linkages to other organizations:	There is a direct link with the EU DCR.

Workshop on Sexual Maturity Staging of Elasmobranchs [WKMSSEL]

A Workshop on Sexual Maturity Staging of Elasmobranchs [WKMSSEL] (Co-Chairs: Fabrizio Serena, Italy, and Mark Dimech, Malta) will be established and take place in Malta, 11-15 October 2010, to:

- a) agree on a common maturity scale for Elasmobranchs (sharks and rays) (a list of species will be defined by PGCCDBS and PGMEd 2010 after receiving responses from participants) across laboratories comprising a comparison of existing scales and standardization of maturity determination criteria
- b) reduce sources of error on maturity determination validating macroscopic staging,
- c) establish correspondence between old and new scales to convert time series
- d) propose optimal sampling strategy to estimate accurate maturity ogives.
- e) address the generic ToRs adopted for maturity staging workshops (see ['PGCCDBS Guidelines for Workshops on Maturity Staging'](#))

WKMSSEL will report to RCMs, PGMEd and PGCCDBS by November 2010.

Supporting Information

Priority:	Essential. 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:	The identification and macroscopic classification of maturity stages can play a key-role in the assessment fishery resources and there is an urgent need for reliable and up-to-date information on the maturity parameters for all assessed species to improve the quality of these estimates. To set a sustainable fishery policy and regulations it is necessary to obtain, data and information on the sexual maturity to compute maturity ogives, for discriminating life phases (juveniles, adults) and for the estimation of Spawning Stock Biomass. Moreover, the identification and classification of maturity stages can be used for the best determination of spawning period according to different geographical and environmental areas and to study the relationship between length at maturity and fishery exploitation on a temporal scale. Actually, in the frame of DCR, maturity stages are collected according to different macroscopic scales used locally in the scientific Institutions. The need of a common and standardized system for identification and macroscopic classification of maturity stages in fish resources have to be considered as an important priority to optimize DCR. In order to get this aim, several Mediterranean countries already made an effort to build up a Maturity Photo database (Report of the DCR MEDITS Working group, Nantes, France, 15-18 March 2005: wgmedits2005-wgreport-final.doc) and developed standard operational procedure to calibrate and classify the description of the maturity stages per fishery resources (fish, crustaceans and cephalopods). This group should be aware of the recommendation of the Medits workshop. The expectation of the TORs is that the Workshop produces a comparative description of the scales used in the different labs and set off standard operational procedures and methodologies to facilitate the validation and classification of the different maturity stages.

Resource requirements:	Before the Workshop the organising institute will setup a sampling plan for collecting samples for to be used during workshop. The sampling will be carried out during 2009/10. Guidelines on how to prepare the Workshop, as well for collecting maturity data and histological analysis for the Workshop have been prepared and available in the PGCCDBS 2009 report (Annex 12) .
Participants:	In view of its relevance to the DCR, the Workshop is expected to attract wide interest from both Mediterranean EU and ICES Member States.
Secretariat facilities:	
Financial:	None
Linkages to advisory committee:	
Linkages to other committees or groups:	There is a direct interest from several international (ICES, NAFO, GFCM, ICCAT) advisory committee for a common effort toward the standardization of assessing procedures
Linkages to other organizations:	There is a direct link with the EU DCR

Workshop on Sexual Maturity Staging of Cephalopods [WKMSCEPH]

A Workshop on Sexual Maturity Staging of Cephalopods [WKMSCEPH] (Co-Chairs: Paola Belcari, Italy, and Danila Cuccu, Italy) will be established and take place in Livorno/Pisa, Italy, (4 days) October/November 2010, to:

- a) agree on a common maturity scale for Cephalopods across laboratories comprising a comparison of existing scales and standardization of maturity determination criteria
- b) reduce sources of error on maturity determination validating macroscopic staging,
- c) establish correspondence between old and new scales to convert time series
- d) propose optimal sampling strategy to estimate accurate maturity ogives.
- e) address the generic ToRs adopted for maturity staging workshops (see ['PGCCDBS Guidelines for Workshops on Maturity Staging'](#))

WKMSCEPH will report to RCMs, PGMed and PGCCDBS by December 2010.

Supporting Information

Priority:	Essential. 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 species.
Scientific justification:	The identification and macroscopic classification of maturity stages can play a key-role in the assessment fishery resources and there is an urgent need for reliable and up-to-date information on the maturity parameters for all assessed species to improve the quality of these estimates. To set a sustainable fishery policy and regulations it is necessary to obtain data and information on the sexual maturity to compute maturity ogives, for discriminating life phases (juveniles, adults) and for the estimation of Spawning Stock Biomass. Moreover, the identification and classification of maturity stages can be used for the best determination of spawning period according to different geographical and environmental areas and to study the relationship between length at maturity and fishery exploitation on a temporal scale. Actually, in the frame of DCR, maturity stages are collected according to different macroscopic scales used locally in the scientific Institutions. The need of a common and standardized system for identification and macroscopic classification of maturity stages in cephalopod resources have to be considered as an important priority to optimize DCR. In order to get this aim, several Mediterranean countries already made an effort to build up a Maturity Photo database (Report of the DCR MEDITS Working group, Nantes, France, 15-18 March 2005: wgmedits2005-wgreport-final.doc) and developed standard operational procedure to calibrate and classify the description of the maturity stages per fishery resources (fish, crustaceans and cephalopods). This group should be aware the recommendation of the Medits workshop. The expectation of the TORs is that the Workshop produces a comparative description of the scales used in the different labs and set off standard operational procedures and methodologies to facilitate the validation and classification of the different maturity stages.
Resource requirements:	Before the Workshop the organising institute will setup a sampling plan for collecting samples for to be used during workshop. The sampling will be carried out during 2009-2010. Guidelines on how to prepare the Workshop, as well for collecting maturity data for the Workshop have been prepared and available in the PGCCDBS 2009 report (Annex 12).
Participants:	In view of its relevance to the DCR, the Workshop is expected to attract wide interest from both Mediterranean EU and ICES Member States.
Secretariat facilities:	
Financial:	None
Linkages to advisory committee:	
Linkages to other committees or groups:	There is a direct interest from several international (ICES, NAFO GFCM) advisory committee for a common effort toward the standardization of assessing procedures
Linkages to other organizations:	There is a direct link with the EU DCR

Annex 10: Guidelines for collecting maturity data and maturity ogive estimation for stock assessment purpose

These guidelines should be regularly evaluated based on research developments and the experience from maturity staging workshops.

Date	Details of changes, person/group making them, reference
19 Jan 2007	Guidelines initially developed at WKMAT (ICES 2007).
6 June 2008	Reviewed and extended to include estimating proportion mature at WKMOG (ICES 2008).
6 March 2009	reviewed and updated at PGCCDBS (ICES 2009) to include the number of samples or hauls sampled (point 15 below).

- 1) For survey data to be used in maturity index of the spawning stock, the survey must be conducted at the right time compared to the spawning period and have adequate coverage. If survey data are not available at the right time then histologically validated maturity data obtained outside spawning season can be used, although this should be confirmed on a stock-by-stock basis.
- 2) Where valid (see 3) maturity data are available from market samples they can be used to estimate maturity. This is mainly the case for species with a protracted spawning season where survey data do not cover the whole spawning season or stock area. Also, if survey and market data do not show systematic differences they can be used together.
- 3) Maturity data from market samples should be collected during the whole prespawning (for determinate species¹) or spawning (for indeterminate species²) season on a métier based sampling programme, and cover the whole stock distribution area.
- 4) As with market samples, on-board samples should be collected on a métier basis to avoid gear and fleet selectivity effects and collected from the correct time and spatial frame compared to spawning.
- 5) If possible, maturity staging should be done on board the survey vessel.
- 6) A comprehensive illustrated manual should be available for all stocks requiring maturity observations.
- 7) Macroscopic maturity scales used should be validated, either histologically or by another appropriate way.
- 8) Plot and map the data collected to assess differences by source, strata, location and time.

1 Determinate fecundity species. Number of oocytes to be released in the spawning season (potential fecundity) is defined prior of the onset of the spawning.

2 Indeterminate fecundity species. Number of oocytes to be released in the spawning season are not defined prior of the onset of the spawning, i.e oocyte recruitment continues after the commencement of the spawning.

- 9) Length stratified maturity data should be weighted by the length distribution. If samples are collected from a random sampling scheme or the stock is assessed on a length basis, no weighting according to the length distribution is required.
 - 10) If the fish maturation process is dependent on age and/or sex as well as length then a Sex-Maturity-Age-Length-Key (SMALK) should be used. Age reading precision is important in this context.
 - 11) If the stock shows a sexual difference in maturity a female maturity ogive should be used, or the effect of combining both sexes considered in detail.
 - 12) If the maturity data are modelled, a Binomial GLM with logit link is current standard practice. Alternative approaches should be compared against this baseline approach.
 - 13) Check appropriate model diagnostics.
 - 14) Report the number of maturity staged fish used to calculate the estimates. If length classes are used, report the width of length classes.
 - 15) Report the number of samples or hauls that the maturity staged fish came from. This is likely to be more representative of the effective sample size.
 - 16) When maturity estimates (as proportions) are reported to DCR specifications (Commission Decision 2008/949/EC), calculate the mean confidence interval width for the age and/or length range which correspond to a 20 % and 90% of mature fish. Convert this to a precision level using:
 - if half confidence interval width is less than 0.4 then the precision level is 1
 - if half confidence interval width is less than 0.25 then the precision level is 2
 - if half confidence interval width is less than 0.05 then the precision level is 3
- Optionally, report the range of precision levels achieved as well as the mean level.

Annex 11: Guidelines for otolith exchanges (update)

PGCCDBS Guidelines for Otolith Exchanges

Version 2

2–6 March 2009

Montpellier, France

Introduction

The objective of exchanges of calcified structures is to estimate precision and relative/absolute bias in the age readings from age readers of the different age reading laboratories, to check that this is still within acceptable levels. 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”.

PGCCDBS recommends a three-stage process. A small-scale exchange should take place to ascertain if the precision of the age readers providing data for stock assessment is acceptable for a species or stock. If the small-scale exchange reveals reading problems that need to be addressed, then a larger exchange must be carried out in preparation for a workshop. The frequency of exchanges and workshops mainly depends on the quality of the age determination and will be revised by national age determination coordinators and by expert groups. Small-scale exchanges should be organised at least every two years for each species by default, unless national age determination coordinators or expert groups advise that an exchange is not necessary. Even if the small scale exchanges do not reveal significant problems, the possibility for a workshop should be offered at least once every four years.

Small-scale Exchanges

Images are not required for small exchanges. The suggested sample size for small 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. If larger pre-workshop exchanges are required, they should be organised according to the guidelines in this document. Workshops should be organised in accordance with the PGCCDBS Guidelines for Workshops on Age Calibration.

Experimental Design

Where comparisons between different methods and comparisons in reading ability between the start and end of the workshop are required, these comparisons need to be planned from the start of the 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 exchange from one area then read 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, in 2006 PGCCDBS recommended that the procedure for generating two sets of otoliths for comparison should be:

- 1) 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.
- 2) Identify variables that you suspect influence ability to age.
- 3) For variables that are not of interest control their effect by standardising them, for example, keep laboratory procedures consistent.
- 4) For variables that are of interest or cannot be fixed, define strata based on these variables, 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.)
- 5) Then for each group defined by the strata, randomly assign otoliths 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.

Identifying Exchange Participants

The co-ordinator is required to contact other age reading laboratories to identify the age readers who will participate in the exchange. Generally this will be the readers whose age readings are used for stock or environmental assessments. At the same time he needs to inquire how much experience the readers have in age reading this species and other species. Participants can be asked to provide a brief statement describing the species that they read and the number of years they have been reading these species. 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, a separate exchange must be carried out for each area (See 2006 cod exchange reports). 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.

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.

The CS for the exchange should be completely representative of the CS used for stock or environmental assessment. Bearing this in mind, the co-ordinator 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.

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].

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 the schedule re other unforeseen work commitments, illness etc., in order to ensure the timely circulation of the exchange material.

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 sent 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.

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 coordinator. 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.

Reporting the Results of the Exchange

The co-ordinator is responsible for the report of the exchange. The report of the age reading exchange might contain 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).

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 return the otoliths to the age reading laboratories.

Annex 12: Guidelines for Workshops on Maturity Staging (final version)

PGCCDBS Guidelines for Workshops on Maturity Staging

Version 2

2–6 March 2009

Montpellier, France

Introduction

The main objectives of a maturity staging workshop are: i) to agree on a common maturity scale for the species/stock of concern across laboratories, based on a comparison of existing scales and standardization of maturity determination criteria; ii) to establish correspondence between old and new scales so that time series of previous data can be converted; iii) to reduce sources of error in maturity determination by validating macroscopic staging, and iv) to propose an optimal sampling strategy to estimate accurate maturity ogives.

Topics to consider when preparing a Workshop

- a) Identify sources of data that, at present, are used to collect maturity data and their current sampling protocols.
- b) Gather information on the reproductive biology and ecology of the species / stock of concern with emphasis on the timing of the different stages of the reproductive cycle, particularly spawning time, delimitating clearly its duration.
- c) Studies are required on spawning synchronicity among individuals within a stock, as low synchronicity will mean there is temporal overlap of different stages (developing, spawning, spent and/or resting)
- d) The organization for the collection of the samples and the methods for histological analysis need to be decided amongst the experts but guidance can be found below (Guidelines for collecting maturity data).
- e) Maintain contact with participating countries to ensure adequate sample coverage is obtained prior to the workshop's analyses of samples. In this sense the following should be ensured:
 - i) Laboratories participating in stock assessment or data collection of the stock of concern should participate even if they do not collect routinely maturity data.
 - ii) However, there are practical limits to the number of participants; in this case each laboratory will need to ensure that only the most suitable people attend.
 - iii) Experts on histology, maturation process and the reproductive ecology/biology of the species of concern or at least a related species should participate in the workshop.
- f) If there is a need for fresh samples to be used at the workshops, this needs to be taken into account when setting the timing of the meeting.
- g) Identify the metadata that are needed to accompany samples collected for analyses and specify it in the sampling protocols (see guidelines below).
- h) Provide detailed protocols on collecting images of the gonads sampled, including at least a precise description of the quality of images (set-up of camera and format) and image calibration. Additionally, in case of histologically images, agree on the histological protocol and microscope set-up (see guidelines for histological process below).
- i) Gather information on how the data are, or could be used, in the assessment process.

- j) Put in place arrangements for histological analyses of collected material taking into account that all participants may not have facilities or resources to meet this requirement. Arranging for centrally located analyses has proved effective in the past and has ensured that adequate samples are validated. Consider bi-lateral agreements to cover the cost of such work.
- k) Each laboratory should carry out investigations into potential discrepancies in maturity staging between scientists within the laboratory. They should consider macroscopic staging and, if available, microscopic staging. If possible provide statistical analysis of precision and accuracy within the laboratory. Potential causes for lack of precision and accuracy should also be analyzed.
- l) Prepare a full set of reference material covering both the spatial and temporal aspect of the species/stock of concern. These consist of pictures of all maturity stages together with their histology report.
- m) The meeting should be held in an institute with suitable wet laboratory facilities and ideally with histological facilities. If not histological facilities are not available at least with sufficiently high quality research microscopes with attached high definition cameras.

Topics to consider during the Workshop

- a) Provide information on participating laboratory procedures, including sampling procedures, macroscopic maturity determination process, maturity scale definitions and if applicable gonad preservation and histological methods, and protocols used to determine microscopic maturity.
- b) Resolve interpretation differences between readers and laboratories both at macroscopic and microscopic scales. Differences may arise from:
 - i) Using different maturity scales
 - ii) Different interpretation of the same macroscopic stages (terminology and precise definition of stages are critical issues)
 - iii) Different sampling protocols, e.g. timing and/or gear selectivity or availability, see guidelines for collecting maturity data below.
 - iv) Different interpretation of gonad structures and gamete development in histological slides. This should not be an issue, so experts on gametogenesis should be involved in workshops.
- c) Agree and create a single maturity scale. Consider the following aspects:
 - i) Keep the scale as simple and efficient as possible. Not everything can be extracted from a maturity scale and a complex maturity scale may introduce more errors than relevant information (See WKMAT report)
 - ii) Describe the stages precisely avoiding ambiguity and overly subjective description (like colour descriptions), for example, give measurements instead of saying "bigger".
 - iii) If two stages are hard to distinguish macroscopically they should normally be merged. This often occurs with resting and/or mature inactive stages that are confused with immature or developing (at early stages).

- iv) In these cases histology must be used to separate the merged maturity stage into the different real stages. It is necessary to define the minimum number of samples to be collected, the timing of the sampling, how they should be histologically processed, and what criteria should be used to distinguish between stages, and if possible define a reference lab (see below).
- d) As a calibration exercise each participant should classify the workshop sample collection using the agreed maturity scale. This will provide a test of the new scale and any discrepancies in interpretation should be identified and resolved.
- e) The results from the calibration exercise should be recorded to provide data for statistical analysis. If you want to measure improvements in agreement due to the workshop then ideally a different set of samples should be used, not the ones already staged earlier in the workshop.
- f) Provide a statistical report comparing observed maturity stage with validated histological stage for the workshop participants to consider.
- g) Differences in staging between laboratories should be statistically analyzed in terms of precision and accuracy; sources of discrepancies should also be analyzed.
- h) Try to use standard terminology (Murua and Saborido-Rey, 2003; Brown-Peterson *et al.*, 2007) during the workshop and in the report. Try to keep the recommended maturity scale as similar to the standard as possible.
- i) When a new agreed maturity scale is proposed the impact on maturity historical series should be evaluated
- j) Produce an agreed reference collection of preserved gonads, histological slides and images that should be stored in a reference lab and always available for the scientific community. Copies of histological slides can be made and distributed with referenced images of these slides.
- k) A reference laboratory should be defined, for each species, with experience and equipments to define, with precision, maturity stages and to “solve problems”.
- l) The minimum output from species-specific workshops should be an illustrated manual.
- m) Provide recommendations to stock assessment Working Groups and Benchmarks on relevant issues derived from maturity stage studies, such as timing of sampling, changes on maturity time series, spatial differences on maturity, differential sex maturation, etc.

Guidelines for collecting maturity data and histological analyses for maturity workshops

These guidelines are partly taken from Workshop on sexual maturity staging of Cod, Whiting, Haddock and Saithe (WKMSCWHS). The guidelines should be regularly evaluated based on research developments and the experience from maturity staging workshops.

- 1) Sampling has to be conducted by cooperation between the participating laboratories.
- 2) The number of samples by length range, sex and location has to be clearly defined considering number of countries involved, timing, and spatial overlap of sampling.
- 3) Preferably, the sampling procedure should be executed several times during a year to follow the reproductive cycle and development of the gonads. At least 4 times at year, or more frequent depending on species.
- 4) However, cruises are normally not conducted each quarter or several times at year at the same location and hence limitations in sampling capacity are recognised. Commercial fleet samples (e.g., from observers on-board) can be used to complete sampling if gonads are properly preserved and observers properly trained for maturity staging.
- 5) Sampling at landing should generally be avoided as in most occasions gonads have already undergone lyses. Sampling at landing can only be used if a known catch has occurred recently before landing and the location of the catch is known.
- 6) For data collection and histology samples, each specimen should be given a fish ID including the following information: Country, station, date and fish number
- 7) For each specimen the following information should be collected:
 - Procedures made to collect maturity data
 - Location of sample collection
 - Date of sample collection
 - Fish total length
 - Sex
 - Maturity (as noted at time of collection)
 - Fish total weight
 - Gonad weight
 - Fish gutted weight
 - Age if available
 - Additionally other parameters should be taken if demonstrated to be relevant to assess temporal patterns in gonad development, like liver weight.
- 8) A series of photographs of the fish and gonad including the identification number should be taken during the sampling process:
 - i) Fish with visible gonad *in situ*.
 - ii) Fish with gonad lying next to it.
 - iii) Close-up photo(s) of gonad.

- 9) The gonad or sub-samples of the gonad tissue has to be preserved immediately after collection. If only pieces of gonads are collected, these should be representative of the entire gonad (for example from the anterior, middle and posterior part of the organ). The sampled tissue has to be preserved in buffered 4% formaldehyde.
- 10) Histological process has to be done in similar manner across laboratories or a single laboratory selected to process the samples.
- 11) Pieces of tissue should be embedded in wax or resin, but agreement on the location of the tissue within the gonad is very important, as differences in oocyte development across the gonad may bias the results. There is not an *a priori* preferred location, which should be investigated for each species.
- 12) Thickness of histological section is not critical but should not exceed 5 microns.
- 13) Staining protocol is a key aspect to be considered as differences in histological section interpretation may occur due to this, especially for cortical alveoli, postovulatory follicles and atresia. Haematoxylin-Eosin is a standard, but experts should advice on this. In any case the same protocol across laboratories should be used.
- 14) Slides should be used at the meeting, but images should also be taken for discussions and dissemination. Previous agreement is required on microscope set-up (illumination and numerical aperture is critical for microscopic image definition), setup of camera, image format (size and compression) and image calibration.

Annex 13: National reports on the implementation studies on mixed species sampling

France

See PGMED report: Angélique JADAUD, Joël VIGNEAU, J-Hervé BOURDEIX, Ysabelle CHERET, Luisa METRAL 2009: Description of mixed species in a Mediterranean auction and consequences for stock assessment, 4 pp.

Germany

In the German data collection on commercial catches, no market sampling is being carried out, as most of the German-flagged vessels are landing in foreign ports. Catches and discards are sampled onboard, i.e. the species are determined by biological observers. Staff is sufficiently trained to differentiate species and take sub-samples back to the lab and consult taxonomists in the case of doubt. An overview on species group entries the logbook/sales notes data (Table 1) and their spatial distribution (Table 2) has been produced in order to quantify the extent of references to species groups in German landings. About 19% of the total landings in 2007 referred to species groups, but most of the species groups only contain one or a few species.

With regard to the draft Council/EP Regulation on the submission of nominal catch statistics by Member States fishing in the north-east Atlantic (Doc. PE-CONS 3648/08 of 10 Feb 2009) and other relevant legislation under revision, it would be advisable to allow only species entries.

Table 1. References to species groups in German logbook/sales notes data 2005-2007.

Species code	English name	Latin name	Species sampled/expected
ANF	Anglerfish	<i>Lophius</i> spp.	exclusively <i>L. piscatorius</i>
APO	Cardinalfishes n.e.i.	Apogonidae	(very few entries, not sampled)
CAT	Catfish	<i>Anarhichas</i> spp.	<i>A. lupus</i> , <i>A. minor</i> , <i>A. denticulatus</i>
CRA	Marine crabs n.e.i.	Brachyura	<i>Cancer pagurus</i> in the North Sea
DGX	Sharks and spurdogs	Squaliidae	mostly <i>Squalus acanthias</i> , <i>Scyliorhinus canicula</i>
FBR	Freshwater breams n.e.i.	<i>Abramis</i> spp.	mostly <i>A. bramis</i>
FLX	Flatfishes n.e.i.	Pleuronectiformes	exclusively <i>Platichthys flesus</i>
JAX	Horse mackerel	<i>Trachurus</i> spp.	mostly <i>T. trachurus</i> in the North Sea, Westerly Brit. Isles and Mauritania; <i>T. murphyi</i> in the SE Pacific
LEF	Lefteye flounders n.e.i.	Bothidae	exclusively <i>Arnoglossus laterna</i>
LEZ	Megrim n.e.i.	<i>Lepidorhombus</i> spp.	exclusively <i>L. whiffiagonis</i>
MUL	Mullet n.e.i.	Mugilidae	exclusively <i>M. surmuletus</i>
MUX	Surmullet (=Red mullet) n.e.i.	<i>Mullus</i> spp.	
OTH	Other species	(none)	(several species)
RED	Redfishes	<i>Sebastes</i> spp.	mostly <i>S. mentella</i> , some <i>S. marinus</i>
SAN	Sandeels n.e.i.	Ammodytidae	mostly <i>Ammodytes marinus</i>
SKA	Other rays and skates	Rajidae	mostly <i>R. radiata</i>
SQU	Various squids n.e.i.	Loliginidae, Ommastrephidae	(usually not sampled)
TRO	Trouts n.e.i.	<i>Salmo</i> spp.	mostly <i>S. trutta</i>

Table 2. Distribution of species group entries (landings in t) in German logbook/sales notes data 2007 by areas.

Sp_code	NE_Arctic	Kat_Skag	Baltic	North_Sea	Ice_Green	West_Brit	NAFO	Maurit	SE_Pacific	Total
ANF	0	1	0	201	0	454	0	0	0	656
CAT	32	3	0	16	1	0	0	0	0	52
DGX	0	0	0	1	0	0	0	0	0	1
FBR	0	0	144	0	0	0	0	0	0	144
FLX	0	0	85	0	0	0	0	0	0	85
JAX										4971
	0	0	22	72	0	5778	0	474	43371	7
LEF	0	0	0	22	0	0	0	0	0	22
LEZ	0	0	0	10	0	0	0	0	0	10
MUL	0	0	1	1	0	0	0	0	0	2
MUX	0	0	0	3	0	0	0	0	0	3
OTH	0	2	2	10	1	0	0.1	27	16	56
RED	612	0	0	1	1122	0	0	0	0	1735
SAN	0	0	0	1965	0	0	0	0	0	1965
SKA	0	0	0	12	0	24	0	0	0	36
SQU	0	1	0	17	0	0	0	0	0	18
										5450
Total	644	7	253	2331	1124	6257	0.2	501	43387	4

Ireland

The Planning Group suggested that each MS should start in 2008 an implementation study. Such a study should,

- 1) evaluate from the sales notes the total quantity of references to mixed species (rays, anglerfish, "soup", fry,).

To address this point a study was conducted in two of the main fishing ports in Ireland and in 2008 to assess the quantity of mixed species being sold through the Co – Op's. Port A is located on the East coast and accounts for the majority of skates and ray landings in Ireland. Port B is located on the South coast and accounts for a large quantity of monk and megrim landings. The objective was to ascertain the proportion of landings being sold in the market in mixed boxes, and to quantify the species composition within these mixed boxes. To do this a questionnaire was created for the Co – Op manager, and sampling trips were conducted to focus specifically on elasmobranchs (skates and rays), and also looking at the species composition of boxes of "monkfish". Observations through sampling led to the following mixes being identified:

- Rays and skates (usually a mix of thornback, spotted, blonde and cuckoo ray) – labelled and sold as "Rays"
- *L.budegassa* and *L. piscatorious* - labelled and sold as "Monkfish"
- *Lepidorhombus whiffiagonis* and *L. boscii* – labelled and sold as "Megrim".
- Brill, Turbot and John Dory – Labelled and sold as "Prime Mix"
- Haddock, Cod, Whiting – labelled and sold as "Round Mix"

The only time rays are separated is if there is sufficient numbers of Blonde rays, as they demand a higher price compared to other ray species. But this does not happen very often.

The study revealed that approximately 10% of landings in the major ports are of “Mixed Species”, mainly skates/rays and monkfish. Through an extensive sampling programme the Marine Institute, Ireland are able to quantify the % breakdown of these boxes of mixed species, and apply the resultant species composition to the total landings of that “mixed species “ for an individual vessel. An example of the process used is attached below.

- 2) Identification of the common ray species does not appear to present a problem for staff, and on – going training occurs at sea whilst on survey for all staff.

The Netherlands

PGCCDBS recommended an implementation study to evaluate and identify problems with mixed species landings, in particular landings of elasmobranchs. This study comprised of 6 questions to be addressed in 2008. However, to answer these questions, access to sales notes was necessary, but up to the very end of 2008, the information from sales notes was not available for researchers. The following information is based on earlier experiences with mixed species landings.

In the Netherlands, mixed species landings mainly occur for rays. Other species that are likely to be mixed are different species of gurnards and monkfish. However, nowadays gurnards are landed species by species and the landings of monkfish only contain *L. piscatorius* as there are virtually no landings of *L. budegassa* in the Netherlands. For rays, these are always registered in the logbook as SRX (skates and rays), even if only one species is landed, no distinction by species is made.

When sampling rays for length, the mixed boxes are sorted by species and the total weight by species and by sex is determined to get a proxy for the landings distribution by species. Through this proxy, the total annual landing figures by species are estimated. The sampling staff is well trained and able to distinguish the different species of rays. Next to this, to ensure proper identification of the different species by new staff members, sampling teams carry plasticised cards showing the main characteristics of the different species.

Since 2008 rays officially have to be landed species by species. However, during recent sampling events, boxes containing multiple species of rays were still found in the auction. Often, *Raja clavata*, is landed separately whereas *Raja brachyura* and *Raja montagui* are usually landed mixed.

Portugal

See Machado et al. 2004

Spain

In AZTI, we have identified several groups of species, which are landed and sold with a similar label. At present, these species are inaccurately identified. It would be useful to identify the landings of these mixed sp and the proportion of each sp (length, age), by subdivision and gear.

These species are:

1. ELASMOBRANCHS

a. Fleet: Trawlers

- Species landed as Rajidae:
Leucoraja naevus, Raja asterias, Dypatus batis, Raja clavata, Raja fullonica, Raja montagui, Raja oxyrinchus, Raja undulata
- Species landed as Triakidae spp.:
Mustelus mustelus y Mustelus asterias
- Species landed as “cazón”:
Galeorhinus galeus , Mustelus mustelus y Mustelus asterias

b. Fleet: Surface lines

- Species landed as “Kaela”:
Galeorhinus galeus , Mustelus mustelus y Mustelus asterias

c. Fleet: Bottom lines

- Species landed as “Lijas”:
Centrophorus granulosus, C. squamosus, Deania calceus, D. histicosa, Centroscymnus coelolepis....

2. DEEP SP

It would be important to distinguish the different species comprised in the groups landed as:

- Phycis spp: Phycis blennoides, etc
- Scorpaena spp.

3. OTHER SP

- Species landed as Triglidae:
Eutriglia Gunardus, Aspitrigla Cuculus, Trigla Lucerna, trigla Lyra, Trigloporus Lastoviza
- Species landed as Trisopterus spp.:
Trisopterus luscus, Trisopterus minutus
- Species landed as Trachurus spp.:
Trachurus mediterraneus, Trachurus trachurus

Other species which are landed and sold with a similar label, but can be well identified during the market sampling are:

- Species Landed as Lophius spp.:
Lophius piscatorius, Lophius budegassa
- Species Landed as Lepidorhombus spp.:
Lepidorhombus boscii, Lepidorhombus whiffiagonis

Landings (Tons)

			<i>T. marmorata</i>	<i>D. baibis</i>	<i>D. oxyrinchus</i>	<i>L. circularis</i>	<i>L. fullonica</i>	<i>L. naevus</i>	<i>R. clavata</i>	<i>R. microocellata</i>	<i>R. montagui</i>	<i>R. undulata</i>	<i>D. postinaca</i>	<i>M. aquila</i>	<i>R. asterius</i>	<i>R. brachyura</i>	<i>Raja miraletus</i>	<i>Rostrenja alba</i>	<i>miscellaneous</i>	<i>Raja spp.</i>	<i>Total (Tons)</i>
Country	year	area																			
Spain (Basque Country)	2000	VIII		6			4	250	39		2	0									302
Spain (Basque Country)	2001	VIII		8	0		26	230	85		5				0						354
Spain (Basque Country)	2002	VIII						243	54		18										314
Spain (Basque Country)	2003	VIII					12	230	38		4	0									284

Landings (%)

Country	year	area	Species																Roja spp.
			<i>T. marmorata</i>	<i>D. batis</i>	<i>D. oxyrinchus</i>	<i>L. circularis</i>	<i>L. fullonica</i>	<i>L. naevus</i>	<i>R. clavata</i>	<i>R. microcellata</i>	<i>R. montagui</i>	<i>R. undulata</i>	<i>D. postinaca</i>	<i>M. aquila</i>	<i>R. asterius</i>	<i>R. brachyura</i>	<i>Raja miraleus</i>	<i>Rostroja alba</i>	
Spain (Basque Country)	2000	VIII	0%	2%	0%	0%	1%	83%	13%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Spain (Basque Country)	2001	VIII	0%	2%	0%	0%	7%	65%	24%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Spain (Basque Country)	2002	VIII	0%	0%	0%	0%	0%	77%	17%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%
Spain (Basque Country)	2003	VIII	0%	0%	0%	0%	4%	81%	13%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%

Sweden

Fishing for sharks and rays are very limited in Sweden and some species of rays and sharks are classified as protected species and prohibited to fish, like Lesser spur dogfish (*Scyliorhinus canicula*) basking shark (*Cetorhinus maximus*), porbeagle (*Lamna nasus*), skate (*Raja batis*) and roker (*Raja clavata*). Furthermore, no species of rays are allowed to be landed in parts.

In Sweden, fishing for dogfish (*Squalus acanthias*) is prohibited with longline and net and is only allowed as bycatch in the trawl fishery. Dogfish larger than 1 m should be put back into the water immediately.

In 2008, 74,5 tonnes was landed of Picked dogfish (*Squalus acanthias*) and 0,1 tonnes was landed of Porbeagle (*Lamna nasus*). There were no reported Swedish landings of Kitefin shark (*Dalatias licha*), Basking shark (*Cetorhinus maximus*), Portuguese dogfish (*Centroscyminus coelolepis*) and Leafscale gulper shark (*Centrophorus squamosus*) in 2008.

3 kap. Gemensamma fiskebestämmelser

Fredade arter

1 §¹ /Upphör att gälla U: 2009-02-01/ Det är förbjudet att fiska skärkniv, havsnejonöga, småfläckig rödhaj, brugd, sillhaj (håbrand), slätrocka, knaggrocka, majfisk, staksill, blåfenad tonfisk och ål².

Fiskeriverket kan efter ansökan medge den som har haft tillstånd att fiska ål under år 2007 tillstånd att fiska ål under kalenderåret 2008. Ett tillstånd för ålfiske får omfatta högst 500 enkel- eller dubbelryssjor och avse endast fångst av ål med ett minsta mått av 40 centimeter i Skagerrak och Kattegatt, 35 centimeter i Östersjöns delområde 23 (Öresund) samt 65 centimeter i Östersjöns delområden 24-31. Ett sådant tillstånd får dock inte omfatta fångst av blankål i Skagerrak och Kattegatt norr om latituden 56 25,00 N. (*FIFS 2007:56*).

1 §³ /Träder i kraft I: 2009-02-01/ Det är förbjudet att fiska skärkniv, havsnejonöga, småfläckig rödhaj, brugd, sillhaj (håbrand), slätrocka, knaggrocka, majfisk, staksill, blåfenad tonfisk och ål⁴.

Fiskeriverket kan efter ansökan medge den som har haft tillstånd att fiska ål under år 2008 tillstånd att fiska ål under kalenderåret 2009 enligt bestämmelserna i bilaga 10. Fiskeriverket kan i tillståndet föreskriva ytterligare villkor. (*FIFS 2009:2*).

1 a § Rockor (*Rajiformes*), som inte omfattas av fiskeförbud, får inte ilandföras i kapat skick. (*FIFS 2007:38*).

UK England

Recording landings of skates (Rajidae) in the ICES area

Traditionally landings of skates have been reported at the family level (mixed skates and rays), although some nations have reported varying proportions of skates to the individual species level for the main species. Some nations also report landings of other batoids, such as stingrays and electric rays.

Identification issues

There are however several identification/reporting issues that have been raised by WGEF, examples including:

French landings do not report blonde ray *Raja brachyura* and this species may be contained within reported landings of spotted ray *Raja montagui* (see Table 18.2 of ICES, 2007).

Reported French landings of undulate ray *Raja undulata* have been $<2 \text{ t.y}^{-1}$ in recent years, although since restrictions on this species were brought in during 2009, fisheries in VIIe have reported that landings of this species are a lot greater.

Belgian landings of skates include large proportions of *Leucoraja circularis*, especially in ICES Divisions VIIIf,g (the species is rare/absent from VIIIf), whereas small eyed ray *Raja microocellata*, which is abundant in VIIIf and the eastern parts of VIIg, is not noted (see Table 18.4 of ICES, 2007).

Reported catches of white skate *Rostroraja alba* by Scottish fisheries operating in ICES sub-area IV (see Table 10.6 of ICES, 2005) are probably incorrect records.

Given that member states are now required to report landings of the main skate species to species level (from 2008 in the North Sea, from 2009 in other areas, see Table 1), then national laboratories may need to ensure that appropriate identification material is available at port offices. In addition to mis-identifications, there can be difficulties in reporting due to regional use of common names. For example (in the UK) both small eyed ray *R. microocellata* and undulate ray *Raja undulata* have 'painted ray' as a frequently used common name. Small eyed ray is also known in some areas as 'sandy ray', whereas sandy ray is the normally used term for *Leucoraja circularis*.

Summary of 2008 UK(E&W) landings of all batoids

A total of 2 486 t of 'batoids' were reported from UK-registered fishing vessels landing into E&W, of which 1 055 t (42.5%) were recorded to species level and 1 431 t recorded at a generic level, although there was considerable regional variation in the proportion of batoids that were reported to species level (Table 2). The species composition of batoids being taken by UK-registered vessels in 2008 by ICES region is shown in Table 3 and summary details are given below, highlighting suspicious records.

Central North Sea (IVb): Landings dominated by thornback ray (79%) and spotted ray (18%). Smaller quantities of blonde ray, cuckoo ray and sandy ray reported.

Southern North Sea (IVc): Landings dominated by thornback ray (92%) and blonde ray (>6%). Smaller quantities of spotted ray and common skate.

NW Scotland (VIa): Landings dominated by cuckoo (77%) and thornback ray (18%). Smaller quantities of Norwegian skate reported.

Irish Sea (VIIa): Landings dominated by thornback ray (>97%). Smaller quantities of blonde ray, spotted ray and cuckoo ray. Sandy ray reported, but this is outside its normal distribution and refers to small eyed ray.

West of Ireland (VIb-c): Landings dominated by Norwegian skate (14-3%), thornback ray (28-30%) cuckoo ray (30-54%). Smaller quantities of common skate, long-nosed skate, blonde ray and white skate. Port sampling to confirm the proportions of long-nosed, common and Norwegian skates should be considered.

Eastern English Channel (VIId): Landings dominated by thornback ray (59%) and blonde ray (28%). Small quantities of small eyed ray, spotted ray and undulate ray. Presence of common skate, long-nosed skate and shagreen ray in this ICES Division are possible misidentifications/misreporting.

Western English Channel (VIIe): Speciose area with landings dominated by blonde and cuckoo ray (44 and 39% respectively). Small quantities of common skate, shagreen ray, thornback ray, small eyed ray, spotted ray and undulate ray. Reported landings of starry ray, long-nosed skate and sandy ray in this ICES Division are possible misidentifications/misreporting.

Bristol Channel (VIIf): Speciose area with landings dominated by blonde, small eyed and thornback ray (31, 28 and 28%, respectively). Small quantities of common skate, shagreen ray, cuckoo ray, and spotted ray. Reported landings of Norwegian skate, starry ray and sandy ray in this ICES Division are possible misidentifications or misreportings.

Northern Celtic Sea (VIIg): Landings dominated by blonde and thornback ray (23-25% each) and small eyed ray (11%), with shagreen and cuckoo ray also taken (11% each). Small quantities of common skate, sandy ray, spotted ray and white skate. Reported landings of Norwegian skate and long-nosed skate in this ICES Division need to be substantiated.

Southern Celtic Sea (VIIfh): Landings dominated by cuckoo ray (70%) and Norwegian skate (10%), with smaller quantities of common skate, long-nose skate, sandy ray, shagreen ray, blonde ray, spotted ray, thornback ray, small eyed ray. Reported landings of starry ray need to be substantiated.

Western Celtic Sea (VIIfj): Landings dominated by cuckoo ray (46%) and Norwegian skate (22%), with smaller quantities of common skate, long-nose skate, shagreen ray, blonde ray, spotted ray, thornback ray, small eyed ray and white skate.

Table 1: Requirements for the landings of skates and rays (Rajidae) according to Council Regulation (EC) No 43/2009 of 16 January 2009 fixing for 2009 the fishing opportunities and associated conditions for certain fish stocks and groups of fish stocks, applicable in Community waters and, for Community vessels, in waters where catch limitations are required. This lists the TAC by area, which species should be recorded to species level (*) and those species that “may not be retained on board and shall be promptly released” (P). Species that do not occur in an area (occasional vagrants withstanding) are listed ‘-’. Blank cells indicate that the species occurs in the region but there are no current requirements to report to species level. [Note: White skate are not listed in the tables for VIId, but are listed for all of sub-area VII in Part B (19) of the regulations]

Species name	Common name (English)	EC waters of:				
		IIA and IV	VIa,b VIIa-c,e-k	VIId	IIIa	VIII and IX
<i>Stelliolepis radiata</i>	Starry ray	*	–	*	*	–
<i>Rajda batias</i>	Common skate	P	P	P	P	P
<i>Rajda nidarosiensis</i>	Norwegian skate		P	–		–
<i>Rajda oxyrinchus</i>	Long-nosed skate			–		
<i>Macroraja circularis</i>	Sandy ray		*	–		
<i>Macroraja fullonica</i>	Shagreen ray		*	–		
<i>Macroraja naevus</i>	Cuckoo ray	*	*	*	*	*
<i>Raja brachyura</i>	Blonde ray	*	*	*	*	
<i>Raja clavata</i>	Thornback ray	*	*	*	*	*
<i>Raja microocellata</i>	Smalleyed ray	–	*		–	
<i>Raja montagui</i>	Spotted ray	*	*	*	*	
<i>Raja undulata</i>	Undulate ray	–	P	P	–	P
<i>Centrolophus alba</i>	White skate	–	P	?	–	P
TAC (t)		1 643	15 748	1 044	6 423	68

Table 2: The proportion of batoids being landed by UK-registered vessels into E&W being recorded to species level by ICES Division (2008 data).

ICES Division	Reported UK landings (tonnes):			Recorded to species level (%)
	Total batoids	Species level	SKA	
IVA	0.0	0.0	0.0	0.0%
IVB	79.8	25.6	54.2	32.1%
IVC	339.2	179.3	159.9	52.9%
VIA	5.7	4.2	1.5	73.2%
VIB	0.4	0.0	0.4	0.0%
VIIA	255.9	120.0	135.9	46.9%
VIIB	73.6	59.6	14.0	81.0%
VIIC	2.8	2.2	0.6	77.6%
VIID	201.6	38.9	162.7	19.3%
VIIE	469.2	73.7	395.4	15.7%
VIIF	638.9	247.4	391.5	38.7%
VIIIG	108.9	75.1	33.8	69.0%
VIIH	164.4	141.5	22.9	86.1%
VIIJ	143.6	87.9	55.7	61.2%
VIIK	0.5	0.0	0.5	0.0%
VIIIA	1.3	0.0	1.3	0.3%
VIIIB	0.2	0.0	0.2	0.0%
Total	2486.3	1055.5	1430.8	42.5%

Table 3: The species composition of those batoids being recorded to species level by ICES Division. Data refer to landings by UK-registered vessels landing into E&W in 2008.

Group	Species	IVB	IVC	VIA	VIIA	VIIIB	VIIC
BATOIDS	SKATES	<i>Amblyraja radiata</i>	-	-	-	-	-
		<i>Dipturus batis</i>	0.0%	0.1%	-	0.3%	-
		<i>D. nidarosiensis</i>	-	-	5.1%	14.4%	38.9%
		<i>D. oxyrinchus</i>	-	-	-	2.6%	1.1%
		<i>Leucoraja circularis</i>	0.0%	-	0.1%	-	-
		<i>L. fullonica</i>	-	-	-	-	-
		<i>L. naevus</i>	0.8%	-	76.8%	0.7%	54.4%
		<i>Raja brachyura</i>	1.9%	6.4%	1.6%	0.1%	-
		<i>R. clavata</i>	79.3%	92.2%	18.1%	97.6%	28.0%
		<i>R. microocellata</i>	-	-	-	-	-
		<i>R. montagui</i>	18.0%	1.4%	0.0%	-	-
		<i>R. undulata</i>	-	-	-	-	-
		<i>Rostroraja alba</i>	-	-	-	0.1%	-
	OTHERS	<i>Torpedo marmorata</i>	-	-	-	-	-
		<i>T. nobiliana</i>	-	-	-	-	-
		<i>Dasyatis pastinaca</i>	0.0%	-	-	-	-

Species	VIID	VIIE	VIIF	VIIG	VIIH	VIIJ	VIIIA
A. radiata	-	0.6%	0.0%	-	0.4%	-	-
<i>D. batis</i>	0.0%	3.0%	1.5%	2.8%	7.5%	5.8%	-
<i>D. nidarosiensis</i>	-	-	0.0%	7.0%	10.2%	21.7%	-
<i>D. oxyrinchus</i>	1.1%	0.0%	-	5.3%	3.3%	11.4%	-
<i>L. circularis</i>	-	0.1%	3.8%	4.8%	0.3%	-	-
<i>L. fullonica</i>	0.0%	0.1%	0.6%	10.9%	1.3%	1.0%	-
<i>L. naevus</i>	-	38.6%	4.0%	9.1%	69.8%	45.9%	25.0%
<i>R. brachyura</i>	27.9%	43.9%	31.1%	23.5%	2.6%	0.7%	50.0%
<i>R. clavata</i>	58.9%	3.0%	27.6%	24.8%	0.1%	12.5%	-
<i>R. microocellata</i>	1.9%	4.4%	28.0%	11.3%	4.4%	0.2%	25.0%
<i>R. montagui</i>	6.1%	5.2%	3.3%	0.3%	0.0%	0.0%	-
<i>R. undulata</i>	4.1%	1.1%	-	-	-	-	-
<i>R. alba</i>	-	-	-	0.2%	-	0.9%	-
<i>T. marmorata</i>	-	0.0%	-	-	-	-	-
<i>T. nobiliana</i>	-	-	0.0%	-	-	-	-
<i>D. pastinaca</i>	-	-	-	-	-	-	-

UK Scotland

Report on PGCCDS Intersessional work on mixed species (skates and rays).

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Background

PGCCDBS (ICES, 2008) agreed with the recommendations of Liaison Meeting (Anon. 2008) on the need to get better information of the species compositions in mixed species landings and that this objective is relevant for all mixed species landings. The Working Group on Elasmobranch Fishes (ICES.2007) stated that the data collected for skates (Rajidae), and possibly other elasmobranchs, from market sampling and discard surveys were compromised by inaccurate species identification and recommended that PGCCDBS provide the necessary supporting information to ensure that data collection (including species identification) and raising procedures (by gear, season, ICES Division and nation) for skate and ray sampling are standardised across laboratories. In addition, WGEF suggested that such work may be best conducted in the form of a one-off workshop.

This point is emphasised by the provisions of the future DCR as SGECA-SGRN 08-01 meeting elaborating the rules for implementing the EU Regulation 199/2008, demanded to estimate on a routine basis *"the share of the various species for those species that are internationally regulated, e.g. flatfish in ICES division IX, megrim, anglerfish, and elasmobranchs."*

The PG is of the opinion that the first step in addressing this issue is to assess the extent of the problem and to identify the methodological problems. Since the estimation of the share of the various species will be mandatory under the new DCR, the suggestion is for each MS to start in 2008 an implementation study. Such a study should:

- 1) evaluate from the sales notes the total quantity of references to mixed species (rays, anglerfish, "soup", fry, ...)
- 2) check that the mixed species boxes seen at the market are referenced with a similar label in the sales notes
- 3) check by sampling that boxes of elasmobranchs, labelled as a single species, are composed of the appropriate species
- 4) sample boxes of mixed species, only to count the different taxa
- 5) notice when the species identification could not be carried out because of difficulties in distinguishing the different taxa (morphologically too similar, lack of formation, ...)
- 6) confirm/test that the sampling staff is qualified to distinguish the various taxa composing the mixture of species in the landings.

It is expected that the raising should not be problematic if points 1 and 2 do not show major discrepancies. It is also expected that no methodological problems in evaluating the share of mixed species should occur if point 3, 5 and 6 do not show major difficulties. In order to evaluate the need for a workshop and the related terms of reference, the results of the implementation studies should be provided to PGCCDBS/PGMED 2009.

Methods

At FRS we have a sampling programme which includes skates and rays, and although we also sample sharks, this is not regarded as a priority species for sampling at present. With this in mind, the inter-sessional study was focused mainly on skates and rays but would also comment on implications relating to the shark fisheries based on our findings and current knowledge of the fishery. Efforts were also to be made to identify other species or groups of species that may be landed as “mixed” and consider how estimates of landings could be provided for each species within the grouping.

Course of action undertaken by FRS included:

- 1) Select several vessels as case studies and through the relevant agencies compare the vessel logbooks with the sale notes (as well internal database records) to gain information on descriptions of skate and rays classification or groupings.
- 2) On occasions that “mixed skate” are sampled through our current market sampling scheme, check the sales notes to confirm how they have been classified for sale.
- 3) If any skate species are labelled as a single specific species, attempts will be made to confirm that this actually is the case.
- 4) From the current sampling scheme address the issue of quantifying the different taxa within a catch (for the period 2006 – 2007).
- 5) Species identification is not regarded as a problem (at FRS) for the vast majority of skate species landed commercially but there may be problems with the limited “deep-water” species.
- 6) Although sampling staff are well trained and equipped for species identification, a quick review of how effective and accurate this is will be conducted.
- 7) Identify species or groups of species that may be landed as “mixed” and consider how estimates can be provided each species involved.

Examination of Logbook and Sales Notes

For the period 2006 – 2007 the sales notes and logbooks for all vessels that landed directly to Aberdeen fish market were examined. There was a total of 138 occasions when vessels landing directly at Aberdeen fish market had records of skate as part of their landings. A comparison of log book entries and sales notes records is shown in Table 1. On all occasions, the entry in the logbook was recorded as skate (not specific), with the subsequent official records by SFPA (Scottish Fishery Protection Agency) showing the same.

Table 1. Entries from sales notes.

Year	Sales note records							
	No of landings With skate	Occasions other than "skate" recorded	White skate	White roker	Thorny	Jumbo	Blue skate	Blonde skate
2006	87	29	4	21	2	5	1	1
2007	51	6	4	4	1			

There are three fish selling companies operating at Aberdeen and although two of the companies noted different species (and sizes) on some occasions when fish were sold, in reality the names used (on the sales notes) were common names which could not be associated with specific species. This was confirmed in conversation with fish salesmen and SFPA staff. The term "white skate" can apply to several species other than "blue skate (*Raja batis*). The terms "roker" and "thorny" are generally regarded as local names for *Raja clavata* but again, comments and experience has shown that this term often relates to boxes of mixed skate which may or may not include Spotted ray (*Raja montagui*) or Blonde ray (*Raja brachyuri*)

Comparison of Observed Samples v Sales Notes

Within the IMS (Integrated Market Sampling) scheme operated by FRS, regular sampling of commercial catches was carried out at ports throughout Scotland. When sampling commercial catches of skate, the sampling team measure all skate landed (where practically possible) and record details of species, as well as length and sex. If the catch is too large to allow measurement of all fish, sub sampling takes place. This entails sampling each category (size) or group (mixture of species) as presented for sale with the outcome being that a reliable estimate of weight for each species of skate can be calculated.

For the purpose of this exercise the comparison of species observed in the IMS samples obtained at Aberdeen were compared with those noted in the sales notes available in order to see if any reliance can be placed on the sale note information for estimating the mix of species. Results from this exercise are shown in Table 2.

Table 2. Comparison of number of species directly observed against number recorded.

Number of species in sample	Occasions noted	Number of species recorded on sales notes				Percentage Agreement
		1	2	3	4	
1	3	3				100
2	6	5	1			17
3	2	1		1		50
4	2	2				0
Total	13					31

Although the number of occasions when sales notes were readily available for comparison with directly observed species was restricted to 13, it was clear that with only 5 occasions when the number of species noted were similar, no reliance could confidently be placed on sales note information. Given that earlier comments indicate the practice of recording skate landings as one species (mixed skate), it is to be expected that agreement would be high if number of species observed was only one.

Single specific species

As can be seen from the earlier comments and figures (Table 2), the labelling of skate as a single species on the sales note has not been very reliable. On comparing sales notes against the records from the IMS scheme (at Aberdeen) there were 10 occasions when a single species was recorded on the sales notes but on 8 of these occasions, the sampling scheme noted more than one species. On each occasion, the sales note simply recorded skate, with no reference to size or locally known species names. Detailed examination of the corresponding logbooks (highlighted earlier) show that official records were always recorded as “mixed skate” (for the period of this study). In effect, no reliance could be placed on the accuracy or relevance of sales notes or log book reference to single species entry for skate species.

Quantifying Different Taxa from Observed Samples

Given that the IMS scheme operated by FRS identifies all skate species within a catch sampled and records numbers at length, by applying suitable length weight relationships to the data, suitable estimates of weight for each taxa can be obtained.

During the period 2006 – 2007, skate species were sampled on a total of 95 occasions within the IMS scheme. Although sampling of demersal species is generally carried out in a stratified manner by area (Annex I), gear and time, sampling of skate species has been on a more opportunistic basis. However, data from all samples were combined to provide indications of weight ratios for each species encountered and are displayed by market sampling area (Figures 1 & 3) and ICES division (Figures 2 & 4) for the years 2006 and 2007 respectively.

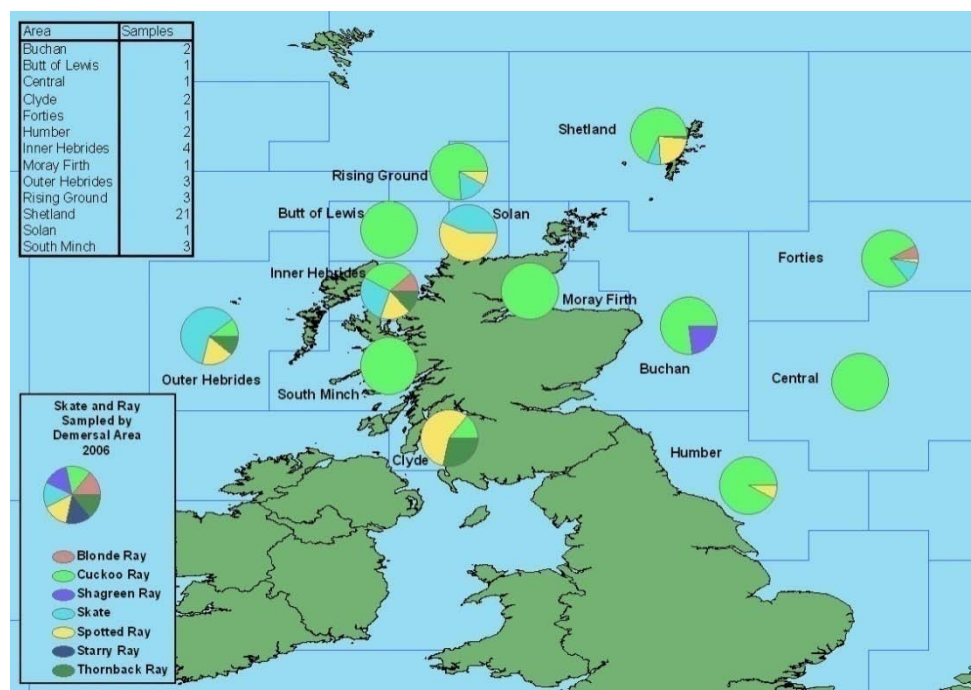


Figure 1. Weight composition by taxa by Market Sampling area (2006)

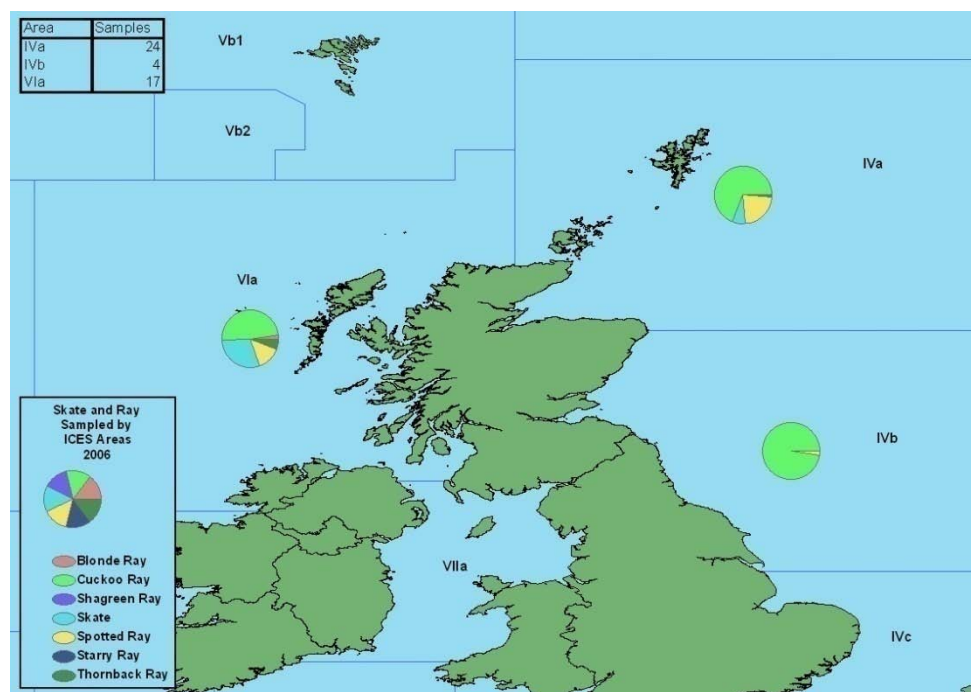


Figure 2. Weight composition by taxa by ICES division (2006).

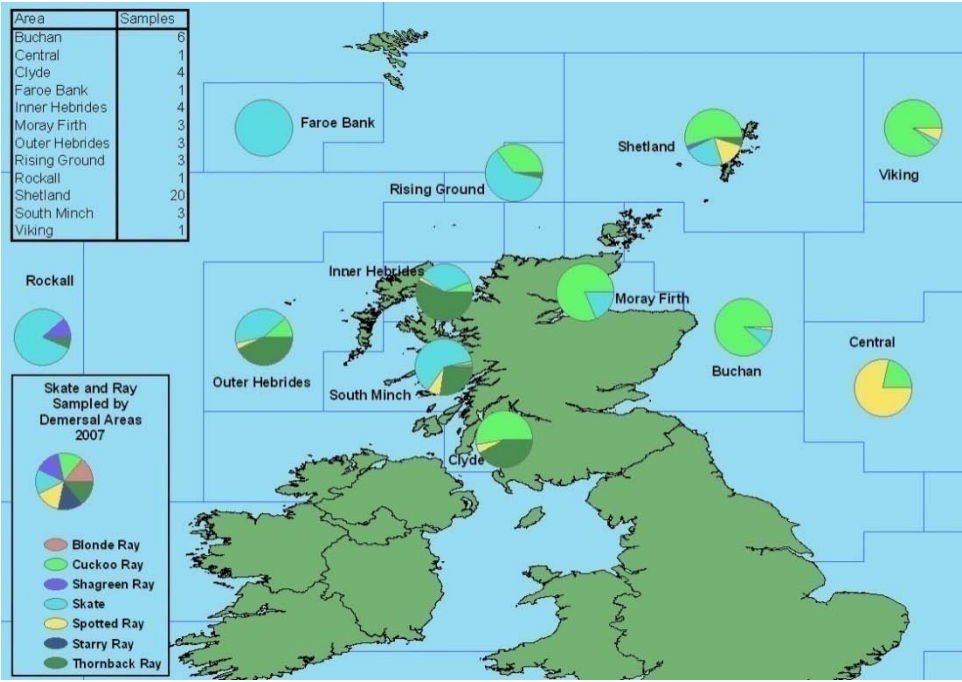


Figure 3. Weight composition by taxa by Market Sampling area (2007)

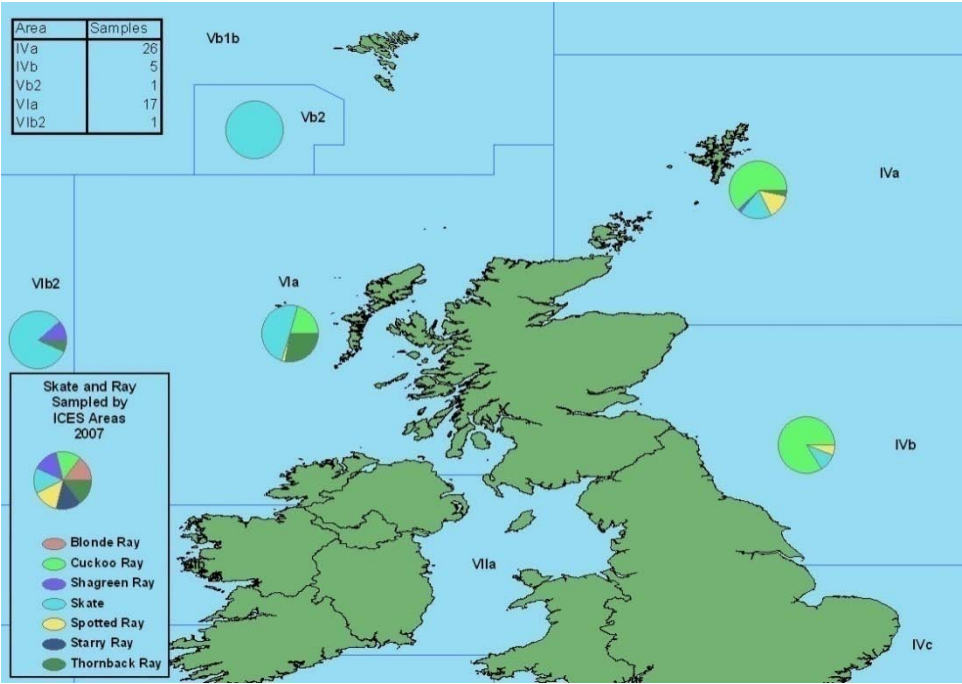


Figure 4. Weight composition by taxa by ICES division (2007).

The ratio estimators for each sampling area (and ICES division) were applied to the landings data for mixed skate species for 2006 and 2007 to provide estimates of weight landed by taxa. Due to gaps in the sampling programme, estimators were not directly available for areas where the catch amounted to approximately 8% of the 2006 landings and 16% of the 2007 landings. In the cases where no ratio estimators were available for an area, the ratio estimator from an appropriate adjoining area or the relevant ICES division was applied. The estimated weight by taxa for 2006 and 2007, by sampling area and ICES division are shown in Tables 3 and 4 respectively. Although no sampling for Rockall (VIb2) was carried out in 2006, for the purpose of this exercise, the weight ratio estimators obtained from the 2007 sampling scheme was applied to the 2006 landings data.

Table 3. 2006 estimates of weight landed (kg) by taxa

Area	landings (kg)	Blonde Ray (<i>Raja brachyura</i>)	Cuckoo Ray (<i>Raja naevus</i>)	Shagreen Ray (<i>Raja fullonica</i>)	Skate (<i>Raja batis</i>)	Spotted Ray (<i>Raja montagui</i>)	Starry Ray (<i>Raja radiata</i>)	Thornback Ray (<i>Raja clavata</i>)
Shetland	241936	0	164367	1577	17706	53460	1267	3559
Viking	1189	86	935	0	137	31	0	0
Moray Firth	6935	0	6935	0	0	0	0	0
Buchan	15090	0	11605	3485	0	0	0	0
Forties	1140	82	896	0	132	30	0	0
Central	665	0	665	0	0	0	0	0
Danish Coast	12	0	12	0	0	0	0	0
Humber	53	0	49	0	0	4	0	0
West Orkney	26532	0	0	0	11523	15009	0	0
German Bight	0	0	0	0	0	0	0	0
Thames	0	0	0	0	0	0	0	0
Ijmuiden	0	0	0	0	0	0	0	0
Utsire		0	0	0	0	0	0	0
Solan	11869	0	0	0	5155	6714	0	0
Rising Ground	14352	0	10912	0	2325	1114	0	0
Butt of Lewis	52384	0	52384	0	0	0	0	0
Inner Hebrides	31751	3521	9808	0	8870	5507	0	4045
Outer Hebrides	103080	0	10231	0	63082	18339	0	11427
South Minch	61381	0	60482	0	0	350	0	549
Clyde	31925	0	4561	0	0	18243	0	9121
Northern Ireland	8723	0	866	0	5338	1552	0	967
Western Deepseas	12116	0	1203	0	7415	2156	0	1343
ICES Division								
IVa	291329	156	198224	2495	21254	63475	1503	4222
IVb	2224	0	2172	0	0	52	0	0
VIa	327581	7699	157565	0	97662	45421	0	19234
VIb	23306	0	0	2668	18997	109	0	1532

Table 4. 2007 estimates of weight landed (kg) by taxa

Area	landings (kg)	Blonde Ray (<i>Raja brachyura</i>)	Cuckoo Ray (<i>Raja naevus</i>)	Shagreen Ray (<i>Raja fullonica</i>)	Skate (<i>Raja batis</i>)	Spotted Ray (<i>Raja montagui</i>)	Starry Ray (<i>Raja radiata</i>)	Thornback Ray (<i>Raja clavata</i>)
Shetland	245633	270	134451	6488	55012	37166	359	11888
Viking	892	0	795	0	31	66	0	0
Moray Firth	4209	0	3427	0	782	0	0	0
Buchan	10979	0	9646	0	1147	186	0	0
Forties	1365	1	850	28	249	184	2	51
Central	863	0	189	0	0	674	0	0
Danish Coast	41	0	35	0	4	2	0	0
Humber	364	0	307	0	36	21	0	0
West Orkney	25800	0	9116	0	15818	95	0	770
German Bight	25	0	21	0	2	1	0	0
Thames		0	0	0	0	0	0	0
Ijmuiden		0	0	0	0	0	0	0
Utsire		0	0	0	0	0	0	0
Solan	12137	0	4288	0	7441	45	0	362
Rising Ground	31440	0	11109	0	19276	116	0	939
Butt of Lewis	45600	26	9418	0	22582	916	0	12659
Inner Hebrides	24538	0	1525	0	8435	533	0	14044
Outer Hebrides	135828	0	15533	0	57080	4553	0	58661
South Minch	83934	1269	1366	0	52215	6441	0	22643
Clyde	24829	0	13227	0	0	1160	0	10442
Northern Ireland	9541	0	1091	0	4010	320	0	4121
Western Deepseas	11996	0	1372	0	5041	402	0	5181
ICES Division								
IVa	287372	244	179051	5875	52435	38675	325	10765
IVb	2800	0	2360	0	278	161	0	0
VIa	379842	213	78447	0	188103	7630	0	105448
VIb	19604	0	0	2244	15980	91	0	1289

Species ID within Sampling Scheme

The recording of individual skate species landed is regarded as a problem due to the fact that they are either landed as mixed skate species or are simply recorded on sales notes and log books as mixed skate. However, as this study has looked at methods of estimating weights landed by individual skate species based on the IMS sampling scheme at FRS, a great deal of confidence can be placed on the accuracy of species identification. Sampling is carried out by a team consisting of two members of staff with the "Team Leader" having undergone an extended period of training which may also include research vessel surveys and observer work on commercial vessels. During training, several identification books are used including;

- ID keys prepared at FRS,
- Stehmann's Guide to Common Skate Species in Northern European Shelf Waters
- Fisherman's I.D. guide to Skates & Rays
- Key to the Fishes of Northern Europe (Alwyne Wheeler)

Review of staff ID Training

With most of the sampling of skate species now being carried out at the port of Peterhead, the Sampling Programme Project Leader carried out a brief assessment of the effectiveness of the identification of skate species during sampling procedures. During this review it was confirmed that the designated sampling "Team Leaders" had the relevant knowledge and experience to enable them to carry out appropriate identification of skate species. On considering the most appropriate ID keys to be used, the Project Leader became aware that local SFPA staff (and Fishermen) had been issued with copies of the Fishermen's I.D. guide to Skates & Rays and found these to be most effective.

In addition to sampling at ports, FRS has an Observer Sampling Programme which normally samples about 70 demersal commercial trips per year and during these trips, sampling of the landings (including skate) is normally carried out. FRS Observers usually undergo an extensive training period, including species identification, before they carry out sampling duties unsupervised. If they encounter any species that they have difficulty in identifying, they are instructed to bring a specimen back to the Laboratory, or collect photographic images with the digital cameras they are issued with.

The sampling teams have been issued with laminated copies of the leaflet, Fishermen's I.D. guide to Skates & Rays which has been widely distributed within the Industry by the Sea Fish Industry Authority (Annexe II).

Other mixed species

Examination of official landings statistics indicated that there are several instances where two or more species may be mixed and presented for sale as well as being recorded as grouped (mixed species). The weight landed for each species group for the main ICES areas (IV & VIa) are provided in Table 5.

Table 5. Weights of grouped species landed in Scotland (ICES Divisions IVa, IVb & VI)

Code	Description	Weight landed (Tonnes)	
		2006	2007
GRO	Mixed Groundfish	281.4	209.3
FLX	Mixed flatfish	42.8	32.6
MON	Monkfish (mixed)	8368	9547
SQU	Unidentified squid	870	1191
SHK	Shark unidentified	?	15.8

Mixed Groundfish

This classification accounts for a relatively small proportion of the Total Demersal landings in ICES areas IV & VIa (Scottish Sea Fisheries Statistics), approximately 0.3% in 2006 and 0.2% in 2007. The most common reasons for fish to be recorded in this classification is when a vessel lands part boxes of mixed species for reasons such as;

- Combining several species which do not merit presenting for sale singly due to the costs associated with use of boxes, ice etc.
- Inshore vessels, particularly *Nephrop* Trawlers where the by catch is small, typically <50kg.

Given that statistics are available by Port of landing and statistical rectangle caught, it would be possible to re-allocate the group GRO to individual species by two methods;

- On the basis of the composition of the recorded landings of all demersal species either at port (or District), market sampling or ICES area level.
- Carry out sampling in the locations where this is issue is most common in order to determine species mix. In areas where sampling levels are relatively low, it may be possible to supplement data with information collected on FRS observer trips, or possibly on other observer initiatives which are funded by the Scottish Government.

A significant proportion of the group GRO was actually landed as a by-catch of the pelagic fisheries with 22 landings in 2006 accounting for 157 Tonnes and 10 landings in 2007 accounting for 62 Tonnes. This issue has been addressed by the SFPA and future recording by this sector should be diminishing.

Mixed Flatfish

Previous common procedure in some ports was to box all flatfish together at sea with selection taking place on the market. This resulted in the entries in the logbooks being logged simply as “flatfish” and although selection may have been carried out prior to sale, this is not always recorded fully in the sales notes. This practice seems to be diminishing and the expectation is that it should not pose a problem in the near future. One exception may be where the lesser valued species may still be presented for sale as mixed in order to save on time and costs. If this continues, estimation of each species could be obtained by:

- Applying the ratio of the recorded landings of all flatfish species (either at port, market sampling or ICES area level) to the quantities recorded as FLX.
- Carry out sampling in the locations where this is issue is most common to determine species mix.

Monkfish (mixed)

There is a significant fishery for Monkfish (Anglers) in ICES area IV and VI and although this consists mainly of the species *Lopius piscatorius*, the common practice is to include any Black-bellied anglers (*Lophius budegassa*) in the catch as there appears to be no marketable reasons for doing otherwise. During the sampling of Monkfish by FRS staff, the presence of Black-bellied angler is always recorded on the data sheets although not currently stored on the database. Given that this species is sampled at a relatively high level (199 samples taken in 2006 and 187 taken in 2007), it would be relatively simple to estimate the mix (by weight) of the two species within each sample and apply the ratios obtained (at an appropriate area level based on spatial and temporal distribution of the two species).

Squid Unidentified

Fisheries for squid in Scotland fluctuate considerably from year to year depending on recruitment and although normally landed as a by-catch in demersal and nephrop fisheries, more directed fisheries develop from time to time. Although classed as SQU (squid unidentified) the species caught (and landed) is the short-finned squid, *Loligo forbesi* with occasional occurrence of other species being caught but not landed for commercial sale. In effect, there is no issue regarding assigning this classification to specific species.

Sharks Unidentified

On investigation it transpired that a large quantity (11,910 kgs) was incorrectly assigned and was subsequently re-coded or disregarded in relation to quantifying sharks.

The outstanding balance of landings (3907 kg) from 60 landings, are more mixed in interpretation. 6 landings amounting to 543 kg come from Anglo-Spanish gill-net vessels and are most likely to be miscoded porbeagle or tope, but this cannot be assured and records will not be changed. 2 landings (by a pair trawl team) to Peterhead port weighing 1000 kg were recorded on log sheets as "shark". It is at least possible that these may have been spurdog. The remaining 52 landings accounted for landings of 2364 kg. These may be small quantities of shark species such as porbeagle, tope or others which have been miscoded or unidentified, they may be dogfish (spurdog, smooth-hound etc.) or there is a chance that log sheets recording SKA (skate unspecified) may have been misread as SKH (sharks unspecified). It would take a more in-depth investigation of individual trip records to put a reliable interpretation on likely percentage allocations here.

Outcomes

Since this exercise was set in place there have been several positive moves which should result in less instances where species are recorded as "mixed", in particular, in relation to flatfish, skates and rays and sharks. The SFPA have now added species codes to their database system which will enable any records of specific species landed to be recorded appropriately if presented for sale as a single species. Further to this, changes to regulations (from January 2009) are in place which should ultimately result in sharks, skates and rays being sorted into specific species prior to sale and subsequently recorded appropriately in official statistics. However, as this process is likely to take some time before being fully implemented and enforced, there is a continuing need to adopt a process for allocating landings of mixed species to specific species. In the case of skates and rays, FRS have identified suitable methods which can be adopted to provide realistic ratio estimators which could be applied to landings data on mixed skate in order to estimate landings at species level.

For mixed groundfish (GRO), mixed flatfish (FLX) and monkfish (MON), FRS are in a position where data obtained from the IMS scheme and official landings data can be utilized to provide robust species ratio estimators which could be applied to each recognized group of species. In practical terms the classification "squid unidentified" can be taken to be one particular species (*Loligo forbesi*). Although difficulties were experienced in assessing the composition of landings attributed to "sharks unidentified", improvements in data recording and processing by SFPA should reduce the number of instances when this occurs in the future. Closer liaison by FRS staff and SFPA would also provide a better insight into the composition of future declarations of "sharks unidentified".

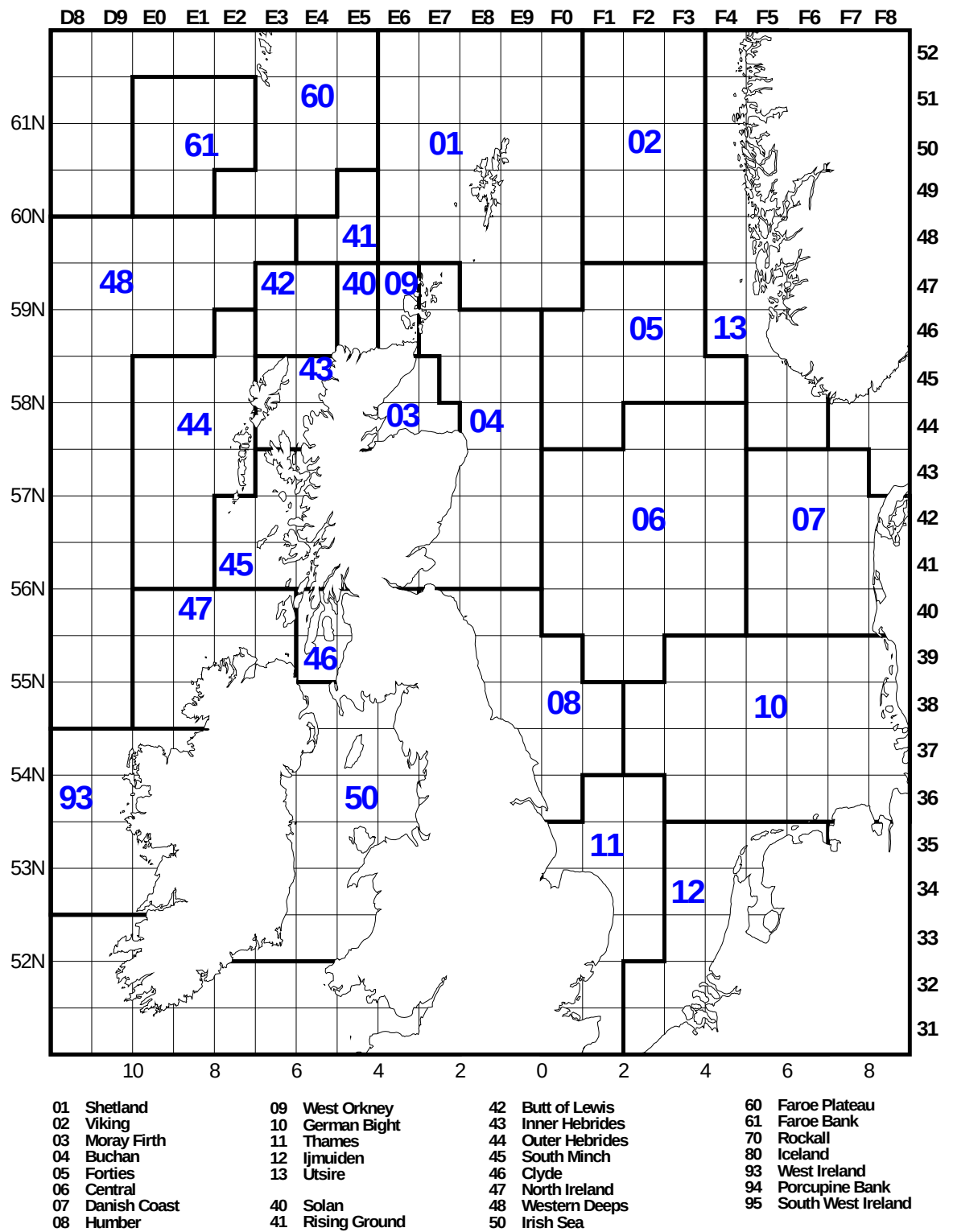
It is recognized that the estimators obtained for this exercise may need refining to take account of temporal and spatial issues if the procedures are to be adopted.

References

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- Wheeler, A. (1978) Key to the Fishes of Northern Europe. Warne, London

Annex I

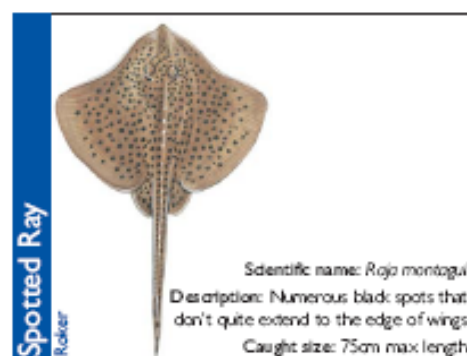
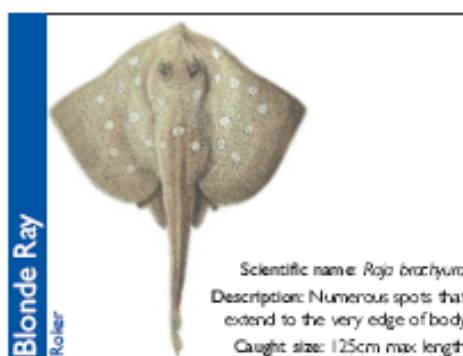
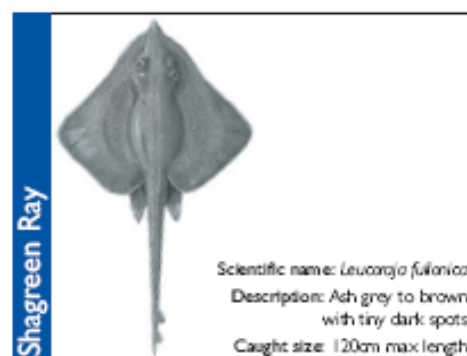
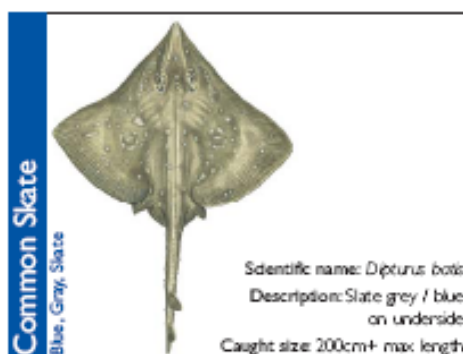
Demersal Sampling Areas



Annex II

Fisherman's I.D. guide to

Skates & Rays



Fisherman's I.D. guide to Skates & Rays

Starry Ray	 Scientific name: <i>Amblyraja radiata</i> Description: Brownish grey with scattered irregular black blotches and some faint pale cream spots Caught size: 60cm max length
Thornback Ray Rollet, Thorny, Hard back	 Scientific name: <i>Raja clavata</i> Description: Series of dark and light bands down the tail Caught size: 110cm max length
Small-eyed Ray Painted, Sandy	 Scientific name: <i>Raja microcellata</i> Description: Pattern of light blotches and undulating stripes on body Caught size: 90cm max length
Cuckoo Ray Puttling, Stars, Crowbards	 Scientific name: <i>Leucoraja naevus</i> Description: Distinctive black and cream eye spots on each wing Caught size: 75cm max length
Sandy Ray Leathers, Sandies, Faoness Rollet	 Scientific name: <i>Leucoraja circularis</i> Description: 4-6 small creamy spots with black edging on each wing Caught size: 120cm max length
Undulate Ray Painted	 Scientific name: <i>Raja undulata</i> Description: Dark bands edged with white spots Caught size: 100cm max length

If the skate or ray you caught does not match one of those shown in this guide, please contact the SharkTrust by telephone on 0870 128 3045 or by email through their website. The species illustrated here are the most commonly caught in fishing grounds around the British Isles. Other species may be encountered in the extremes of these areas.



www.seafish.org



www.sharktrust.org



Annex 14: Recommendations

Recommendation	For follow up by To:	Timeframe
PGCCDBS are strongly of the opinion that the improvement of InterCatch needs to be addressed with urgency.	ICES Secretariate	As soon as possible
PGCCDBS recommends all countries to record data on seal predation on fish, and instances of seals interaction of fishing gears.	National laboratories	From now on
PGCCDBS recommends that the score-card developed by the WKACCU to detect bias in key parameters of importance in stock assessments should be tested at benchmark workshops.	Benchmark Wks	next benchmark WK meetings
PGCCDBS recommends that in the future, appropriate data should be collected and the cluster size recorded from which a sample was taken. In general, it is best to collect a few fish for aging from as many clusters as possible. When presenting the results, the effective sample size should be reported since it is much more informative than the total number of fish sampled.	National laboratories	From now on
PGCCDBS recommends that countries consider the effect of intra cluster correlation when completing their length based concurrent sampling programmes, and attempt to attain length samples from as large a numbers of "clusters" as possible.	National laboratories	From now on
PGCCDBS recommends that AWG's complete and include in the report the Table – "Stock Data Problems Related to Data Collection" (Annex 4) as part of their generic ToR b).	Assessment Working Groups (AWGs)	Next AWG meetings
PGCCDBS recommends that Member States evaluate potential changes to the continuity of their stock assessment fishery data sets caused by the new DCR sampling schemes from 2009 onwards.	National laboratories	From now on.
PGCCDBS recommends that STECF reviews the requirement for recording of each effort variable according to the current and potential future regional requirements of the end users of the data.	STECF	As soon as possible
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.
PGCCDBS recommends the wide use of the outcome of the WebGR and COST projects, once available (see sections 2.1.6 and 2.1.7, 4.7.1 and 4.7.3).	National laboratories	Once project results are available for implementation.
PGCCDBS recommends that an analysis on the effectiveness of self sampling programmes versus traditional observer programmes be conducted.	Fisheries Observer Conference 2009, ICES Symposium 2010	PGCCDBS 2010/2011
PGCCDBS recommends to evaluate (develop guidelines to improve) the use of results from age	PGCCDBS intersession work, co-ordinated by Lotte	PGCCDBS 2010

Recommendation	For follow up by To:	Timeframe
calibration exercises in assessment working groups.	Worsøe Clausen (Denmark) and Loes Bolle (The Netherlands).	
PGCCDBS recommends that Benchmark Wks should evaluate sex separated maturity ogives for each stock, where ogives are available, when estimating SSB. This task may be developed in connection with the FRESH Action (see section 6.2).	PGCCDBS intersession work, co-ordinated by Fran-Saborido Rey (Spain).	PGCCDBS 2010
PGCCDBS recommends developing statistical tools for comparison of maturity stages assignments of samples at workshops to assess the significance of agreement/disagreement among laboratories.	PGCCDBS intersession work, co-ordinated by Fran-Saborido Rey (Spain), David Maxwell (UK) and Ernesto Jardim (Portugal).	PGCCDBS 2010
PGCCDBS recommends that for new species where no mature data exist, there is no need for workshops and laboratories should use standard protocols developed by WKMAT, until more specific and agreed protocols exist for the concerned species/stocks.	National laboratories	Until specific protocols have been developed.
PGCCDBS recommends that workshops on species following different reproductive strategies should be initiated, such as viviparity and hermaphroditism in fishes, crustaceans and cephalopods.	PGCCDBS	PGCCDBS 2010
PGCCDBS recommends an angler and black-bellied angler otolith exchange		2011
PGCCDBS recommends a blue whiting otolith exchange	Hans Høie (Norway)	2010
PGCCDBS recommends a brill otolith exchange	Annemie Zenner (Belgium)	2010
PGCCDBS recommends a North Sea cod otolith exchange	Hans Høie (Norway)	2010
PGCCDBS recommends a North Sea sole otolith exchange	Mark Etherton (UK)	2010
PGCCDBS recommends a Baltic turbot otolith exchange	Lotte Worsøe Clausen (Denmark)	2010
PGCCDBS recommends a roundnose grenadier otolith exchange	Kélig Mahé (France)	2009/2010
PGCCDBS recommends a dab otolith exchange	Christoph Stransky (Germany)	2009
Spanish mackerel is only fished by Spain and Portugal and a small exchange should be arranged by those countries alone.	Spain, Portugal	
PGCCDBS recommends investigating the need on holding maturity staging workshops in 2011-12 regarding: Blue Whiting, Megrin, Deep-sea species, Salmon	PGCCDBS	PGCCDBS 2010
PGCCDBS recommends a workshop on methods for merging fleet metiers for fishery based sampling [WKMERGE]	ICES Secretariat	until August 2009
PGCCDBS recommends a Workshop on the Design of Regional Age Sampling Schemes [WKDRASS]	ICES Secretariat	until August 2009
PGCCDBS recommends a Joint ICES-STEFC	ICES Secretariat	until August

Recommendation	For follow up by To:	Timeframe
Workshop on the implementation of the Common Open Source Tool (COST) [WKCOST]		2009
PGCCDBS recommends a Workshop on ecosystem indicators of discarding [WKEID]	ICES Secretariat	until August 2009
PGCCDBS recommends a Workshop on Age Reading of Greenland Halibut [WKARGH]	ICES Secretariat	until August 2009
PGCCDBS recommends a Workshop on Age Reading of Greenland Cod [WKARGC]	ICES Secretariat	until August 2009
PGCCDBS recommends a Workshop on Age Reading of dab [WKARDAB]	ICES Secretariat	until August 2009
PGCCDBS recommends a Workshop on Age Reading of North Sea (IV) and Skagerrak-Kattegat (IIIa) plaice [WKARP]	ICES Secretariat	until August 2009
PGCCDBS recommends a Workshop on Age Reading of Mackerel [WKAMAC]	ICES Secretariat	until August 2009
PGCCDBS recommends a Workshop on Sexual Maturity Staging of Redfish and Greenland Halibut [WKMSREGH]	ICES Secretariat	until August 2009
PGCCDBS recommends a Workshop on Sexual Maturity Staging of Herring and Sprat [WKMSHS]	ICES Secretariat	until August 2009
PGCCDBS recommends a Workshop on Sexual Maturity Staging of Elasmobranches [WKMSSEL]	ICES Secretariat	until August 2009
PGCCDBS recommends a Workshop on Sexual Maturity Staging of Cephalopods [WKMSCEPH]	ICES Secretariat	until August 2009