ICES PGCCDBS Report 2008

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

3-7 March 2008

Cyprus

ICES International Council for the Exploration of the Sea

CIEM Conseil International pour l'Exploration de la Mer

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Executive summary

The Planning Group on Commercial Catches, Discards and Biological Sampling [PGCCDBS] (Chair: Ernesto Jardim, Portugal) met 3–7 March, 2008 in Cyprus. 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. 1543/2000 and 199/2008; 1639/2001 and 1581/2004). 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 Fish 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.

Since 2007 Mediterranean Scientists organize a Planning Group (PGMED) to deal with specific sampling issues of this area. Although organized 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 will be maintained through: (i) the inclusion of each group's report as an annex of the other; (ii) the organization of parallel meetings; (iii) the organization of joint plenary for generic issues, and (iv) the organization of joint workshops.

As mentioned last year (ICES, 2007d), it is the concern of this group that the work done in workshops should be promoted by publishing calibration WK results under the ICES Cooperative Research Report series (CRR). A CRR on European hake age readings will be presented this year to the Council.

Considering the importance of methodological workshops and the forthcoming Workshop on methods to evaluate and estimate the accuracy of fisheries data used for assessment [WKACCU] and Workshop on Maturity Ogive Estimation for Stock Assessment [WKMOG], two working sessions were promoted so that the chairmen could discuss objectives and methods. It is our view that these working sessions contributed to increase the workshops' success.

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

The Group reviewed AWG reports with respect to recommendations addressed to PGCCDBS (Table 3.1). Considering the urgent need to improve communication between AWGs and the member states providing data for assessment a discussion about the development of a data catalogue to manage sampling meta information was carried out. Such catalogue is being developed under the remits of STECF-SGRN to evaluate the compliance of Member States with the DCR and their National Programmes. The implementation of such a catalogue will be tested by introducing table templates (see Tables 3.2 and 3.3) to be filled in by a set of stock co-ordinators.

The results of [WKISCON] Workshop on Implementation Studies on Concurrent Length Sampling and [WKUFS] Workshop on Using Fishermen to Sample Catches were presented and discussed (Section 3.3).

The results of the several workshops on maturity staging (Section 3.4) and age calibration (Section 3.5) 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 (Annex 5), workshops on age calibration (Annex 6) and workshops on maturity staging (Annex 7) were developed and should contribute to improve the results obtained.

Recommendations from the European Commission expert groups related with the DCR were considered and where appropriate actions to be taken within the ICES system were proposed. Most gave raise to workshops proposals or intersessional work.

A considerable shift on data collection is expected due to the recent revision of Council Reg. 1543/2000 by Council Reg. 199/2008, and the forthcoming revision of EC Reg. 1639/2001 and EC Reg. 1581/2004. The group considered there will be a consultation process with ICES. However, some subjects were already identified as being potentially of high impact and listed in Section 4.

Regarding the standards for best practices collecting commercial data the group continued the developments from last year and designed a quality assurance framework (Section 6.2) which is supported on a set of quality indicators for each input parameter for assessment. The implementation of such framework relies on 2 workshops (WKACCU and WKPRECISE) scheduled for 2008 and 2009 and the development of minimum sampling protocols (Section 6.1). A suggestion of quality indicators is presented in Table 6.1 for the consideration of WKACCU and WKPRECISE. A minimum sampling protocol for length sampling on the market was developed and will be tested intersessionally. The results of such exercise shall be presented to WKACCU.

During the meeting a set of tasks were identified to be carried out until the 2009 PGCCDBS meeting. Such tasks are of extreme importance once that they allow to take over situations requiring a longer period to be dealt with than the duration of the meeting (Table 8.1). A set of otolith exchanges were proposed for North Sea Place, Mackerel, Eel and Haddock.

A set of workshops were proposed to respond to requests from other expert groups or considering the perception of the group regarding work to be carried out. [WKPRECISE] Workshop on methods to evaluate and estimate the precision of fisheries data used for assessment; [WKSMRF] Workshop on Sampling Methods for Recreational Fisheries; [WKAEH] Workshop on Age Estimation of European hake; [WKARA] Workshop on Age Reading of European Anchovy (*Engraulis encrasicolus*); [WKACM] Workshop on Age Calibration of Red mullet *Mullus barbatus* and Striped mullet *Mullus urmuletus*; [WKMSSPDF] Workshop on Sexual Maturity Staging of sole, plaie, dab and flounder; [WKMSC] Workshop on Maturity Staging of Crustaceans (*Aristeus antennatus, Aristaeomorpha foliacea, Parapenaeus longirostris, Nephrops norvegicus*).

1 Introduction

1.1 Terms of Reference

The Planning Group on Commercial Catches, Discards and Biological Sampling [PGCCDBS] (Chair: Ernesto Jardim, Portugal) met 3–7 March, 2008 in Cyprus to:

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

b) Review feed-back from ICES Assessment Working Groups and other relevant Expert Groups or Workshops as communicated through the contacts officers; Where appropriate propose actions to be taken within the ICES system;

c) Consider a report by the European Commission from the DCR Liaison Meeting and relevant STECF sub-groups on data collection issues. Where appropriate propose actions to be taken within the ICES system;

d) Review changes in data collection procedures and communicate changes to the assessments groups through the contact officers. The Assessment Groups will consider if these changes present problems for stock assessment data and where appropriate propose procedure changes for rectifying the problems.

e) Continue developing standards and best practices for sampling commercial fisheries. Review the work plan and actions taken so far for establishing standards and best practices and agree on a work plan for intersessional work.

f) Continue the work on developing protocols for age calibration and maturity staging workshops;

1.2 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 (EC/Reg. 1543/2000 and 199/2008; 1639/2001 and 1581/2004).

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 Fish 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.

There are five EU Regional Co-ordination Meetings (RCMs): 1) Northwest Atlantic (NAFO), 2) Mediterranean, 3) Baltic Sea, 4) North Sea and 5) Northeast Atlantic. These RCMs are forums where EU member countries discuss how best to implement their national programmes.

1.3 General introductory remarks and work plan

There was a clear intention of shifting PGCCDBS into a more action group that could plan and execute tasks. With this is mind the experts attending the group accepted, as last year, to always go beyond recommending, by providing actions, identifying responsibilities and define schedules to fulfil the tasks proposed.

PGCCDBS took in its hands some tasks and defined intersessional work to be carried out during 2008. The tasks, task coordinators and deadlines were agreed during the meeting and are included in a specific section about intersessional work (Section 8).

Once more the stabilization of the ToRs contributed to clarify the role of the PG on the advisory system and largely contributed to an efficient meeting. The work of an expert group like PGCCDBS, with approximated 35 participants from all European countries, must be built along the years, 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 6 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. This year the Sharepoint site was used to manage documentation during the meeting. These tools supported the development of our work and created conditions to continue our tasks intersessionally.

1.4 Cooperation with PGMED (The Mediterranean Planning Group)

Since 2007 Mediterranean Scientists organize a Planning Group (PGMED) to deal with specific sampling issues of this area. Although organized 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 will be maintained through: (i) the inclusion of each group's report as an annex of the other; (ii) the organization of parallel meetings; (iii) the organization of joint plenary for generic issues, and (iv) the organization of joint workshops.

1.5 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 (WKAC&MS) 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/pgccdbs/PGCCDBSdocrepository.asp), maintained by the ICES Secretariat.

As mentioned last year (ICES, 2007d), it is the concern of this group that the work done in workshops should be promoted by publishing calibration WK results under the ICES Cooperative Research Report series (CRR). Such 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's 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 about hake age calibration will be submitted based on a 2007 resolution (Section 1.6) and other examples will be promoted (redfish, cod).

1.6 Hake Cooperative Research Report

Since 1992, otolith analyses have been employed routinely to build annual age-length keys for hake stock assessment (ICES WGSSDS), but in recent years assessments have raised concerns about the state of the hake stocks. Age data is provided by different countries and there is a need to assess the reliability of the age readings. Hake otoliths are difficult to interpret due to numerous checks and complex otolith growth patterns. The complex otolith macrostructure and growth variability are related to the long spawning season. The debate about whether hake is a fast or a slow growing species has been going on since the 1930s (Hickling 1933; Belloc, 1935) and extensive literature on growth studies from different areas have reported very different growth estimates for hake on both NE Atlantic (see for revision, Piñeiro and Sainza 2003) and Mediterranean Sea (Morales-Nin *et al.,* 1998; Garcia Rodriguez and Esteban, 2002). Hake age estimation method has yet not been validated, although there has been progress on improving the precision of age data within international reading otolith exchanges and workshops during the last decade: (1997, 1999, 2001, 2003, and 2004):

The biology of hake is insufficiently known to make accurate predictions, particularly growth knowledge, which is essential in order to accurately assess the two Atlantic stocks (Northern and Southern). Results based on a blind interpretation of marked otoliths by two experts involved in the routine age estimation of hake, showed that the age estimates were neither accurate nor precise and invalidate the internationally agreed age estimation method (De Pontual *et. al,* 2006). The Hake age-reading WK in 2004 recommended to interrupt ALK for the WGHMM until validated/accurate criteria are available (WGHMM Report, 2004, ICES CM 2005/ACFM: 02).

Validation studies based on tagging method have only been recently accomplished due to fragility of the sp. (Lucio *et al.,* 2000; De Pontual *et al.,* 2003, Piñeiro *et al.,* 2007) and results from tagging-recapture experiments have concluded that hake grows two-fold faster than considered previously with a mean growth rate of 0.052 cm/day (De Pontual *et al.,* 2006; Piñeiro *et al.,* 2007). Daily growth studies corroborate the fast growth hypothesis of this species with growth rates between 0.62 to 0.74 mm/day during the first year of life (Piñeiro *et al.,* 2004; Kacher and Amara, 2005; Piñeiro *et al.,* submitted). It is essential the study of factors such as hatch date season, the typology of otolith macrostructure and its biological meaning, as well as understanding the mechanisms (environmental and endogenous) (Courbin *et al.,* 2007) that control the deposition of otolith growth rings. Daily growth studies are necessary to locate the position of the first annual ring by area and stock. Experiments in controlled environment to understand optical signal of the otolith structure and other issues are required.

1.6.1 Recommendations

- A large-scale tagging programme covering both stocks.
- Compile present known age material that can be used for age validation.
- To weigh aged otoliths in order perform statistical approaches to estimating age distributions from these data.
- To carry out an exchange programme with a set of exchange images (including otoliths from tagged fish).
- To agree a WK with age readers and stock assessors to progress a solution.

1.7 Methodological workshops working session

Considering the importance of methodological workshops and the forthcoming Workshop on methods to evaluate and estimate the accuracy of fisheries data used for assessment [WKACCU] and Workshop on Maturity Ogive Estimation for Stock Assessment [WKMOG], two working sessions were promoted so that the chairmen could discuss objectives and methods. It is our view that these working sessions contributed to increase the workshops' success.

1.7.1 WKACCU working session

During the Planning Group meeting the chairman called for a sub-group to plan and discuss the content of the WKACCU in October 2008.

The first ToR aims at black landings, discards and fishing effort. Possible sources of bias should be reviewed and (preferably) rank listed. General parameters (indicators)/procedures to assess and quantify the bias should be identified, if appropriate then combine sources of information. Scientifically justified methods/procedures for bias quantification are needed.

Probability indicators of illegal landings should be proposed, etc having a big/average/small impact on the assessment. Sources of information and their quality should be categorised. Assessment groups have described this extensively. This should be systematised over stock level (if national levels are too politically difficult). This is often a sensitive issue, but transparency is needed. If there is a high probability of having wrong catch statistics, then it is proposed to show different scenarios and choose the scenario with the best guess on underestimation.

The Group thought it would be useful to invite control and enforcement people. Thus, it is necessary to get clearance from the ICES General Secretary to invite participants from the control agencies. Inspection databases may be used. Misreporting indicators are set up by inspectors. This includes number of inspections, rate of errors etc. This is published in public information and hence would be very useful for us. However, we should be aware of the political sensitiveness of their input and status in the meeting. Data collection should not become an inspection instrument. It will be investigated until the WKACCU if and how these databases, on a routine basis, could be sent to and compiled by ICES for assessment purpose.

The process of how the Stock Coordinator decides which catch statistics to take into account should be reviewed. The basis for the WG estimates should be described. Standard information/systematised per stock assessment can make a standard table, that could also serve to make this transparent to the public. Direction and size of the issue should be included, and if it is considered large enough/quantifiable and taken up in the actual calculations. For example:

List of bias issues	Category 1 Quantified + used in assessment	Category 2 Not quantified but considered important	Category 3 Not quantified, probably not important
Discards			
Underreporting			
Misreporting	Can be + or -		
Etc			
Totals	XX		

Totals are what we use now in calculations, without a) showing exactly where it comes from or b) what other issues need to be dealt with too.

Other issues that should be a concern for the WKACCU:

a) Logbooks versus sales notes.

b) Use VMS data too to reach higher precision.

c) Plot logbook/VMS to assure area coverage.

d) VMS to scale effort.

e) Wrong conversion factors being used for converting product weight to live weight may be an important source of bias.

f) Bias could be caused by the quota system/regulations.

g) The Study Group of Unaccounted Fishing Mortality reports should be reviewed to see if work presented there could be useful for WKACCU.

Tasks that need to be completed by each participating country prior to the meeting are listed under ToR e).

The Planning Group also refers to the proposed quality assurance plan shown under ToR e), and the requested input from WKACCU in that regard and with regards to the second ToR concerning accuracy related to the biological sampling and sampling coverage (e.g., output from recently developed catch-at-age analysing programs such as COST, ECA may be useful).

1.7.2 WKMOG working session

A short working session was held to discuss and prepare for the upcoming Workshop on Maturity Ogive Estimation for Stock Assessment, (WKMOG), 3–6 June 2008. This proved to be useful and was welcomed by the WKMOG chair. The terms of reference were endorsed and the focus of the workshop will be to apply estimation methods to data. Therefore, it is essential that before the workshop participants provide data, method descriptions and code or programs to implement them.

Lisa Readdy (lisa.readdy@cefas.co.uk) will be the data co-ordinator for the workshop and workshop participants are requested to send an example of the data they use for maturity estimation to her by 7 May 2008 to allow time for checking. Along with the examples that WKMOG participants will provide, PGCCDBS suggested extracting data from the DATRAS database. Cod and flounder from the Baltic Sea Q1 survey and North Sea gadoid species from the IBTS Q1 survey were identified as suitable examples.

PGCCDBS agreed that the FishFrame 5.0 / COST 1.0 data exchange format (www.fishframe.org) should be used to provide data. Within this format the CS

tables are appropriate for maturity sample information and any associated length sample data.

Two working documents were provided to PGCCDBS describing methods of sexual maturity estimation currently in use; these will be used as examples for other workshop participants to follow. The methods described were regression based on the transformed percentage maturity for Baltic sprat, herring and cod and a GLM/GAM approach adopted by ICES WGHMM to estimate annual maturity ogives for Southern hake. PGCCDBS suggested that the national DCR Technical Reports are reviewed for any information on methods of maturity estimation. The reports on 2005 will be used initially as they are available on the JRC website (http://datacollection.jrc.ec.europa.eu/)

Discussion on methods highlighted that maturity data collection and estimation need to take into account the spatial structure of the population, particularly if spawners and non-spawners are found in areas where fishing gear has different catchabilities, and WKMOG should consider this.

1.8 Organization of the report

The report is organized by ToR starting with Section 2 for ToR a) through Section 7 for ToR f). A set of annexes was added following the template provided by ICES (list of participants, agenda, ToR for 2008, recommendation table), the WK proposals and the PGMED report.

2 Review and follow up of last year's recommendations

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

RECOMMENDATION	ACTION	STATUS
1. PGCCDBS will promote the publication of calibration WK reports under the ICES Cooperative Research Report series.	McCurdy and Milner to request and compile WK reports and prepaire submission to CRR.	Hake CRR accepted by Council. Authors progressing. To be submitted on the 4th quarter.
2. The chairs of WKAC&MS for specific stocks will make sure that the relevant WG chair is aware of the results and the report.	Chair to email this decision to 2007 WK chairs. ICES Sec. to include on the information to be sent to future WK chairs.	Done.
3. PGCCDBS decided to have internal correspondents for each AWG that should take over the responsibility of communicating with AWG chairs.	PGCCDBS chair to collect these names in Table 3.4 before next meeting.	Done.

RECOMMENDATION	ACTION	STATUS
4. To promote communication with AWG PGCCDBS will propose a template for a data section to be included in AWG reports and discuss it with AWGs chairs.	Stransky and Ringdhal to develop proposal and start discussion with AWGs chairs.	Done. Under development/test during 2008 (section 3.2)
5. The Secretariat will function as distribution point for any recommendation or information from PGCCDBS to stock coordinators.	ICES Sec. to take note.	Done.
6. Recommendations and communications from PGCCDBS and its workshops to other bodies will go via the ICES Secretariat.	ICES Sec. to take note.	Done.
7. Develop a "minimum protocol" for length frequency sampling and compare national protocols with it to identify main deviances.	Bell, Fotland and Berth to develop this taks and present proposal during next 6 month.	Partially done, developments during the meeting (section 6.1).
8. WKAC findings to be forwarded to relevant AWG.	ICES Sec. to forward to AWG.	Done.
9. WKMAT report to be distributed.	ICES Sec. to forward to EG.	Done.
10. WKDRP report to be distributed.	ICES Sec. to forward to EG.	Done.
11. Liaison meeting recommendations to be forwarded.	ICES Sec. to forward to LM.	Done.
12. AWG recommendations to be forwarded (Table 3.4)	ICES Sec. to forward to AWG.	Done.
13. Update maturity ogives used for a number of stocks should be considered (Table 4.1).	ICES Sec. to forward to AWG.	Done.
14. Take advantage of new technology in fish markest like automatic fish-grading machines.	ICES Sec. to forward to National Laboratories.	Done.
15. PGCCDBS recommends that the new ICES Quality Manager co-operates with PGCCDBS to develop online data tables containing basic data collection information, including age calibration and maturity staging information and its use by assessment working groups.	ICES Sec. to give feedback and start cooperation with PGCCDBS (Hanson, Maxwell and Jardim).	No progress. Developments during the meeting (section 6.2).

RECOMMENDATION	ACTION	STATUS
16. Each laboratory to carry out implementation studies in 2007 following the protocol described.	ICES Sec. to forward to National Laboratories.	Done.
17. Proposal for a Workshop (WKISCON, see Annex 5) to dicuss the results of the implementation studies.	ICES Delegates to decide.	Done.
18. During discard sampling collect both the retained and the discarded catch fractions concurrently, i.e. from the same fishing operation.	ICES Sec. to forward to National Laboratories.	Done.
19. The PGCCDBS agreed on the following prioritized workplan: To develop a "minimum" international protocol to be used as a standard, and which should contain a minimum of procedures that the national protocols need to meet to fulfil the requirements set. Such requirements are e.g., how the fish is measured – total length, fork length, rounding to nearest cm below etc., stratification system etc. A possible indicator of quality could be the percentage agreement of compliance with the minimum protocol. This analysis should be done prior to WKACCU (see below). A workshop (WKACCU) with terms of reference to establish standardized/joint methods on how to evaluate and estimate the accuracy of submitted fisheries data should be held in 2008. This should include analyses of sample coverage and methods to use for estimating/evaluating the quality of total catches, i.e., whether and how discards, misreportings, unreportings, etc. are included. A workshop (WKPRECISE) with terms of reference to establish standardized/joint methods and indicators for evaluating and estimating the precision of submitted fisheries data should be held. Definitions of standards (i.e., minimum requirements) should then be made. Although some laboratories already have developed suitable tools for such precision estimation, the planned EU COST-project should preferably be finished (about 2 year) before holding the workshop, as this EU-project may contribute a lot to this issue.	ICES Sec. to discuss and give feedback and/or propose to ICES Delegates.	Done. Workplan accepted.
20. PGCCDBS considers that cooperation and coordination in fish age determination should be arranged on a permanent and regular basis. Therefore it is recommended to hold regular otolith exchanges and workshops. Exchanges should be carried out at least once every two years and the possibility for a workshop should be offered at least once every four years (Table 6.1).	ICES Sec. to distribute to National Laboratories, WK chairs and AWGs chairs asking for feedback on the next 3 month. Bolle, McCurdy, Kornilovs, Chonchúir and Milner	Done. No feedback. Developments during the meeting (section 7.1).
21. Guidelines for otholits exchanges.		
22. Guidelines for workshops on age calibration.		
23. Guidelines for follow up actions of workshops on age calibration.		
24. Guidelines to report relevant information of workshops on age calibration to AWGs.		

RECOMMENDATION	ACTION	STATUS
25. Generic ToR of workshops on age calibration.	to build on these comments and propose a final version on the next 6 month, which should be approved on the next PGCCDBS meeting.	
26. Generic ToR of workshops on maturity staging.	ICES Sec. to distribute to National Laboratories, WK chairs and AWGs chairs asking for feedback. To be finalised on the next PGCCDBS meeting.	Done. No feedback. Developments during the meeting (section 7.2).
27. Proposal for a WKMOG (Annex 5)	ICES Delegates to decide.	Accepted by Council.
28. Several proposals for WKAC&MS (Annex 5)	ICES Delegates to decide.	Partial. Most accepted by Council but some were not able to provide a mature proposal in time.

3 Review feedback from ICES Assessment Working Groups and other relevant Expert Groups or Workshops as communicated through the contacts officers; Where appropriate propose actions to be taken within the ICES system.

3.1 Assessment Working Group (AWG) recommendations

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

Table 3.1. Assessment Working Groups recommendations and PGCCDBS comments.

AWG	RECOMMENDATION	PGCCDBS COMMENTS
AFWG	none	
HAWG	none	
NWWG	none	
WGBAST	none	

AWG	RECOMMENDATION	PGCCDBS COMMENTS
WGBFAS	A regular quality control of age reading consistency for Baltic herring, sprat, sole, cod and flounder should be organized.	
	a) regular exchange of an agreed number of otolith samples which are circulated among the national fisheries institutes. The results are sent to persons who coordinate the sample exchange for the certain species and who conduct the analysis of age determination results and distribute them between the participants;	PGCCDBS recommendation to arrange small exchanges every second year, see section7.1)
	b) organisation of regular Age Reading Workshops on triennial basis. The differences in age determination of sprat and flounder revealed by Age Reading Workshops in 2006 identified the need of further work between national experts that will manifest in exchange of otolith samples starting in spring 2006. It would be essential that the results of these exchanges are discussed in Age Reading Workshops held in 2007. Besides bilateral or trilateral meetings on regional basis of the Baltic Sea could also be useful and should be supported.	PGCCDBS recommendation is to consider offering workshops every fourth year, see section 7.1) and PGCCDBS report 2007
	c) WGBFAS emphasizes the importance that national institutes pay attention to recommendations of the Age Reading Workshops concerning collection of otolith samples for age reading, necessary age reading technique and the general results of age determination in otolith sample exchanges and at the Workshops.	
WGDEEP	none	
WGEF	Given that some of the data collected for skates (Rajidae), and possibly other elasmobranchs, from market sampling and discard surveys is compromised by inaccurate species identification, and that raising procedures and data origins are often not supplied, it is 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. Such work may be best conducted in the form of a one-off workshop.	PGCCDBS recommends conduction of implementation studies on mixed elasmobranch species landings in 2008, see section 4.1)
WGHMM	none	
WGMHSA	none	
WGNEW	none	
WGNPBW	none	
WGCRAN	WGCRAN recommends that catch sampling be undertaken by all nations on Crangon fishing vessels in line with EU data collection regulations. Both by-catch and Crangon are important. WGCRAN recommend that standardised protocol be used for sampling Crangon vessels. Sampling should be stratified to sub-sample a representative cross-section of fleet, especially seasonal and depth variation.	PGCCDBS notes that the co-ordination of Crangon sampling will be dealt with in the Regional Co-ordination Meeting on the North Sea region (RCM NS&EA).
WGNSDS	none	

AWG	RECOMMENDATION	PGCCDBS COMMENTS
WGNSSK	The 2006 review Group expressed concerns about these noisy patterns from the landings, and the WG has also focused on this issue. The WG collected information from Danish and Swedish otolith readers, which confirmed some uncertainties in age reading for plaice IIIa. This is mainly due to difficulties in interpreting the first ring and the edge, as well as to large variations in growth between males and females in the one hand, and North and South in the other hand. However, it has not been possible to further address this issue in the current assessment neither through data checking nor simulation. This will be a main key issue to be investigated for a forthcoming assessment. The WG recommends that this issue could be referred to PGCCDBS.	PGCCDBS notes that this issue will be taken up bilaterally by Denmark and Sweden.
WGMHSA	The Working Group on the Assessment of Mackerel, Horse Mackerel, Sardine, and Anchovy recommends for an age reading workshop on North-east Atlantic mackerel.	see section 7.1)
WGSSDS	none	

3.2 AWG feedback process

PGCCDBS considered that the system of contact officers providing a link between ICES stock assessment Working Groups and PGCCDBS was insufficiently developed in 2007 to evaluate the success of this initiative. Furthermore, there did not appear to be a well-defined protocol for contacts officers to provide feedback from AWGs. Hence PGCCDBS was not in a position to provide adequate review of feedback from contact officers.

The development of a Quality Assurance Framework (QAF) and associated data catalogue (Anon. 2008a) may prove a more appropriate link between AWGs and PGCCDBS by automating the reporting of data usage by the AWGs, reducing demands on already reduced WG time. The AWGs would still need to explain why certain data were not incorporated in assessments and this is likely to lead to more constructive scientific debate on data needs.

The ICES AMAWGC (ICES 2008) supported the development of a data catalogue to manage sampling meta information so that the sampling summaries can be generated automatically. This should at the same time also suit the needs of STECF-SGRN when evaluating the compliance of Member States with the DCR and their National Programmes. The implementation of such a catalogue will be tested by introducing table templates (see Tables 3.2 and 3.3) to the AWGs in 2008 to be filled in by the stock co-ordinators of the following stocks (expanded from the list AMAWGC proposed):

a) WGWIDE: NEA mackerel, NSS herring

b) WGSSDS: Haddock VIIb-k, Plaice VIIe

c) WGHMM: Iberian hake, Bay of Biscay sole

d) HAWG: North Sea herring

e) WGBFAS: eastern Baltic cod, Baltic sprat

f) WGNSSK: North Sea plaice

The proposed tables will be reviewed intersessionally (until end of March 2008) by Jørgen Dalskov, Ernesto Jardim, Christoph Stransky and Joël Vigneau, sent to the stock co-ordinators by early April 2008. These persons will also co-ordinate the

collation of responses from the stock co-ordinators for consideration at the next PGCCDBS.

Table 3.2. Example for data table per country.

PARAMETER: LENGTH DISTRIBUTION OF LANDINGS/RETAINED PART			COUNTRY 1	COUNTRY 2	...	RESPONSIBILITY
Conformity with protocol						
Coverage	Time (Q)	1				
		2				
		3				
		4				
	Space (ICES Div.)	VIa				
		VIb				
		VIIa				
		VIIb				
		VIIc				
	Tech/metier	Trawl 50mm				
		Trawl 90mm				
		Nets 120mm				
		Pots				
Sampling effort	No. of sampled trips					Automatic from catalog
	No. fish measured					
	No. different vessels					
Methods	Sampling strategy					
Data	Available					
	Processed					Stock coord.
	Used					

Table 3.3. Example for data table per stock.

PARAMETER: LENGTH DISTRIBUTION OF LANDINGS/RETAINED PART			STOCK 1	STOCK 2	...	RESPONSIBILITY
Conformity with protocol						
Coverage	Time (Q)	1				
		2				
		3				
		4				
	Space (ICES Div.)	VIa				
		VIb				
		VIIa				
		VIIb				
		VIIc				
	Tech/metier	Trawl 50mm				
		Trawl 90mm				
		Nets 120mm				
		Pots				
Sampling effort	No. of sampled trips					Automatic from catalog
	No. fish measured					
	No. different vessels					

PARAMETER: LENGTH DISTRIBUTION OF LANDINGS/RETAINED PART		STOCK 1	STOCK 2	...	RESPONSIBILITY
Methods	Sampling strategy				
Inference	Methods				
	Bias quality indicator (WKACCU)				Stock coord.
	Precision quality indicator (WKPRECISE)				

3.3 Methodological Workshops carried out in 2007

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

One of the major changes in the new DCR is a shift towards concurrent length-sampling of fishing activities; a sampling strategy covering the sampling of all species during a sampling operation. This strategy facilitates the data demands of the existing stock-based assessments as well as serving the needs for future fishery based management and ecosystem approach. PGCCDBS (2007) stated that the requirements on concurrent length-sampling are likely to cause significant problems for the involved institutes. To ease the shift towards concurrent length sampling, member states that foresaw practical problems, carried out implementation studies on concurrent sampling testing the feasibility of and the possibilities for concurrent sampling.

16 member states presented the results of their implementation study during WKISCON in Copenhagen. The following common problems were identified:

1) *Restricted access:* Several issues concerning access to the fish in auction were raised, including; limited access to storage, access to "fragile" species or species specially packed for sales and the fear that data could be used for control purposes.

2) *Time restrictions:* In nearly all cases the time window available to sample the fish was often too low.

3) *Commercial grades:* Some species are sorted into 7 categories, resulting in a time consuming sampling operation to cover all categories.

4) *Higher costs:* All countries participating in the implementation studies identified the possible increase in costs as a result of increased sampling effort. This increase is a result of the extra samples that have to be taken; the risk of repeated sampling operations in case of incomplete samples; cost to gain access to the fish (buying of samples) and the possible increase in on-board sampling

5) *Data issues:* Concerns were expressed on the representativeness of the samples, in particular relating to random vessel selection and the complexity of sampling polyvalent vessels fishing in multiple areas.

Sampling at sea is the preferred way of concurrent sampling and length sampling of landings on shore can be considered as a supplement to at sea sampling. On shore sampling can be combined with at sea sampling where appropriate. WKISCON redesigned the sampling scheme proposed by PGCCDBS in 2007. The new scheme (Table 3.4) takes the results of the implementation studies into account and foresees in full concurrent sampling even when this is done on a sufficient number of intermittent trips where extra resources can be made available.

Table 3.4. Proposed sampling scheme.

Sampling scheme	Frequency	Group 1					Group 2					Group 3				
		Target and recovery species					Other TAC regulated and major by-catch species					Other by-catch species				
		1	2	3	.	*n*	1	2	3	.	*n*	1	2	3	.	*n*
Scheme 1	Every sampling event	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Scheme 2	*x*% of sampling events	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	(100-x)% of sampling events	x	x	x	x	x										
Scheme 3	*x*% of sampling operations	x	x	x	x	x	x	x	x	x	x	Sampling at sea				
	(100-x)% of sampling events	x	x	x	x	x										

Three groups of species are proposed to allocate species to, covering the range from species that drive the management process to by-catch species. Regional coordination is needed to allocate a certain species to a group, thus ensuring all countries in a region use the same allocation. As for the allocation of species, the allocation of samples to a métier needs to be coordinated by region, preferably by the Regional Coordination Meetings (RCM) of that specific region.

Based on the ideas as suggested by SGRN 06-03, WKISCON suggests that the selection of the métiers to be sampled is done by ranging the métiers by effort and to include all métiers in the sampling program that cover the top 95% of the effort. It is suggested that some métiers can be merged for practical reasons, but this merging has to be done on such basis that the sampling coverage of the major métiers is ensured.

One of the major concerns is the difficulty to perform random sampling as concurrent sampling has to be implemented next to other sampling operations, e.g. sampling for ages. In general, concurrent sampling depends on the willingness of the fisherman to cooperate. Another concern is that the effort put into sampling is redirected towards by-catch species, resulting in a relative under-sampling of species that actually drive the fisheries management. To counteract this, additional sampling of the most important species might be appropriate.

The number of trips that have to be sampled should be defined by precision objectives. As each métier catches several species, it is undesirable to find a compromise between the objectives of precision for each species. Therefore, WKISCON suggests that the objective of precision should be defined at a regional level on the assemblage of target species.

3.3.2 [WKUFS] Workshop on Using Fishermen to Sample Catches

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 cost effective. Currently there is ongoing effort worldwide to develop programs to use fishers to self-sample their catches. Because of the possibility that using fishers would be an efficient and cost effective means to collect fishery data, the workshop attracted many scientist and industry representatives from throughout Europe and Canada. Two broad objectives for such self-sampling programs were identified at the workshop. One is that it would be a way to efficiently collect commercial fishery data. The other goal of such programmes would be to involve fishing industry in the assessment process by having them work closely with the scientists. Therefore it is clear that the purpose of the programs is to improve stock assessments. Here, the improvement is less a question of precision

(which is a purely a scientific measure) or accuracy (which is difficult to ascertain) but more that the assessments should provide a common perception of what is in the sea. While self-sampling schemes often involve some form of payment, this should be regarded as secondary. It is the greater involvement of fishers in the assessment process that is the ultimate benefit of self-sampling programs. 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 programs could be improved to more closely reflect the reality in the sea. The workshop reviewed some self-sampling projects that are presently operational. Based on this review, six themes were identified for designing and implementing a self-sampling program: creating incentives for fishermen, communication, confidentiality, financing, training, and survey design. The workshop focused mainly on two types of quality control procedures: cross-checking data from self- sampling surveys with other sources of information from the same area such as fleet positions, time period, etc.; and monitoring the internal consistency of data series. Methods for analyzing self-sampled data, appropriate estimators and sources of variability were discussed. Bias in self-sampling may be avoided by routinely checking the coverage by, e.g., area, gear and season using simple ratio-estimators. For all self-sampling programs, sources of variability should be detected and the sampling scheme adjusted accordingly. One rule for sampling in the marine environment appears to be generally true: It is better to sample a few fish from many locations than to sample many fish at each of a few locations.

3.4 Maturity Calibration Workshops carried out in 2007

3.4.1 [WKMSMAC] Workshop on Sexual Maturity Staging of Mackerel and Horse Mackerel

The WKMSMAC workshop took place in Lisbon, Portugal, from 26 to 29 November 2007 with the following terms of reference:

a) Compare the macroscopic maturity scales for Mackerel and Horse Mackerel used in the different laboratories.

b) Compare and calibrate the criteria, followed by the scientists/technicians involved in maturity stage sampling, to classify each maturity stage for males and females.

c) Standardise the criteria to classify each maturity stage.

d) Propose a common maturity scale, with common classification criteria, to be used by all laboratories.

Several different maturity scales are currently used by different institutes. Most of these scales are used for very specific purposes, and the data produced are difficult to compare or jointly analyse. The Walsh scale, in particular, has been used for 17 years, and is used as routine or for special purposes by most of the observers present at the workshop (although the version used in most labs is slightly different from the original). Taking into consideration the generic standard scale proposed in a previous workshop (WKMAT), and the characteristics of the mackerel and horse mackerel reproductive cycles, the workshop has proposed a standard scale for these species. The Walsh scale was fitted into this standard scale (Table 3.5), and the calibration exercises were made on the original Walsh scale, on the Walsh scale modified by each lab, and on this new standard scale.

Table 3.5. Combination of the Walsh maturity scale into the standard scale proposed by WKMSMAC.

STANDARD	WALSH	MATURE/ IMMATURE	STATE	FEMALE	MALE
1	1	Immature	Immature	Gonads small. Ovaries wine red and clear, torpedo shaped.	Gonads small. Males pale, flattened and transparent.
2	2	Mature	Maturing	Gonads occupying 1/4 to 3/4 body cavity. Opaque eggs visible in ovaries giving pale pink to yellowish colouration, largest eggs without oil globule.	Gonads occupying 1/4 to ¾ body cavity. Testes off-white, milt not running.
	3	Mature	Maturing	Gonads occupying 3/4 to almost filing body cavity. Ovaries yellow to orange. Largest eggs may have oil globules.	Gonads occupying 3/4 to almost filing body cavity. Testes creamy white.
3	4	Mature	Spawning	Ovaries characterized by externally visible hyaline eggs no matter how few or how early the stage of hydration. Ovary size variable from full to 1/4.	Testes filling body cavity, milt freely running.
	5	Mature	Spawning	Gonads occupying 3/4 to < 1/4 body cavity. Ovaries slacker than in stage 3 and often bloodshot.	Gonads occupying 3/4 to < 1/4 body cavity. Testes with free running milt and shrivelled at anus end.
4	6	Mature	Spent/ Recovery	Gonads occupying 1/4 or less of body cavity. Ovaries reddish and often murky in appearance, sometimes with a scattering or patch of opaque eggs.	Gonads occupying 1/4 or less of body cavity. Testes opaque with brownish tint and no trace of milt.

Ideally a calibration should be carried out with gonads of a 'known' stage. For practical reasons such an exercise was not possible. Therefore, the objective of this workshop was restricted to compare and improve the agreement between observers, assuming that the "correct stage" was the one given to each gonad by the majority of the observers.

For mackerel, the highest agreements in maturity staging were obtained with the Walsh scale and there was a slight decrease in the average agreement when using the standard scale (Table 3.6). However, 17 observers had higher agreement with the standard than with the Walsh scale, while 14 observers showed the opposite trend. The standard scale agreement for immature fish was in particular much lower than the one obtained with the Walsh scale.

Table 3.6. Agreement between maturity stages attributed to mackerels by each observer with the modal stage.

OBSERVER	WALSH MODIFIED	WALSH ORIGINAL	STANDARD 1ST EXERCISE	STANDARD 2ND EXERCISE
1	0.6	0.65	0.65	
2				0.58
3		0.48	0.57	0.33
4	0.81	0.81	0.88	0.83
5	0.67	0.67		0.75
6	0.33	0.33	0.43	0.67
7	0.86	0.86	0.81	0.58
8				
9		0.29	0.19	0.58
10				
11	0.7	0.75	0.75	0.83
12				0.83
13	0.76	0.76	0.81	0.67
14	0.75	0.75	0.75	0.58
15	0.76	0.76	0.86	0.83
16	0.24	0.62	0.81	0.5
17				0.75
18	0.33	0.33	0.43	0.67
19	0.71	0.71	0.52	0.33
20	0.57	0.57	0.57	0.58
21	0.72	0.72	0.89	0.83
22	0.9	0.9	0.6	0.83
23	0.89	0.89	0.44	0.58
24	0.89	0.89		0.58
Overall	0.68	0.67	0.64	0.65

For horse mackerel, the level of agreement was higher for the standard than for the Walsh scale (Table 3.7). However, this was also not the case for fish in immature stage, which had a lower agreement with the standard than with the Walsh scale. Almost one third of the immature fish were classified as being in a maturing stage when using the standard scale, which may indicate a low precision in the calculation of maturity ogives.

Table 3.7. Agreement between maturity stages attributed to horse mackerels by each observer with the modal stage.

OBSERVER	WALSH MODIFIED	WALSH ORIGINAL	STANDARD 1ST EXERCISE	STANDARD 2ND EXERCISE
1	0.5	0.62	0.69	
2				0.71
3	0.42	0.54	0.73	0.19
4	0.65	0.65	0.35	0.85
5	0.69	0.69	0.73	0.86
6	0.42	0.42	0.62	0.85
7	0.62	0.62	0.58	0.67
8	0.54	0.5	0.42	0.81
9	0.54	0.54	0.69	0.43
10	0.84	0.84	0.68	0.81
11	0.42	0.42	0.54	0.48
12	0.65	0.65	0.72	0.9
13	0.52	0.52	0.61	0.6
14	0.58	0.58	0.69	0.57
15	0.67	0.67	0.42	0.38
16	0.57	0.57	0.53	0.57
17				0.57
18	0.5	0.5	0.65	0.85
19	0.52	0.52	0.68	0.67
20	0.36	0.36	0.27	0.67
21	0.62	0.62	0.58	0.85
22	0.84	0.84	0.52	0.67
23	0.61	0.61	0.39	0.67
24	0.68	0.68	1	0.86
Overall	0.58	0.59	0.6	0.67

The standard scale is proposed by the workshop as a good description of the mackerel and horse mackerel reproductive cycle, with an adequate level of detail for most purposes, being especially useful for exchanging and comparing data between observers or institutes. However, many observers are still very used to the Walsh scale, and the fitting of the Walsh scale into the standard one must be better assimilated.

Given the results obtained in some cases in the distinction between mature and immature fish, the workshop recommended that maturity ogives, in particular when they are used for SSB estimation, should be based on histological data. When a maturity ogive based exclusively on histological data is not possible to obtain, data on the GSI, HSI, or from histological examination of part of the samples should be analysed, in order to check the accuracy of the resulting maturity ogive. This is based on the fact that it can be difficult to make a clear macroscopic distinction between recovering and virgin females (or identification of the omitting spawning individuals if they exist). WKMSMAC also recommended that a similar workshop should be repeated every three years, in the year prior to the Atlantic mackerel and horse mackerel egg survey. These should be used to train and calibrate observers, and also

to address several questions on the reproduction of mackerel and horse mackerel (such as the question whether skipped spawning occurs or not in these species).

3.4.2 [WKMSHM] Workshop on Sexual Maturity Staging of Hake and Monk

The Data Collection Regulation (DCR) programme covers extensive sampling of maturity data (Reg. 1639/2001). Maturity stage is an important biological parameter that is 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.

The terms of reference of this workshop were:

a) compare the macroscopic maturity scales for Hake and Monkfish used in the different laboratories;

b) compare and calibrate the criteria, followed by the scientists/technicians involved in maturity sampling, to classify each maturity stage for males and females;

c) validate macroscopic maturity scales with histological analysis;

d) standardize the criteria to classify each maturity stage;

e) propose a common scale, with common classification criteria;

f) evaluate alternative methods to identify immature and mature fish, namely GSI and HIS;

g) identify the period best suited to estimate maturity ogives.

Laboratories involved in the collection of Hake and Monkfish maturity data use different macroscopic maturity stage keys for the same species. Even for those that were using the same maturity stage key it was detected that they use different criteria to classify the maturity stages that are more prone to a subjective interpretation. The misinterpretation between institutes was detected based on maturity data collected with photographic registration and gonads collection for histology analysis. A calibration exercise with fresh hake specimens was carried out among all participants.

Correspondence between each institute maturity stage key was provided. The standardization of maturity stage classification is fundamental when stock assessment is based on several institutes' data. In order to estimate new maturity ogives all institutes involved in stock assessment should use the same criteria to distinguish immature and mature specimens. One of the main goals of this workshop was present a standard maturity key for each species. The proposed macroscopic maturity stage key is in agreement with the histological information of the species and is based on knowledge of the reproductive cycle. The maturity stage keys of all participant institutes were analyzed and the proposed one was the consensual that allow the minimization of the macroscopic misclassification. Photo observation helped to establish macroscopic characteristics that define each stage and to identify the major sources of classification uncertainty. Also the relation between each institute maturity stage key and the standard proposed during the workshop was established. This exercise allows transforming historical maturity data in a standard format.

For both species, hake and monkfish, it is not possible to distinguish immature from resting females, macroscopically. The use of GSI and HIS to differentiate these two stages was investigated but does not give an accurate answer. Only histology can

allow the correct classification of resting females. Taking to account that the proportion of resting females during the peak of the spawning season is lower than the rest of the year, maturity ogives should only be based on data collected during the peak of the spawning season.

In case of hake it is recommended to collect immature/resting female gonads for histology purposes in a length class basis to estimate a correction factor that could be applicable to the macroscopic data. If any doubts in the macroscopic maturity stage classification arise it is recommended to collect the gonad for histological analysis. Few histology studies focusing on males have been produced. Considering that all the hake and monkfish stocks used sex combined maturity ogives, more histology work should be done and the same importance should be given on both sexes. Histology is the only tool to produce validated maturity data.

In case of monkfish, it was easier to achieve a consensus on a new scale, comparatively with hake, because of the similarity of the scales used by each institute. However, it should be noted that the histological knowledge of this species is weaker. The detection of different stage interpretation between institutes were only possible with this workshop, where scientists from different institutes classified the same gonad with the same maturity key and explained which macroscopic characteristics gave rise to a given classification.

Also the presence of experts in reproductive biology, namely in histology, is an essential key to support the correct macroscopic identification and to link them with the reproductive cycle. It is recommended that this kind of workshop should be carried out intra and inter institutes on a routine basis. At the very least, maturity exchanges with macroscopic and microscopic photos should be carried out to calibrate maturity identifications between institutes.

Usually, maturity sampling is performed by a large number of people in each institute. It was not possible to evaluate maturity data quality of each country based on one or few workshop participants. It is recommended that in the near future a similar workshop should be carried out inside each institute to assess discrepancies and also to present these workshop conclusions and to convert each institute maturity data in the new standard maturity stage key.

This kind of workshop should be carried on during the main spawning season of the respective species, to ensure fresh sample availability and the maximum range of maturity stages. Even inside the spawning season, the closer to the beginning of the year will be preferable, as fresh specimens become unavailable when quotas are reached. A calibration exercise should always be conducted with fresh samples.

A standard tool should be developed to analyse observer's discrepancies as has been developed for otoliths exchanges and workshop (Eltink *et al*., 2000a). This analysis should weight the differences between immature and mature and not only stages. Also considering the reproductive cycle circular statistic analysis should be applied.

3.4.3 [WKMSCWHS] Workshop on Sexual Maturity Staging of Cod, Whiting, Haddock and Saithe

A workshop on Sexual Maturity Staging of Cod, Whiting, Haddock and Saithe (WKMSCWHS) was held at the Technical University of Denmark, National Institute of Aquatic Resources (DTU-Aqua), Charlottenlund, Denmark in the period 13–16 November 2007 with 24 participants from 11 countries.

The workshop had the following ToRs:

a) Compare applied maturity scales and main criteria followed by the scientists / technicians involved in the national sampling, to classify each maturity stage for males and females.

b) Validate macroscopic maturity determination with histological analysis.

c) Standardise the criteria to classify each maturity stage.

d) Propose a common scale, with common classification criteria, to be used by all laboratories.

e) Identify the optimal sampling time to estimate maturity ogives.

In order to have access to material to be used at he workshop sampling of gonads and testes was conducted in cooperation between the participating countries during the IBTS 1Q and IBTS 3Q 2008. Institutes from Denmark, France, Germany, Holland, Norway, Scotland and Sweden participated in the sampling during the IBTS 1Q in January to March. Denmark, England, Germany, Norway, Scotland and Sweden participated during the IBTS 3Q in August to September. A few specimens from Greenland sampled during May and June were also included.

The procedure was to obtain photos of the fresh gonads, records of national staging and preserved gonad samples for histological analysis for subsequent maturity evaluation of all four species. Sampling procedures were elaborated at DTU Aqua and sent to collaborating institutes in all countries participating in the IBTS. Photographs, records and samples were after each national cruise sent to DTU Aqua, where gonad samples were selected for histological processing to validate the maturity stage of both females and males. The histological sections were photographed and the gonadal developmental stage was determined. The ovaries and testes of each species were categorised according the histological staging. Photographs of the fresh gonads and matching histological sections were used as basis for discussions during the workshop. The histological characteristics were compared with the original stage determination and used to elaborate a common scale, with revised macroscopic and histological classification criteria. The reproductive cycle and strategy of each species was described. Photographs of gonads and tissue were selected as basis for draft manuals. The best sampling time to estimate maturity ogives in relation to existing IBTS cruises was judged for all species based on the timely occurrence of different stages and the accuracy of the stage determination.

Based on the examination of the picture of macroscopical sections and pictures of microscopical sections the workshop participants recommended a 6 scale maturity key to be implemented at the IBTS.

I. Juvenile: No sex determination (below e.g. 15 cm) Sex determination: Juvenile - transp. Immature - translucent.

II. Maturing: firm, opaque, granulated/oocytes visible.

III. Spawning: hydrated eggs visible.

IV. Spent: slack with greyish cast, rich in blood vessels.

V. Regeneration / Resting / Skip of spawning: No visible development.

VI. Abnormal: Hard parts, intersex (connective tissue, spematogenic, tissue).

The workshop participants found the workshop very successful especially because of the significant work carried out by DTU-Aqua prior to the workshop on histology of the collected material.

3.4.4 Review of Maturity Staging Workshop Recommendations

PGCCDBS carried out a review of the reports of the species specific workshops held in 2007 (WKMSMAC, WKMSHM and WKMSCWHS). The comments from PGCCDBS in relation to the recommendations of these workshops are provided in table 3.8.

Table 3.8. Review of recommendations from maturity workshops.

Workshop acronym	Recommendation of Workshop	Comments of PGCCDBS
WKMSMAC	WKMSMAC recommends that the proposed standard scale for sexual maturity staging [Mackerel] should be adopted for all sexual maturity sampling, as a minimum acceptable level of detail. This means that other scales currently used that are less detailed should be abandoned in favour of this standard scale. If more detailed scales, such as the Walsh scale, are being used, it should be ensured that those can be fitted into the standard scale and that there is a good agreement observers using those scales.	PGCCDBS supports this recommendation.
WKMSMAC	WKMSMAC recommends that, when a maturity ogive based exclusively on histological is not to obtain, data on the GSI, HSI, or from histological examination of part of the samples should be analysed, in order to check the accuracy of the resulting maturity ogive. This is based on fact that it can be difficult to make clear macroscopic distinction between recovering and virgin females (or identification of the omitting spawning individuals if they exist).	PGCCDBS agrees with the comments made. This is particularly relevant to species with an extended spawning season.
WKMSMAC	WKMSMAC recommends having a workshop on maturity of mackerel and horse mackerel every three years, in the year prior to the Atlantic mackerel and horse mackerel survey. Both technicians and scientist involved in the sampling of mackerel and horse mackerel should be involved in this workshop.	PGCCDBS feels that if the guidelines outlined in 2007 (updated in 2008) are followed, the need for regular workshops is reduced. Further workshops should only be arranged to address specific issues. Training issues could be addressed at national or regional level. PGCCDBS should review the need for a workshop in 3 years time based on comments from the group.

WORKSHOP ACRONYM	RECOMMENDATION OF WORKSHOP	COMMENTS OF PGCCDBS
WKMSMAC	WKMSMAC recommends that, in case a future workshop will take place, all fish to be used should have the information on sampling date and area with it. These data are available when doing the real-time sampling and can be used to help to classify the maturity stages, especially in geographical areas where the spawning season is short and well defined. The circumstances at the workshop should be as much the same as possible as real-time sampling. If pictures are presented at the workshop, sampling date, area, length and weight should be included for each individual fish.	PGCCDBS supports this recommendation and will incorporate these comments into their guidelines
WKMSMAC	WKMSMAC recommends that, in a future workshop, the presentation of gonads should include pictures of histological sections as well as pictures of the whole gonad. The histological sections are the only means of resolving the differences in the macroscopic determination.	PGCCDBS supports this recommendation and will incorporate these comments into their guidelines
WKMSMAC	WKMSMAC recommends that the question whether or not skipped spawning occurs in mackerel and horse mackerel should be in future workshops	PGCCDBS feels that this is a matter for WGMEGS and WGWIDE to.
WKMSHM	It is recommended that this type of workshops should be carried out on a routine basis. At the very least, there should be a maturity exchange with macroscopic and microscopic photos to calibrate the maturity identifications between institutes.	PGCCDBS supports the proposal of a maturity exchange but does not support the recommendation of routine workshops. PGCCDBS suggest they should review the need for a workshop in 3 years time based on comments from the group.
WKMSHM	It is also recommended that regular calibration exercises inside institutes, with fresh specimens (not only images) should be carried out;.	PGCCDBS fully supports this recommendation at national level.
WKMSHM	Maturity ogives should only be based on data collected during the peak of the spawning season considering geographical variation, since it is impossible to macroscopically distinguish immature from resting females. The proportion of resting females during the peak of the spawning season is lower than on the rest of the year;	PGCCDBS supports this recommendation .
WKMSHM	A standardized tool should be developed to analyse observer discrepancies as already has been developed for otolith exchanges and workshops (Eltink *et al*, 2000). This analysis should weight the differences between immature and mature and not only stages. Also considering the reproductive cycle circular statistic analysis should be applied;	PGCCDBS agrees with this recommendation and suggest that within the development of present software and databases, this recommendation should be taken into account.

Workshop acronym	Recommendation of Workshop	Comments of PGCCDBS
WKMSHM	This kind of workshop should be carried out during the main spawning season of the respective species, to ensure fresh sample availability and the maximum range of maturity stages. That was the reason for lack of spawning specimens in the calibration exercise.	PGCCDBS accepts that there may be a need for this but this could be covered by internal training or calibration. PGCCDBS also appreciates the benefits of this during an update workshop. By following guidelines relating to collection of photographs and validation by histological samples there should be no need for fresh samples at workshop.
WKMSHM	Even inside the spawning season, the closer to the beginning of the year the better, in order to avoid reaching quotas and to ensure fresh specimens availability. That was the reason of the lack of a calibration exercise with monkfish.	When following guidelines relating to collection of photographs and validation by histological samples, there should be no need for fresh samples at the maturity workshop.
WKMSHM	Histology was an important tool to achieve a consensus on maturity stage description/classification.	PGCCDBS supports this recommendation and will incorporate these comments into their guidelines.
WKMSHM (Hake)	Gonad histology should be undertaken to assess the differences between immature/resting stages, mainly during the spawning season (period used for the maturity ogive estimation). Immature/resting female's gonads should be collected for histology purposes in a length class basis to estimate a correction factor applicable to the macroscopic data.	PGCCDBS agree that this is relevant at national level.
WKMSHM (Hake)	Since the two hake stocks use sex combined maturity ogives, histology on males should be undertaken to validate the macroscopic classifications, mainly in the differentiation between immature and mature.	PGCCDBS awaits the advice of WGHMM before it can comment further.
WKMSHM (Hake)	In the case of doubts in the macroscopic classification of the maturity stage it is recommended to collect the gonad for histological analysis.	PGCCDBS supports this recommendation and will incorporate these comments into their guidelines.
WKMSHM (Monkfish)	More histology studies should be done to validate the macroscopic maturity key, for both species. Also, histology should be applied to quantify the inaccuracies due to misclassification between immature/resting, at least during the spawning season (period recommend for maturity ogives estimation).	PGCCDBS agrees that this is relevant at national level. Future guideline will emphasize the need for histological validation of samples prior to workshops.
WKMSHM (Monkfish)	Maturity scales should include a reference catalogue of images to clarify identification (if possible validated by histology), since each stage can present a great variability in the macroscopic aspect.	PGCCDBS supports this recommendation and will incorporate these comments into their guidelines.
WKMSCSWH	A common maturity scale including 6 stages is recommended for cod, saithe, whiting and haddock.	PGCCDBS supports this recommendation and agrees that this should be referred to IBTS, BITS & WGBEAM for implementation.

WORKSHOP ACRONYM	RECOMMENDATION OF WORKSHOP	COMMENTS OF PGCCDBS
WKMSCSWH	Adaptation of DATRAS to include 6 maturity stages is recommended.	PGCCDBS supports this recommendation and agrees that this should be referred to IBTS, BITS & WGBEAM for implementation.
WKMSCSWH	It is recommended that the spawning proportion replaces the maturity ogive in the assessment of the spawning stock size.	PGCCDBS awaits the advice from WGNSSK and WGNSDS before it can comment further.
WKMSCSWH	It recommended that sampling of maturity data for cod, saithe, whiting and haddock is only conducted during 1 quarter IBTS survey, but with increased intensity.	PGCCDBS supports this fully but note that collection can extend to pre spawning period – possibly quarter 4 and that collection may not be restricted to IBTS.
WKMSCSWH	A follow-up Workshop is recommended considering cod, saithe, whiting and haddock .	PGGCDBS will await the outcome of the work that is presently being done before commenting on this recommendation. Now 2010.
WKMSCSWH	It is recommended that the preliminary manuals for cod and saithe are tested on IBTS cruises in 1 quarter 2009 and that supplementing sampling is carried out to complete the manuals.	PGCCDS agree with this but emphasize the need to implement the new scales (rather than test).
WKMSCSWH	In order to improve determination of reproduction pattern and routine sampling is recommended that additional sampling of haddock and whiting is conducted on ITBS cruises in 1 quarter 2009 and supplementing sampling is carried out by harbour sampling or during at-sea sampling to obtain missing stages.	PGCCDBS supports this action.

3.5 Age Calibration Workshops carried out in 2007

3.5.1 [WKARFLO] Workshop on Age Reading of Flounder

The Workshop on Age Reading of Flounder was held on 20-23 of March 2007 in the Institute of Coastal Research Öregrund, Sweden. 20 researchers from 9 countries (Denmark, Estonia, Germany, Latvia, Lithuania, Poland, Russia, Sweden and United Kingdom) participated in the workshop. Most of the age readers have low experience. Only one reader from Sweden had high experience however unlike all other readers was working with sliced and stained otoliths. Two experienced readers from United Kingdom determined the age of other flatfishes not flounder.

Knowledge of the biology and stock structure of the Baltic flounder were reviewed and discussed. Studies suggest that there are two different ecological and genetic types of flounder, a northern type with demersal eggs and a southern type with pelagic eggs. This could also have influence on the formation of otolith structure.

Participants presented national sampling, processing and age determination methods. Regular sampling of flounder is done in Sub-divisions 23–29 and 32. Most institutes determine ages from whole otoliths, but the sectioning and staining method is preferred by a few countries. At present a tentative analytical assessment is performed only for flounder in the south-western part of the Baltic Sea. Flounder fishery is not regulated by TAC. However, the national CANUM and WECA data are

submitted to the Baltic Fisheries Assessment Working Group by the most of the countries.

Results from an exchange experiment were presented. Altogether six samples of whole otoliths and four samples of sectioned and stained otoliths had been read by 4–10 persons. In total the samples contained 275 whole otoliths and 175 sectioned and stained otoliths from different parts of the Baltic Sea. The German samples came from Sub-division 24, Lithuanian from Sub-division 26, Swedish from Sub-division 27, Latvian from Subdivision 28 and Estonian from Sub-division 29 thus covering almost whole distribution area of Baltic flounder. The overall agreement for whole otoliths was 62% (CV=20%) while for sectioned and stained otoliths agreement was lower, 53 % (CV=22%).

Age determination by reading whole, burnt or sectioned otoliths was evaluated in a WS experiment. The otoliths came from Sub-division 27. From each sampled fish one otolith was left whole and the other one, either broken and burnt or sectioned. In total 50 pairs of otoliths were used for the experiment. Participants were asked to state the number of winter rings and to mark the rings on a photo of the otoliths. The sectioned otolith technique had the highest percentage agreement (51%) and lowest CV (16%), while the burnt and whole otoliths had a lower level of agreement (40%) and higher CV (20 and 22% respectively). The markings on photos revealed large disagreements among readers where the actual rings were located.

After the experiment of winter ring determination from whole, sectioned and burnt otoliths, these structures were viewed on a screen and participants discussed how the winter rings were determined and what could be the correct way of doing it. The common discussion of the whole otoliths revealed significant discrepancies in the determination of winter rings. This is caused by the structure of the flounder otoliths which usually has very wide translucent winter rings and by the transition between hyaline and opaque zones that is very vague. In addition, translucent rings inside opaque zone (checks or false rings) are common. Moreover, even for whole otoliths where the annuli seemed to be distinct and clearly separable, the determined age differed from the age determined from the sectioned otolith of the same fish. For older whole otoliths the age determination was hampered by „cliff-edge" effect, thus always causing a lower defined age than from sectioned otoliths. It was clear from viewing the sectioned otolith that the "cliff-edge" effect is visible already in flounders at age six. These causes were the background for a general conclusion that whole otoliths should not be used for age determination. It was concluded that the most convenient method for age determination of flounder is from sectioned and stained otoliths.

After extensive discussions, a re-reading of two sectioned samples from the exchange program was done. The percentage agreement was significantly higher in the re-reading compared to the original readings in both sets of otoliths (70% compared to 59% and 62% in comparison with 48%). Results indicate a higher consistency among readers than obtained prior to the workshop.

A first draft of an international manual for age determination of Baltic flounder was discussed during the meeting. It was agreed that the objective of the manual is to provide quality assurance among and within national laboratories. It was recommended that sectioning and staining of otoliths should be used for the age determination of Baltic flounder. The second-best method is the broken and burnt method. Training of age determination by sectioned otoliths will be achieved by an

intercessional exchange program using sectioned otolith samples from Germany and Sweden.

Considering the fresh insights into the age determination of flounder a 2nd workshop is recommended to take place in 2008. The terms of reference should include:

a) evaluation of the 2007 exchange experiment

b) experiment on broken and burnt otoliths

c) experiment on influence of length information on age determination

d) updating of an international manual

e) measures to update national reference collections

f) protocol for updating historical data.

3.5.2 [WKARRG] Workshop on Age Reading of Roundnose Grenadier

The first roundnose grenadier age reading workshop was hosted by IFREMER in Boulogne-sur-mer (France) from 4 to 7 September, 2007. Prior to the workshop, there was an exchange of otoliths realised in 2006. The objectives of workshop were manifold: review of the sample processing and age validation techniques, analyse the results of this exchange exercise and solve the problems detected in roundnose grenadier age determination based on the examination of otoliths. This exchange included four countries (France, Faeroe Islands, Spain and UK Scotland), two of which were at the workshop.

The otolith exchange set consisted of 66 otoliths selected from commercial catches taken from the French fishing areas (ICES areas Vb, VI and VII) during 2005. For each fish, there were a thin transverse section and two calibrated images with the transmitted and the reflected lights. The analysis of the results was performed using the spreadsheet ad-hoc Workbook AGE COMPARATIONS.XLS (Eltink, 2000) following the recommendations of EFAN (Eltink *et al*., 2000).

The results of otolith exchange showed the overall agreement to 30.2% with a precision of 7.0% CV. Only two otoliths were read with 80 % agreement. During the workshop, the image analysis system approach (software TNPC developed by IFREMER) showed that the lack of agreement can be due to two reasons: the first one would be a disagreement on the position of the first ring. The second reason stands on the fact that some readers choose to leave out specific rings identified by other readers as true annual rings. For the position of the first ring, we analysed an otolith image estimated 8 years old (Kelly *et al*., 1997). The age estimated was the same as that one published from these authors and it was consistent with validation of young fish age (Gordon & Swan, 1996). After discussions, a second reading showed the overall agreement to 38.1% with a precision of 6.5 % CV.

Recommendations

Age validation of adult roundnose grenadier should be carried out. Although it does not produce age validation of individual fish, radiometric age estimation as done for the pacific grenadier *Coryphaenoides acrolepis* (Andrews *et al*., 1999) seems to be the most appropriate method to check the consistency of the range of age estimated from visual readings.

It would be important to estimate bias when measuring the pre-anal fin length from commercial landings, especially when the fish is damaged by automatic gutting machine.

It would be necessary to continue to collect information on the otolith weight to identify the accuracy of this predictor of the estimated age. Moreover, the otolith surface could also be a good predictor. Thus, it could be possible to limit the number of reading, which is a very long process for this species.

The roundnose grenadier can live up to 70 years old, the precision and the bias of age estimates should be evaluated according to needs' for the assessment.

In case the need of age structure for assessment is confirmed and the required sampling intensity is maintained, a second workshop on this species would be required. The workshop should involve more countries, and the otolith exchange preceding this workshop should comprise:

a) both juveniles and adults in order to calibrate the readings. 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;

b) samples from different stocks; and

c) samples from different areas within the same presumed stock (the same stock in believed to cover ICES division Vb and XIIb and sub-areas VI and VII).

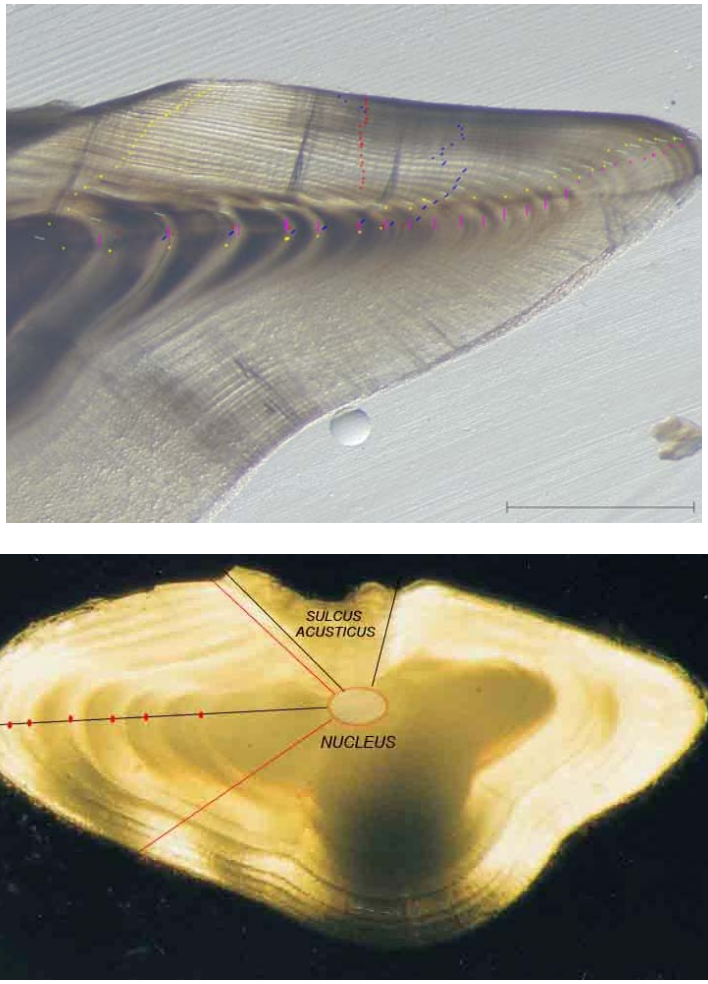

Figure 1: Top (A) individual n°59, age estimated between 22 and 30 years old ; bottom (B) Otolith slide from an immature fish of pre-anus length 5 cm, estimated at age group 8, in transmitted light (In Kelly *et al.*, 1997; Reading zone is defined by the 2 red lines).

3.6 Otolith exchanges carried out in 2007

3.6.1 International Cod Otolith Exchange Programmes

The Planning Group on Commercial Catch, Discards and Biological Sampling (PGCCDBS) meeting in March 2005, identified cod as one of the species requiring confirmation of the ages being assigned by Fisheries Institutes. The Marine Institute, Ireland took responsibility for organizing and co-ordinating all four exchanges.

The objective of the exchange was to examine a broad range of cod otoliths collated from the various institutes currently engaged in cod age reading. It was decided, however, that rather than operate one large, very extensive exchange, which contained samples from various regions, that a number of exchanges would be run which each covered a specific area. Given the countries that voiced an interest in participating in one or more exchanges (19 countries in all) and the areas in which they sample cod, four regions were chosen and an exchange set up for each:

a) North Sea Cod Exchange

b) Baltic Sea Cod Exchange (SD 25-32),

c) Irish Sea/Celtic Sea Cod Exchange (ICES Divisions VIIafg)

d) Area II Cod Exchange (Norwegian cod).

Greenland cod were initially considered as a possible exchange. After some investigation it was realized that Greenland and Germany were the only countries who read Greenland cod and according to EFAN guidelines there needs to be at least 5 participants to ensure a strong modal age.

Participants were encouraged to only participate in the exchange(s) that most closely reflects the area(s) where they carry out their sampling, and routine age reading.

3.6.1.1 North Sea: 22 age readers/9 countries

Percentage agreement was estimated at 74% with a CV 39.8%. The ages were regularly overestimated, and in spite of the fact that the overall percentage agreement was quite low, there was generally a good standard of age reading amongst the experienced readers; 6 readers achieved 90% or greater agreement over all the ages. In such cases a limited exchange for weaker readers would possibly be a good solution; however a workshop has been agreed for 2008 on North Sea cod, in Denmark.

3.6.1.2 Area II: 9 age readers/5 countries

Percentage agreement was estimated at 61% with a CV 26%. It became clear that all readers over estimate the ages in this region, except for 1 reader who under estimated the ages for older fish. In this case a follow up workshop is recommended to address the quite substantial age interpretation issues.

3.6.1.3 Baltic Sea: 9 age readers/7 countries

Percentage agreement was estimated at 53% with a CV 24.4%. These results are very consistent with the results of previous exchanges and indicate a persistent problem in the age reading of Baltic cod. The SGABC (Study Group on the Assessment of Baltic Cod) recognize that the assessment for Eastern Baltic Cod (Subdivisions 25-32) has severe inconsistencies in age determination which affect both the catch-at-age and the survey data. Thus at the SGABC meeting in May 2006, the SGABC participants were informed of a project proposal for the revision of age estimates of Baltic cod based on the implementation of an objective method for age-determination. This EU project,

DECODE, has now started (January 2008) and is being coordinated by DIFRES, Denmark. Baltic scientists will be working on the DECODE Project for the next two years. Given the problems highlighted with Baltic cod age readings, and the commencement of the DECODE project, in which many of the institutes participating in this exchange are involved, it would appear that the wisest course of action is to await the findings of this project.

3.6.2 *Mullus* otolith exchanges

The results of *M. barbatus* and *M. surmuletus* otolith exchange exercise indicated that ageing of both species could not be considered easy. The agreement was in all cases low and the CV was high, particularly for the Mediterranean set of *M. barbatus* otoliths. As a result, a workshop seems to be necessary to clarify the inconsistencies defined in both species ageing. Moreover, a validated by other methods (tagging, tank experiments etc) sample seems to be indispensable, particularly for age group 0 of both species.

Although the main objectives of the exchange exercise were the identification of differences between readers and the necessity of a workshop, the following remarks could also be made:

Better results were obtained for *M. surmuletus* than *M. barbatus*. This could be related with the clearer appearance of rings in the otoliths of the former than the latter species.

Mediterranean age readers gave generally better results for the Mediterranean set of *M. barbatus* otoliths (fact that could be related with their experience on the Mediterranean growth pattern) compared with their north European counterparts. The opposite occurred with the north European set of *M. surmuletus* otoliths. Therefore, area differences should also be discussed.

Burnt otoliths of *M. surmuletus* presented higher agreement and lower CV than the unburnt ones. The treatment of the age structures before ageing should also be examined.

As a consequence, it is recommended that:

a) a workshop should be organised during 2008 or 2009

b) a validated sample had also to be used to help the work of age readers and increase the level of reading precision

c) area, month, sex and different methods of treatment of the age structure should also be objectives of investigation

3.6.3 Saithe otolith exchanges

A saithe otolith exchange was carried out in 2007 and involved 19 readers from 10 countries (Denmark, Faroe Islands, France, Germany, Iceland, Norway, Sweden, UK England, UK Northern Ireland, UK Scotland). The otoliths originated from ICES Divisions IVa and VIa.

The exchange is about to end, as only one country is left to submit their readings. The preliminary results show the following results by Division:

a) IVa : 95.8% agreement and CV = 3.3%

b) VIa : 82.6% agreement and CV = 5.4%

Given the degree of concordance between the readers, no workshop is demanded for this species. The PG will evaluate the final result in 2009 and consider the periodicity of otoliths exchange to implement.

3.6.4 Redfish otolith exchanges

At the Workshop on Age Determination of Redfish (WKADR; ICES 2006), it was decided to exchange several sets of otoliths during autumn 2006–autumn 2007, covering the commercially most important stocks. The characteristics of some of the exchange sets were modified with regard to availability of samples (Table 3.9), as well as the order of participating countries due to availability of age readers. After delays on the exchange routes, some of the sets have not been read by all countries but will be read until summer 2008 in order to analyse the outcome of the exchanges before the next workshop, scheduled for early September 2008.

Table 3.9. Overview table on the redfish otolith exchanges.

Country	Species	Area	Type[1]	Gear[2]	Sampling period	Structure[3]	Method[4]	No.of otoliths	Co-ordinator	Participating countries
Germany	*S. mentella*	ICES XIVb	res	dem	2000	oto	bb	30	Germany	NO, ES, IS, CAN, RUS, POL, DE
Germany	*S. mentella*	ICES XII; NAFO 1F/2H/2J	res	pel	2001	oto	bb	30	Germany	NO, ES, IS, CAN, RUS, POL, DE
Iceland	*S. marinus*	ICES Va	com	dem	2000	oto	bb	30	Germany	NO, ES, IS, CAN, RUS, POL, DE
Iceland	*S. marinus*	ICES Va	res	dem	1995-2005	oto	bb	30	Iceland	ES, CAN, RUS, POL, DE, NO, IS
Russia	*S. mentella*	ICES XII,XIV;NAFO 1F	com	pel	1999-2005	oto	bb	100	Russia	IS, CAN, POL, DE, NO, ES, RUS
Russia	*S. mentella*	ICES II (Norw.Sea)	com	pel	2006	oto/sc	bb	30	Russia	IS, CAN, POL, DE, NO, ES, RUS
Spain	*S. marinus*	NAFO 3M	res	dem	2007	oto	bb/bk	30	Spain	CAN, RUS, POL, DE, NO, IS, ES
Spain	*S. mentella*	NAFO 3M	res	dem	2007	oto	bb/bk	30	Spain	CAN, RUS, POL, DE, NO, IS, ES
Spain	*S. fasciatus*	NAFO 3M	res	dem	2007	oto	bb/bk	30	Spain	CAN, RUS, POL, DE, NO, IS, ES
Extra samples										
Norway	*S. mentella*	ICES II (Norw.Sea)	com (res)	pel	2007	oto	bb/cs	23	Norway	NO, IS, CAN
Spain	*Sebastes* spp. (juveniles)	NAFO 3M	res	dem	2007	oto	bb/bk	10	Spain	CAN, RUS, POL, DE, NO, IS, ES

1 res= research, com= commercial

2 dem=demersal, pel= pelagic

3 oto= otoliths, sc=scales

4 bb = break-and-burn; bk = break-and-bake

4 Consider a report by the European Commission from the DCR Liaison Meeting and relevant STECF sub-groups on data collection issues. Where appropriate propose actions to be taken within the ICES system.

4.1 Recommendations from the Liaison Meeting (LM) 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 LM covering the RCM work 2007 was held in February 2008 (Anon., 2008a). A draft report was available to the Group.

GROUP	RECOMMENDATION	FOLLOW-UP RESPONSIBILITIES
RCM NEA (follow-up of 2006 recommendation)	RCM NEA agrees with comments of LM [2006], the project on evaluation and standardisation of sampling schemes to estimate the landings of rays and skates should be extended to all cases dealing with mixed species landings. The project should aim to find common methods for sampling mixed species landings in general. To be readdressed to RCM NEA 2008.	PGCCSBS/PGMED
LM comment	LM stresses the need to address this issue for all mixtures of species in the landings and all regions. This issue is even emphasised by the need of biodiversity indicators for the ecosystem approach. LM recommends PGs to elaborate implementation studies as soon as 2008 and subsequent workshop.	

PGCCDBS agreed with the LM 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. ICES WGEF 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, megrims, anglerfish, and elasmobranches*."

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 elasmobranches, 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 mixes 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.

GROUP	RECOMMENDATION	FOLLOW-UP RESPONSIBILITIES
RCM Baltic	The Baltic RCM recommends to further investigate the amount and variability of recreational fisher's catch of Baltic cod, with the aim to include these catches as soon as possible in the assessment and management advice. The Baltic RCM reciterate its 2006 recommendation to PGCCDBS to facilitate a regional workshop for the Baltic cod, possibly scheduled immediately after the Annual Science Conference 2008 for which a theme session with this topic is planned. A Workshop on Sampling Recreational Fisheries in the Baltic (WKSRFB) with the following ToR: thoroughly review the results of the EU pilot study of cod catches in the recreational fisheries 2004-2006; provide a detailed description of the structure of the national or regional recreational fishery; identify weaknesses and strengths of the sampling systems used, and essential elements of future studies (or a regular data collection); harmonise the sampling strategies and adapt them to national/local peculiarities if needed; develop a detailed work plan and a timeline for the data collection in the future, with the aim to facilitate the use of the sampled data in scientific stock assessments as soon as possible. WKSRFB will report to PGCCDBS and the Baltic RCM by February 2009.	PGCCDBS/PGMed

GROUP	RECOMMENDATION	FOLLOW-UP RESPONSIBILITIES
RCM NEA	RCM NEA supports Baltic RCM recommendation; recreational fisheries must be incorporated into the matrix, mainly cod, bluefin tuna, albacore, salmon, and maybe pollock. There will be a Theme Session on small-scale fisheries at the 2008 ICES Annual Science Conference, followed by a methodological workshop on recreational fisheries. The incorporation of the recreational fisheries into the metier matrix must be carried out taking into account the results of the Theme Session and the workshop. The new recreational fisheries metiers should be included in the Data Collection Regulation in 2009.	SGECA-SGRN 08-01
RCM NEA (follow-up of 2006 recommendation)	RCM NEA recommends that the priorities for monitoring the recreational fisheries are the estimation of catches of all species and associated effort and that all methodological issues be discussed in a dedicated workshop.	PGCCDBS/PGMed
LM comment	LM considers that the methodological aspects should be addressed by forthcoming PGCCDBS.	
Suggestion for a small scale study from RCM Mediterranean. Recreational fishery: current status of knowledge and future common approach for data collection. LM agrees with the need and suggests to wait further progress on this issue planned during the forthcoming PGCCDBS/PGMED.		

The pilot studies on recreational fisheries carried out in accordance with the DCR (1639/2001 and 1581/2004) revealed that recreational fisheries in some cases could contribute in a non-negligible way to the total removals of certain stocks. The variability of recreational catches could also be high between years. It further became apparent that there are large regional differences in the structure and behaviour of the recreational fishing community, implying that results of one nation cannot be extrapolated to other countries. Methods to estimate removals in recreational fisheries where different and this may have affected the results.

The PGCCDBS is aware that the revised DCR will require multi-annual Community programmes for collection, management and use of data from recreational fisheries for certain species. There is an urgent need to provide Member States with guidelines for statistically robust sampling and data analysis schemes and to ensure the harmonisation of methods across geographic areas. Therefore, the PG recommends a Workshop on Sampling Methods for Recreational Fisheries [WKSMRF] (see workshop proposals, Annex 4).

GROUP	RECOMMENDATION	FOLLOW-UP RESPONSIBILITIES
RCM Mediterranean	The following workshops and exercise are proposed by the RCM Med: Workshop on Mullus barbatus and Mullus surmuletus ageing (Greece, 2008) Otoliths exchange exercise for Pagellus erythrinus (to be organised by Greece in 2007), to be followed by a workshop (2008, Greece)	PGCCDBS/PGMED
LM comment	To be discussed in PGCCDBS/PGMED	

The workshop on Mullets was rescheduled to 2009 (see Annex 4).

GROUP	RECOMMENDATION	FOLLOW-UP RESPONSIBILITIES
RCM NEA	RCM NEA recommends convening: • a Maturity Workshop for Flatfish as the maturity issues raised previously for roundfish also apply to these species • a Maturity Workshop for Crustaceans as the maturity issues raised previously also apply to these species	PGCCDBS/PGMED
RCM NS&EA	The RCM NS&EA recommends that dedicated workshops identify the data sources that suit assessment requirements on which the RCM can build to co-ordinate the sampling. The RCM NS&EA recommends that a dedicated workshop for flatfish species should also be set up by PGCCDBS as the outstanding issues apply to these species as well	
RCM Baltic	The RCM Baltic support the RCM NS&EA recommendation to the PGCCDBS to set up a dedicated workshop on maturity for flatfish species	
LM comment	To be discussed in the forthcoming PGCCDBS/PGMED. In addition, LM stresses that only a full proposal including the ToRs, chair and venue should be presented to the PGs.	
RCM Mediterranean	The following workshops and exercise are proposed by the RCM Med: Workshop on small pelagics (Engraulis encrasicolus, Sardina pilchardus, Trachurus mediterraneus) maturity stages (Italy, 2008) Workshop on crustaceans (Aristeus antennatus, Aristaeomorpha foliacea,Parapenaeus longirostris, Nephrops norvegicus) maturity stages (Italy, 2008)	PGCCDBS/PGMED
LM comment	LM notes that the workshop on small pelagics is planned for 2008 and the workshop on crustaceans is to be forwarded by PGCCDBS/PGMED	

The PGCCDBS agrees on the need to organise workshops on sexual maturity staging for flatfish species and crustaceans. The workshops are included in the list of workshops suggested by the PGCCDBS (see section 7.2). The PGCCDBS stresses the importance for maturity workshops to respect the guidelines elaborated in the 2008 meeting (see section 3.2).

GROUP	RECOMMENDATION	FOLLOW-UP RESPONSIBILITIES
RCM NEA	RCM NEA approves ICES initiative to elaborate a standalone section in every assessment Working Group report to summarise the data deficiencies and data needs.	ICES AMAWGC/ PGCCDBS
LM comment	See general discussion.	
RCM NS&EA	The RCM NS&EA recommends that PGCCDBS promotes improved communication between the data providers and users, e.g. through the participation of a PGCCDBS representative in the AMAWGC meetings and the ICES Annual Science Conference and the interaction of the PGCCDBS contact persons with the Assessment WGs	PGCCDBS
LM comment	LM acknowledges the need to improve the communication between data providers and data users in general. This statement has been already voiced by PGCCDBS and SGRN (see general discussion) and the actions that are ongoing within ICES world could be generalised to all RFMOs.	

The Group has discussed the AWG feed-back process in detail and proposes that selected stock co-ordinators fill in tables that allow evaluation of the data delivered and used by the AWGs; see section ToR 3.2 on the AWG feedback process.

4.2 Review of the Report of the SGRN-SGECA meeting 08-01 (Nantes, February 2008)

The SGRN-SGECA meeting 08-01 (Anon., 2008b) prepared common operational rules for the collection of biological and economic data within the new Data Collection Framework. For an interim period (2009–2010), the expert group provided a list of species by region, based on the current DCR, indicating basic sampling specifications (frequency and intensities). Within this list, species are grouped in three groups, based on the following criteria:

- Group 1: Species that drive the international management process including species under a recovery plan.
- Group 2: Other internationally regulated species and major non-internationally regulated by-catch species.
- Group 3: All other by-catch species.

The proposed list of species (Appendix 4 of the SGRN-SGECA 08-01 report) requires revision by the appropriate RFO.

Therefore, PGCCDBS recommends to:

- review the grouping of species (check the allocation of species to a certain group)
- check if the species-area allocations are in line with the current ICES stock definitions.

This work will be carried out intersessionally by Maris Plikshs and the ICES Secretariat until the end of March 2008.

4.3 Review of the reports of other STECF sub-groups:

MEETING	SUBJECT	REPORT AVAILABLE	RECOM. TO PG
SGMOS 07/03	Evaluation of closed areas	Yes	No
SGMOS 07/04	Discards	Yes (but not final)	No
SGMOS 07/06	Main factors affecting cod-end	Yes	No
SGMOS 07/07	Evaluation of policy statement	Yes	No
SGRST 07/03	Review of stocks	Yes (but not final)	No
SGRST 07/04	Assessment of effort regime	No	-

5 Review changes in data collection procedures and communicate changes to the assessments groups through the contact officers. The Assessment Groups will consider if these changes present problems for stock assessment data and where appropriate propose procedure changes for rectifying the problems.

A considerable shift on data collection is expected due to the recent revision of Council Reg. 1543/2000 by Council Reg. 199/2008, and the forthcoming revision of EC Reg. 1639/2001 and EC Reg. 1581/2004.

The group considered there will be a consultation process with ICES. However, some subjects were already identified as being potentially of high impact and listed in Section 4.

6 Continue developing standards and best practices for sampling commercial fisheries. Review the work plan and actions taken so far for establishing standards and best practices and agree on a work plan for intersessional work.

6.1 Minimum Sampling Protocol for Length Structure of Commercial Landings

The following considerations should be used by all MS undertaking land-based sampling of commercial catches of fish and shellfish species. These minimum requirements should be made available in existing sampling manuals. It is suggested that this information regarding the minimum requirement is appended as the first page of the manual so as to be easily available for reference and checking.

6.1.1 Allocation of sampling effort

- The strategy for allocating sampling effort should be based on the national DCR requirements for sampling of fleet metiers or metier groupings (from 2009 onwards), and for sampling of individual species, by area and sampling period.
- List all the sampling strata that need to be covered (species/gear/season/sampling area), the overall annual target for each stratum, and any additional requirements.
- Plan sampling effort to take account of seasonal and regional variation in fishing effort and landings. This may require an increased allocation of sampling trips at times or locations with increased fishing activity (e.g. during a seasonal or short lived, localised fisheries). The allocation of sampling effort may need to be adapted if fishery patterns change due to changes in management measures, markets or distribution of target species.
- Ensure that the landing and marketing practices at each site are known so that access to the full landings of each species is possible (landings on the market may be incomplete or trans-shipped).
- Use a randomisation scheme to select days and sites for sampling of each species/gear/season/area stratum. Avoid preferential sampling of particular sites or landing days.

It is suggested that a 'master sheet' is constructed to keep account of the number of samples measured compared with the number required.

This sheet should be available at the point of sampling.

Do not routinely use weight-length relationships to determine sample weights unless they are appropriate for the area and period and there is no other information on the weight of fish per box.

6.1.2 Practicalities of sampling at each port visit

Honesty and confidentiality are essential when sampling commercial catches.

1) Assess the vessels available and relevant for your sampling.

2) Randomly choose the boats to sample.

3) Record the name or registration number of boat, date of landing and the fishing area. A map showing fishing areas would be a useful tool.

4) Record the fishing gear used. Record mesh size and other gear parameters if possible (e.g. hook size).

5) Identify the target species of the trip.

6) If the catch is presented by commercial category, identify the categories available to sample, and sample all the categories.

7) Unsorted (mixed) catches should be sampled by species present.

8) Randomly select boxes from the landing of each commercial category for length measuring (or from the whole catch if not categorised) – do not always take the 1st box.

9) Follow guidelines for determining how many fish to measure from each commercial category.

10) Measure all fish in a box unless sub-sampling is necessary (if so, state how to raise the numbers). The fish measured should be representative of fish present throughout the whole box.

11) Record the total weight of the sample and the boxes sampled from each category. Care should be taken when estimating weights of part-filled boxes.

12) Record the total weight of each commercial category landed.

13) Record the unit of weight (e.g. kg).

14) Record whether fish are Whole or Gutted or method of presentation.

15) Record - by species - the length measurement required e.g. total length/pre-anal fin length/etc and specify whether to the cm below, to the 0.5 cm below, mm etc.

6.1.3 Quality Control of data

- Ensure all information has been collected.
- Check for mistakes.
- Enter data into database.
- Check for mistakes again.

6.2 QAF

PGCCDBS developed during the last year a Quality Assurance Framework (QAF) for stock assessment input parameters. 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 DCR and be responsible about the quality control of the aggregated data used for assessment:

"Data – Concerning the advice for fisheries, the Commission will arrange – through member states or directly – for any data collected through the Data Collection Regulation (DCR) and legally available for scientific analysis to be available to ICES. The Commission will assist ICES in getting access to any other data which has been collected under Community legislation or is collected with the support of Community funding while respecting legal status regarding the distribution of this information (i.e. confidentiality or public availability such as pertaining to environmental information). The Commission will provide information from the inspection services which may be useful for the advice while preserving confidentiality.

ICES will communicate any problems encountered regarding access to data, data quality and completeness of data. This shall in particular apply to data are collected through the DCR or which have been collected with other Commission support.

ICES is responsible for quality control of the aggregated data used in assessments and shall decide which data are considered a useful basis for advice. If the quality of landings data cannot be accurately documented ICES may decide to base its advice exclusively on other types of information such as survey data.

ICES will explain in the background documentation for the advice which data were used and how and will evaluate data quality and completeness on a stock, country, fleet and data type basis.

The Parties will facilitate that stakeholders are invited to contribute to data preparation and evaluation of data quality.

ICES will provide advice and services relating to the Data Collection Regulation. These services include recurrent review of data delivered for ICES' advisory obligations and on request specific services regarding standards, manuals and coordination."

The main objectives of the QAF suggested are:

i) to guarantee the quality of the raw data used for assessment,

ii) to promote transparency of the process of compiling parameters at the stock level, and

iii) to give feedback about the usage of the data available.

The approach proposed is based on a set of quality indicators computed for each parameter available for stock assessment. Such indicators can be qualitative or quantitative. At the moment three indicators are proposed (ICES 2007d): (i) compliance with protocols, (ii) coverage of the sampling achieved and (iii) precision of the estimates. These quality indicators are under development in ICES within two dedicated workshops, WKACCU in 2008 that will deal with (i) and (ii) and WKPRECISE in 2009 that will deal with (iii).

The indicators can be computed at the national level or stock level, although regarding stock assessment they are more important at the stock level.

An overview of the system is shown in the following diagram:

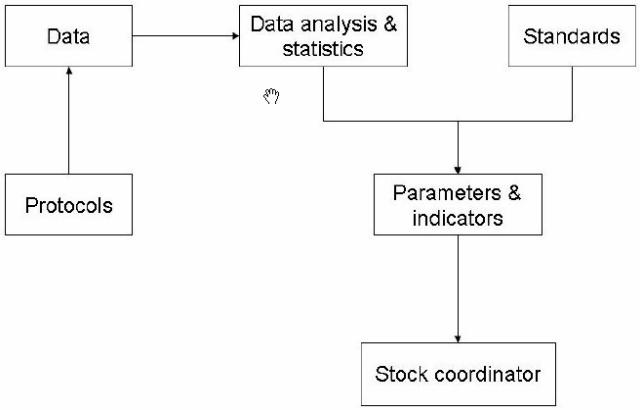

Figure 6.1: Proposed mechanism for indicators construction.

Data collectors provide meta data about the sampling carried out for each parameter to a public online data catalog (to be developed under the EC annual workplan), and

provide data aggregated at the required level to stock coordinators (InterCatch). Based on these information stock coordinators compile input parameters for stock assessment and compute quality indicators. The meta information about sampling and the quality indicators must be included on a specific section on the AWG report (see example in section 3.2) to: (i) provide additional info to advice process; (ii) report back to data collectors; (iii) report to STECF/SGRN to evaluate conformity with NPs; (iv) report to PGCCDBS to evaluate possible problems.

The proposal (Figure 6.2) is that tasks regarding the compilation of data at the national level and the upload of meta data to the data catalog shall be under the remit of each Member State. Tasks regarding the analysis of the meta data at the national level shall be under the remit of STECF/SGRN. Tasks regarding the stock coordinators' procedures shall be under the remit of ICES or other relevant scientific bodies.

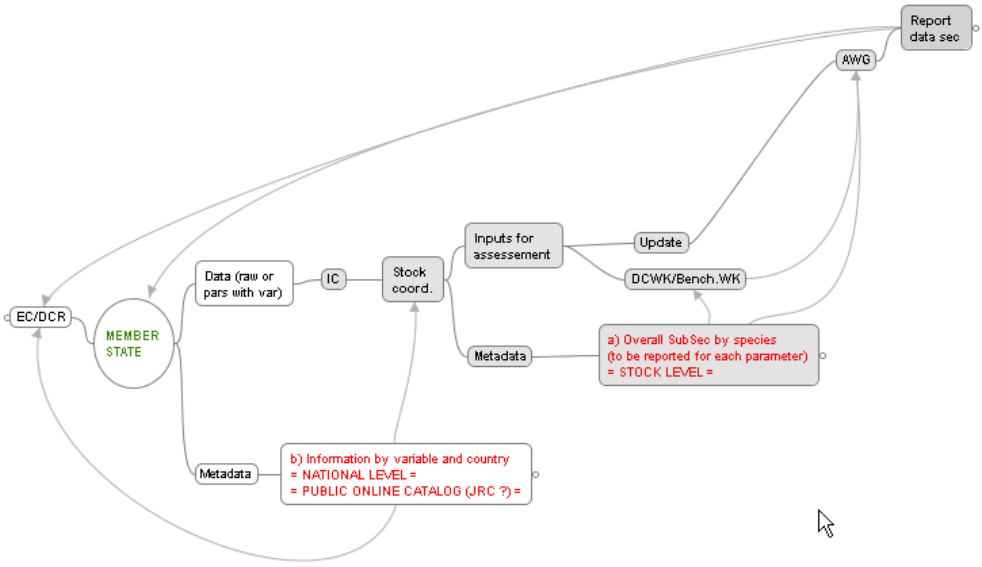

Figure 6.2: Quality Assurance Framework suggested by PGCCDBS.

The Planning Group developed the basic outline for a Quality Plan for information generated from sampling programs and used in stock assessments. The primary purposes of the Quality Plan are:

- To document the procedures and methods of sample collection, preparation and analysis;
- To provide assurance as to the precision and accuracy of samples at the stock level;
- To provide assurance as to the accuracy from using accepted standards;
- To provide reliable information regarding the interpretation of data with respect to how, where and when samples were collected.

Minimum requirements for national programs are:

- Development and adoption of written quality standards and procedures.
- Verification for some or all self-reported data.

- Development of timely compliance tracking and reporting procedures for self-reporting systems.
- Estimates of variance should be provided with some or all estimates.
- Defined goals for minimum levels of precision for sampling programs.
- Development of metadata databases for some or all fishery-dependent databases.
- Establishment of criteria for validation of data element quality in all data collection programs.

Strategic quality planning is based on the development of a proactive quality assurance framework that identifies all activities aimed at preventing sampling errors. Quality control procedures are a part of the framework and are designed to detect errors in the samples already obtained. Figure 6.3 illustrates the relationship between quality assurance, quality control and the important shift of focus from reactive/operational management to a more proactive and strategic management.

Figure 6.3: Hierarchy of quality improvement approaches.

The quality of the sampling, the data, and the analyses conducted prior to the assessment should be assessed at both the sampling program level, at the national- and the stock level. The quality assessment itself could be procedural, operational or statistical. The quality criteria should be updated on a regular schedule. The suggestions listed in the table below are meant as ideas and suggestions to be taken over by the AWGs – and not final proposals.

The Group recommends using effective sampling size in assessing total sample variances and providing guidance for improvements to the data collection (Pennington *et al*. 2002, Lehtonen and Pahkinen 2004, ICES 2007a). The general recommendation is that programs should strive for smaller samples from more vessels than many (and large) samples from a few vessels.

The Planning Group suggests a range of indicators of data quality given in table 6.1.

Table 6.1. Suggested quality indicators of protocol compliance, accuracy and precision for each parameter.

Parameter	Protocol Compliance	Accuracy[1] Area/season/fleet/catch coverage	Precision
Species identification	Scorecard result	Are the staff trained to identify mixed species identification?	
Landings volume	Scorecard result	Miss-reporting - quality of official landings on national basis. Comparing landing statistics with logbooks, and possibly also with other complementary collections such as VMS information and saleslips (ref. PGCCDBS report 2007). Vessels/trips with and without observers. Adjusted according to EUs official fisheries control database. Conversion factors. Δ ACFM landings. Percentage of the species landed in mixed compositions. Indicator: To be proposed by the WKACCU	Relevant in those cases were total landings are estimated. Also in connection with sampling schemes where splitting species to stocks is applicable. Indicator: To be proposed by the WKPRECISE
Effort[2]	Scorecard result	Units of effort depend on gear. Analysis by fleet. Report whether nominal effort or standardized effort has been used. A standardization protocol is needed for determining total effort for the fleet. Establish procedure for calculating standardized effort per fleet. Indicator: Refer WKACCU	Indicator: Refer WKPRECISE
Discard volume estimation	Scorecard result	Measuring the so far unmeasured[3]. Improving discard measurements. Checked for incentives for discards within mgt measures. Indicator: Randomization. Refusing rates (ICES 2004). Observer coverage[4] per sampling stratum, e.g., per estimated discards/catch, effort. Refer WKACCU	Scaling issues/ratio estimators to be defined (ref. ICES CM 2002/ACFM:09 and ICES CM 2007/ACFM:06). Refer AWG for definitions Indicator: SD/var/cv of scaling/raising procedures.

1 Is area coverage (mentioned as indicator in the 07 PGCCDBS report) the same as Accuracy? No, it is only part of accuracy. Distribution of samples needs to closely match the geographic and temporal distribution of the fishing effort

2 There are many Units of measure for fishing effort, (kW)days, fishing time, soaking time etc. But these measures of effort are not necessarily directly reflective of Fishing Mortality. They may only be a relative measurement. See remarks by PGMED (PGCCDBS 07 pg 129)

3 Experiment with full retention schemes and observer effects. System to control measurements and area/season/fisheries coverage

4 No quantification can be given for many stocks now.

Parameter	Protocol Compliance	Accuracy1 Area/season/fleet/catch coverage	Precision
Length measurements of landings	Scorecard result	Interested in covering the strata where there were catches. Access to total landings may be a factor that affects the bias of the measurements. Indicator: % strata in which there were both catches and samples or % coverage by strata of weight of catches sampled/total catch. Alternatively: separate percentages of area coverage and catch coverage	The percentage of the weight of the sampled trip or haul to the total landed weight. What is the effective sampling size (on mean length)? Indicator: The pre-set precision level being achieved. Effective sampling size. A small effective sample size implies that the estimate of the entire distribution is rather imprecise
Length measurements of discards	Scorecard result	See Discard volume estimation Length measurements of landings	See Discard volume estimation and Length measurements of landings
Age	Scorecard result	Workshops on age calibration (WKAC) to develop minimum standards, setting minimum levels of accuracy. Routine otolith exchange projects. Indicator: validated otoliths available for the stock/species; having an acceptable protocol for validating otoliths; quality assurance program (to avoid biases) available; percentage of otoliths being cross-checked	Actions taken: Methodology development / Internal WorkShops / Routine exchange of otoliths (50/100). Minimise variability in age/length (landings-at-age) key. Indicator: The pre-set precision level being achieved. A good reader = X% agreement. Average percent error (APE) < X% Refer WKs for definitions of precision limits
Sex ratio in landings and/or catches	Scorecard result	Both area, season and fleet should be sampled and properly covered due to possible sex selectivity. Indicator: - % area coverage, - % season coverage, - % metier / gear / fleet coverage	Ability to detect changes of M/F ratio over the years Indicator: variance of the ratio
Maturity	Scorecard result	Regular training sessions. Agreed staging protocol in use. Development of manual with gonad/histology photos. Indicator: - % area distribution coverage of the mature and immature components - average time lag between sampling and optimum sampling period as defined by maturity staging workshops - frequency of national training courses - last updated maturity ogive not older than 5 years.	Ability to detect changes in maturity over the years Indicator: The pre-set precision level of maturity-at-age being achieved.

The question remains as to how to systematise reported deviations (per parameter).

Conformity with sampling protocol may be presented in a qualitative or quantitative way, and addresses the basic criteria as to whether samples are being collected according to the accepted protocol. Standard qualitative scores are illustrated in the table below. Finally the potential impacts of the performance metrics listed needs to be evaluated at the stock level.

The requirements according to the national protocol will be stronger than according to the minimum protocol. Comparison of all the different national data contributions against a common minimum international protocol should be considered. The general criteria would be whether the available data are sufficient (coverage of the area, number of samples) for construction of the catch-at-age indicators.

The table below illustrates how the PG considers the 'Score-card' principle being used. Scoring protocol compliance can be very detailed, or a simple traffic light system may be used. For calling the attention of the stock coordinator on how well the data collection complies with the protocol, the Planning Group suggests beginning with the traffic light categories described in Table 6.2.

Table 6.2. Traffic lights example for Protocol Compliance quality indicator.

PROTOCOL COMPLIANCE	CATEGORY 1	CATEGORY 2	CATEGORY 3
	The measures met the Protocol requirements, and could be used in the assessment	The measures deviated from the Protocol requirements on some points, and potential impacts on the assessment should be considered prior to use.	Significant deviations from the Protocol and should not be used in the assessment without analyses to determine the potential impacts on the assessment
Length measurements		X	
Age necessities	X		
Maturity necessities	X		
Etc			X
Totals			

The PG reviewed the current workplan which contains the following tasks:

a) Development of a "minimum" international protocol to be used as a standard, and which should contain a minimum of procedures that the national protocols need to meet to fulfil the requirements set.

This is being reported on under ToR e).

b) A workshop (WKACCU) with terms of reference to establish standardized/joint methods on how to evaluate and estimate the accuracy of submitted fisheries data should be held in 2008.

The Workshop on Methods to evaluate and estimate the accuracy of fisheries data used for assessment [WKACCU] (Co-Chairs: Michael Pennington and Sondre Aanes, IMR, Norway) will be established and will meet in Bergen, Norway, 13–16 October 2008.

During the PGCCDBS meeting a subgroup discussed and planned necessary and preferable tasks to be prepared and done until the workshop in October 2008 (see also Chapter 1.7.1):

- Each participating country should choose one fishery as an example and present ways to assure accuracy in each of the data handling steps from the fish are caught until national data on catch-at-age is provided to the ICES stock coordinator (InterCatch).
- Possible ways to look at this could be logbooks compared with sale slips from the same vessel and/or trip; compare logbook data from vessels or trips with and without observers; combining fishing inspection (onboard observations) and control of landings with VMS data (name and frequency of vessels going to harbour).
- Each participant should prepare geographical distribution charts to the workshop of the national catches shown on a map including the same geographical cells/strata that are the basis for the geographical collection of biological stock data.
- On the same map, or on a copy of the map, suitable information about the coverage of the samples should be presented– with the aim of ensuring that all areas with catches are sampled. Percentages of catches up against samples could be presented on this geographical cells/strata basis.
- Present a list of national conversion factors used to estimate live weight from product weight[5]
- Each country to provide details of sampling intensities (e.g. number of trips sampled against total number of trips) for all sampled fleets (defined according to the Nantes meetings[6]).
- Recommend that where possible, countries should complete the Discard Sampling Review Form (from Charlottenlund) for 2005 by fleet. If sampling design does not allow the completion of this information, the Form should be used as a means of inspiration to provide relevant data.[7]
- Each country to provide a description of variables that are available to them for raising procedures.

c) A workshop (WKPRECISE) with terms of reference to establish standardized/joint methods and indicators for evaluating and estimating the precision of submitted fisheries data should be held.

This workshop is being planned for 2009.

The WKACCU (and in 2009 also WKPRECISE) is requested to review and to consider for routine use the above quality assurance table.

5 This is available in the national technical reports for the DCR. Discussion on the usability ensues: can we quantify this? It is a problem anyhow, even if we may not be able to quantify this. Do we use product weights only, or do we flag this issue in advice? This is actually a political issue: an EU common conversion factor is discussed.

6 If not in Nantes Matrix yet: then use different methods, do not let the development of the Nantes matrix hamper this.

7 Work was done in Charlottenlund meeting on discard raising (2004): report to be taken up on SharePoint.

7 Continue the work on developing protocols for age calibration and maturity staging workshops.

7.1 WKAC

The guidelines for age calibration workshops and otolith exchanges were finalized taking into account last years' proposal. The document is included in Annex 6 and must be distributed to all future workshop chairs together with the ICES guidelines for chairs, so that some consistency is assured.

7.2 WKMS

The draft guidelines for maturity staging workshops were finalized taking into account last years' proposal. The document was included in Annex 7 and must be distributed to the relevant expert groups to be commented so that next year it can be finalized.

7.3 Workshop planning

As an outcome of the 2007 PGCCDBS recommendations, a combination of the tables containing the use of maturity data by assessment working groups (stock specific) and the age determination exchanges and workshop overview (species/partly stock based) was made. However, this does not yet provide the kind of planning tool PGCCDBS needs.

PGCCDBS needs to be able to:

- see the history of exchange/workshop/maturity updates
- plan Workshops/Exchanges/maturity updates
- give and receive feedback on status (ageing status good/medium/poor) between Workshops, WGs and PGCCDBS

The first two points should have the biggest emphasis.

For this, a simple database will be set up with the following properties:

For PGCCDBS use, per stock/species:

- PG can choose the planning sequence (every 2/3/4/5years)
- Review quality of WK/exchanges and add status of ageing

For Workshops per stock/species:

- Review the incorporation of the maturity information in the assessment process.

For WGs per stock:

- last exchanges and workshops
- last maturity update and warning when a new one is due
- status of age reading (traffic lights)

A small database for this use will be set up and hosted by the ICES secretariat. PGCCDBS will be responsible for the upkeep of the data. The database should be available for the different meetings.

8 Intersessional work 2008/2009

During the meeting a set of tasks were identified to be carried out until the 2009 PGCCDBS meeting. Such tasks are of extreme importance once that they allow to take over situations requiring a longer period to be dealt with than the duration of the meeting.

This section aims at reporting the tasks agreed, the task coordinator and the deadline (Table 8.1). A second objective of this section is to report on the otolith exchanges agreed to be carried out during 2008/2009. Most of these exercises aim at explore the need of setting a workshop based on its outcomes.

Table 8.1. Intersessional work, subject, coordinator and deadline.

SUBJECT	COORDINATOR	DEADLINE
Minimum sampling protocol (MSP) landings length sampling: check nationally – stock basis	Margaret Bell	Report to WKACCU End September
Setting up MSP for age	Willie McCurdy	Next PG
Explore the possibility of using EU control reports and if possible compile them.	ICES Sec and Jorgen Dalskov	Next PG
Testing data section proposal	Jorgen Dalskov, Ernesto Jardim, Christoph Stransky, Joel Vigneau	End of March to review tables and distribute to Stock coordinators. Report to next PG.
Cross check ICES assessment stocks with DCR species prioritization	Maris Plikshs and ICES Sec.	End of March, report to EC if there are problems.
Implementation study on mixed species sampling	Ken Coull + PGMED	Next PG + WGEF (Jan09)
Evaluate google groups and sharepoint to estabelish a forum for age readers	Gráinne Ní Chonchúir	asap

8.1 Otolith exchanges for 2008/2009

8.1.1 North Sea Plaice

The last North Sea plaice otolith exchange took place in 2003 in the margins of an EU-project. This exchange was followed by an informal workshop attended by UK, The Netherlands, France, Belgium, Denmark and Ireland.

Although there are no direct indications for problems with current age reading, following the schedule for age determination exchanges and workshops, an exchange for North Sea plaice is foreseen for mid 2009. In case the outcome of the exchange indicates the need for a workshop, a follow-up workshop will be organised in 2010. Loes Bolle (The Netherlands) will act as coordinator for both the exchange as well as the workshop.

The countries likely to participate in this exercise are the same countries that participated in the 2003 exchange and workshop: UK, The Netherlands, France, Belgium, Denmark and Ireland.

8.1.2 Mackerel

PGCCDBS 2008 identified that Mackerel, Spanish mackerel and Skip Jack mackerel were species that may benefit from an otolith exchange and the possibility of a future otolith reading workshop because it is many years since the last workshop. The relevant coordinators and age readers from Member States were contacted. The agreed perception was that an exchange of otoliths was overdue and would benefit all MS mackerel age readers.

Fisheries Research Services (FRS Scotland) has offered to organise and coordinate the exchange during 2008–2009. Contacts are Owen Goudie (O.J.Goudie@marlab.ac.uk) and Robert Watret (R.Watret@marlab.ac.uk).

The exchange will be for the species *Scomber Scombrus* only. An exchange of otoliths from Spanish mackerel, *Scomber colias*, could be arranged between Spain and Portugal only as these countries fish for the species. Skip Jack mackerel is from the Horse mackerel family (*Trachurus*) and will be excluded from the exchange.

There are several otolith readers in each country and they will be contacted to establish methods of reading so that samples can be prepared as part of the exchange set. Countries wishing to take part in this exchange (to date) are: UK – Scotland, UK – England, The Netherlands, Norway, Portugal, Spain (AZTI and IEO), Germany, Denmark and France.

8.1.3 Eel

ICES Comments on the Draft EU Guidelines for Eel Management Plans (EC regulation n° 1100/2007) noted that; monitoring of recruitment and catch should be continued and improved, that methods must be developed for evaluation the status of the stock and these should be progressed between now and 2012.

PGCCDBS identified that European eel should be included in their timetable for age calibration exchanges and workshops and that during 2009 an otolith exchange should be carried out with a view to determining the need for an age calibration workshop. At least two otolith preparation methods are used for European eel, burning + cracking/sectioning and sectioning + staining. Some cross validation within and between laboratories has been carried out, but formal validation does not exist at all age reading laboratories. Eels are marked and recaptured to estimate both the efficiency of stocking out elvers and the escapement of silver eels. The objectives of the exchange should be to:

1) compile information on laboratory procedures to include information on; sampling and storing of otoliths, equipment and preparation methods, processes and protocols used (QA), and how age readings are being checked within laboratories (QC).

2) conduct an eel otolith exchange to determine if an eel age reading (age calibration) is required.

Willem Dekker (The Netherlands) will act as coordinator for the exchange.

Participating countries likely to include: Belgium, Canada, Denmark, France, Germany, Ireland, Netherlands, Norway, Poland, Spain, Sweden, UK, England, UK, Northern Ireland, UK, Scotland.

8.1.4 Haddock

PGCCDBS 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. In the first instance 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.

The exchange will be coordinated by Gordon Henderson and Mandy Gault of Fisheries Research Services (Scotland) and Willie McCurdy of Agriculture - Food and Biosciences Institute (Northern Ireland).

During March 2008, the haddock otolith readers in each country will be invited to participate in the exchange. Otoliths to be used in the exchange will be identified by the coordinating individuals in the period April–June 2008. The exchange should take place during the period July–October 2008 with the preliminary analyses being completed during the period November 2008–January 2009.

Participating countries likely to include: UK–Scotland, UK–England, UK–Northern Ireland, Norway, Denmark, Sweden, Germany, France, Ireland.

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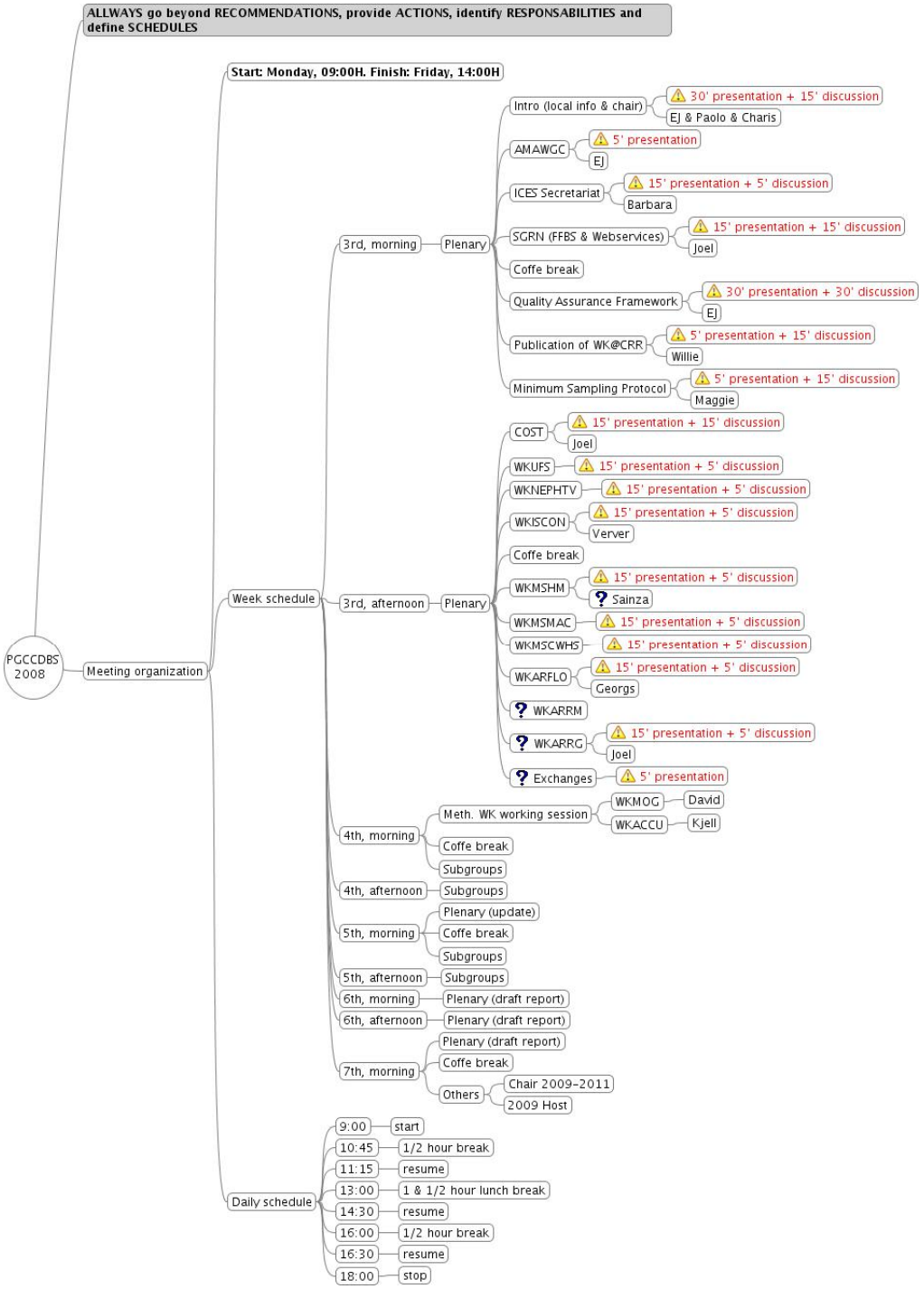
Annex 2: Agenda



Annex 3: PGCCDBS terms of reference for the next meeting

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

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

b) Review feedback from ICES Assessment Working Groups and other relevant Expert Groups or Workshops; Where appropriate propose actions to be taken within the ICES system;

c) Consider a report by the European Commission from the DCR Liaison Meeting and relevant STECF sub-groups on data collection issues. Where appropriate propose actions to be taken within the ICES system;

d) Review changes in data collection that may have a potential impact on stock assessment and advice;

e) Continue developing standards and best practises for sampling commercial fisheries. Review the workplan and actions taken so far for establishing standards and best practices and agree on a workplan for intersessional work;

f) Finalize the protocol guidelines for maturity staging workshops.

PGCCDBS will report for the attention of ACOM by xx March 2009.

Supporting Information

Priority:	
Scientific justification and relation to action plan:	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. 1543/2000 and 199/2008; 1639/2001 and 1581/2004). 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 Fish 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 Montpellier, France, as this meeting shall be held in parallel with the corresponding group for the Mediterranean EU fisheries (PGMED)
Resource requirements:	
Participants:	
Secretariat facilities:	
Financial:	

Linkages to advisory committees:	ACOM
Linkages to other committees or groups:	RMC
Linkages to other organizations:	DG Fish (DCR)

Annex 4: Workshop proposals

[WKPRECISE] Workshop on methods to evaluate and estimate the precision of fisheries data used for assessment

A **Workshop on Methods to evaluate and estimate the precision of fisheries data used for assessment** [WKPRECISE] (Suggested Co-Chairs: Michael Pennington & Sondre Aanes, IMR, Norway) will be held 12–15 October 2009 (dates to be confirmed) at the ICES HQ, Copenhagen, Denmark, to:

a) review the sources of variances and establish procedures to assess the precision on national level of fishery statistics (quantities landed, discards, fishing effort, CPUE) using available data, and advice on best practices;

b) review the sources of variability and establish procedures to assess the precision on national level of biological data collected from the fisheries.

c) suggest quality assurance indicators for the quantities described in a) and b) to be implemented by the quality assurance framework for assessment input data.

WKPRECISE will report by 30 October 2009 for the attention of PGCCDBS and ACOM.

Supporting Information

Priority:	Very high priority because variance and/or precision is crucial for guiding action. In fact, imprecise data may result in wrong decision, leading to disasterous assessments and to waste of resources. It was decided that this workshop will follow after the WKACCU workshop which solely focus on accuracy.
Scientific ustification and Relation to Action Plan:	In the current DCR and other national sampling programs and -strategies, data quality is almost solely addressed by means of target precision levels for a number of fishery-related and stock-related parameters (fishing effort, quantities landed and discarded, age composition of the landings and discards, growth curves, maturity and fecundity ogives, etc.). However, it is not because an estimate is precise that it is also accurate. The workshop will aim at establishing standardized/joint methods and indicators for evaluating and estimating the precision of submitted fisheries data. Definitions of standards (i.e., minimum requirements) should be made. Some laboratories have already developed suitable tools for such precision estimation, e.g., the EU COST-project (EU FISH/2006/15:lot 2) and the Norwegian ECA-model may contribute to this issue.
Relation to Strategic Plan:	
Resource Requirements:	DCR (EU Data Collection Regulation) data collection system, and other national systems and data sources.
Participants:	In view of its relevance to the DCR, the Workshop is expected to attract wide interest from both ICES Member States and Mediterranean EU Member States. The workshop will benefit from the attendance of managers, fishers and people from the fishing industry.
Secretariat Facilities:	ICES HQ general facilities
Financial:	To ensure wide attendance of relevant experts, additional funding will be required, preferably through the EU, e.g. by making attendance to the Workshop eligible under the DCR.
Linkages to Advisory	ACOM and its assessment Working Groups.

Committees:	
Linkages to other Committees or Groups:	This workshop was proposed by PGCCDBS. Outcomes from this Workshop will be of interest to the Living Resources Committee and the Resource Management Committee.
Linkages to other Organisations:	There is a direct link with the EU DCR and outcomes from this Workshop will be of interest to several RFOs, including NEAFC, JNRFC, GFCM and NAFO.
Cost Share:	

[WKSMRF] Workshop on Sampling Methods for Recreational Fisheries

A **Workshop on Sampling Methods for Recreational Fisheries** [WKSMRF] (Co-chairs Dave Van Voorhees, US, and Mike Armstrong, UK) will be held from 14-17 April 2009 in Nantes, France:

a) Provide a comprehensive description of the marine recreational fisheries in each EU country including the species/stocks targeted, the potential or known magnitude of recreational catches and effort by geographic area, time period and fishing method, and the definition of appropriate reference populations of recreational fishermen for sampling;

b) Review the findings of existing studies on EU recreational fisheries including DCR Pilot Studies and their relevance for sampling schemes in other areas;

c) Recommend appropriate statistical sampling schemes and associated data analysis for estimating recreational fishery removals and length/age compositions, taking account of international experience and recent methodological developments. Review potential for conducting parallel studies to establish comparability of results for different sampling schemes.

WKSMRF will report by 1 March 2009 for the attention of PGCCDBS and ACOM.

Supporting Information

Priority:	High. The revised Data Collection Regulation (DCR) will require multi-annual Community programmes for collection, management and use of biological, technical, environmental and socio-economic data from commercial and recreational fisheries. There is an urgent need to provide Member States with guidelines for statistically robust sampling and data analysis schemes and to ensure the harmonisation of methods across geographic areas.
Scientific Justification and Relation to Action Plan:	EC Regulation 1639/2001 required the establishment of pilot projects on recreational fisheries for salmon in the North Sea and Baltic and bluefin tuna in all areas, and the EC Regulation 1581/2004 added cod in specified ICES areas. To date there have been few DCR pilot projects carried out, notably on Baltic cod. Other studies on recreational fisheries have been carried out by some Member States in the ICES and Mediterranean areas. However, there are very few estimates of recreational catches throughout EU waters, and sampling schemes are poorly developed. The revised DCR from 2009 onwards will require estimation of fishery removals of all important species on a fleet-fishery basis including recreational fishing, to support fishery management and evaluation of environmental and ecosystem impacts of fisheries. Terms of Reference (a) and (b) of the Workshop will develop an overview of the nature, magnitude and potential impacts of recreational fisheries in EU waters in the ICES and Mediterranean areas, as a basis for developing appropriate sampling schemes. Term of Reference (c) will build on the experiences gained in existing EU studies, and in countries such as the United States and Australia which have well-established recreational fishery

	sampling programmes, to develop generic guidelines for designing statistically robust surveys and sampling schemes for collecting data on EU recreational fisheries. The Workshop will draw on the outcomes of the 2008 ASC Theme Session on. Small-scale & Recreational Fisheries Surveys, Assessment, and Management. In order for the Workshop to succeed, the following tasks need to be completed by each participating country prior to the meeting: a) Preparation of a Working Document describing the recreational fisheries occurring in each ICES Division, according to fishing method groupings that could be used for defining the populations for sampling (e.g. shore fishing, private boats, charter boats). Information should be given (where known) on target and by-catch species, spatial and seasonal patterns of fishing, qualitative or quantitative information on catches, fishing effort (e.g. numbers of anglers x number of days spent fishing by method, area and time period), potential for access-point and other forms of direct catch and effort surveys, likely sources of bias, and any other factors relevant to the establishment of statistical survey and sampling schemes to estimate total effort, catches and size compositions. A pro-forma for key information will be provided to facilitate inclusion of consistent information in the Workshop report.
Relation to Strategic Plan:	
Resource Requirements :	
Participants :	In view of its relevance to the DCR, the Workshop is expected to attract a wide participation from Member States in the ICES and Mediterranean areas. There will be a requirement for participants with detailed knowledge of national recreational fisheries, as well as international experts on statistical design of recreational fishery survey and sampling schemes.
Secretariat Facilities:	
Financial:	To ensure wide attendance of relevant experts, additional funding will be required, preferably through the EU, e.g. by making attendance to the Workshop eligible under the DCR and providing funding for invited overseas experts.
Linkages to Advisory Committees:	ACOM
Linkages to other Committees or Groups:	ICES Resource Management Committee.
Linkages to other Organisations:	There is a direct link with the EU DCR. Outcomes from this Workshop will be relevant to several regional fisheries organisations and advisory bodies, including ICES, NAFO, GFCM, STECF and others.
Cost Share:	

[WKAEH] Workshop on Age Estimation of European hake

The **Workshop on Age estimation of European hake** [WKAEH] (Chair: Carmen Piñeiro, SP) will take place in C.O. in Vigo, (IEO) Spain, by October–November 2009.

Terms of References:

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 hake otoliths from Southern stock.

d) To revise the age estimation procedures and explore the possibilities to use supplementary information for validating estimated age structures, this include:

i) Otoliths weight distributions

ii) Length distribution in surveys and catches.

e) To develop mathematical methods for estimating hake 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

Supporting information:

An otolith exchange exercise for European hake (*Merluccius merluccius*) will carry out during 2008 aimed to deal with problems of hake age estimation. Following the outcome of this exercise, IEO is going to organize a workshop and the end of 2009.

Up to now France, Portugal, Spain, Ireland and England were participating in the otolith exchanges and workshops. However the age estimation of hake is a complex task that requires also a concerted effort to join international experts on growth, age estimation and Scientists involved in assessment in order to progress towards a solution.

Priority:	Age determination is an essential feature in fish stock assessment to estimate the rates of mortalities and growth. Assessment of hake 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 hake which has been subject of concern of ICES WG HMM and make progress towards a solution.

Scientific justification and relation to action plan:	Hake age estimation method has not been validated although progress has been made regarding precision on age data along the last decade: international reading otoliths exchanges and workshops (1997, 1999, 2001, 2003, 2004). The results obtained indicated that the confident age range dropped from 5 to 3 years old, since WK2001 and this loss of precision is associated with applying ageing criteria, which are not validated. This problem has a potential effect on the drift of individual readers through time that is not evaluated since 2004. 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.
Ressource 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:	Additional funding will be required for facilitate the attendance of the scientists. The workshop will be eligible under the EU - DCR.
Linkages to advisory committees:	
Linkages to other committees or groups:	
Linkages to other organizations cost:	There is a direct link with the EU DCR and outcomes from this Workshop will be of interest to ICES WGHMM.
Secretariat marginal cost share:	

[WKARA] Workshop on Age Reading of European Anchovy (*Engraulis encrasicolus*)

A **Workshop on Age reading of European anchovy** [WKARA] (Co-Chairs: Gualtiero Basilone, Italy and Enrico Arneri, Italy); will be held from 9-14 November 2009 in Mazara del Vallo, Italy:

a) Produce a reference collection from different ecosystem (different growth rates) for (*Engraulis encrasicolus*).

b) Review information on sampling requirements, age determination and validation techniques on this species;

c) Compare different otolith-based age determination methods;

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

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

f) Create a reference collection of otoliths and start the development of a data base of otolith images;

Supporting Information

Priority:	Age determination is an essential feature in fish stock assessment to estimate the rates of moralities and growth. In order to arrive at appropriate management advice ageing procedures must be reliable. Otolith processing methods and age reading methods might differ considerably between countries. Therefore, otolith exchanges should be carried out on a regular basis, and if serious problems exist age reading workshops should be organised to solve these problems.
Scientific Justification and Relation to Action Plan:	The aim of the workshop is to identify the present problems in Engraulis encrasicolus age determination, assess variability of growth patterns among different ecosystems, improve the accuracy and precision of age determinations and spread information of the methods and procedures used in different ageing laboratories. An otolith exchange will start in 2008 and at the workshop, in 2009, results from the otoliths circulation will be presented and discussed.
Relation to Strategic Plan:	Actually, in the frame of DCR, age determination is performed according to different age assigning criteria used locally in the scientific Institutions which deal with this topic. The need of a common and standardized system for unique identification of pattern of otolith rings deposition in fish have to be considered as an important priority to optimize DCR.
Resource Requirements:	DCR data collection system.
Participants:	In view of its relevance to the DCR, the Workshop is expected to attract wide interest from both Mediterranean and Atlantic areas ICES, NAFO, GFCM.
Secretariat Facilities:	None
Financial:	To ensure wide attendance of relevant experts, additional funding will be required, preferably through the EU, e.g. by making attendance to the Workshop eligible under the DCR and providing funding for invited overseas experts.
Linkages to Advisory Committees:	There is a direct link with the EU DCR and outcomes from this Workshop will be of interest to several RFOs.
Linkages to other Committees or Groups:	There is a direct interest from several international (ICES, NAFO GFCM) advisory committees for a common effort toward the standardization of ageing procedures.
Linkages to other Organisations:	There is a direct link with the EU DCR.
Cost Share:	

[WKACM] Workshop on Age Calibration of Red mullet *Mullus barbatus* and Striped mullet *Mullus urmuletus*

A **Workshop on Age reading of Red mullet *Mullus barbatus* and Striped mullet *Mullus urmuletus*** [WKACM] (Chair: Chryssi Mitilineou, Greece); will be held from 6-10 April 2009 in Boulogne sur Mer (France).

An otolith exchange exercise for both *Mullus* species (i.e. *Mullus barbatus* and *Mullus surmuletus*) started during 2007 aimed to deal with possible problems of *Mullus* ageing. Up to now France, Spain, Italy, Cyprus, UK and Greece are participating in the otolith exchange exercise.

Terms of Reference:

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

b) Compare different otolith-based age determination methods;

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

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

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

Priority:	Age determination is an essential feature in fish stock assessment to estimate the rates of moralities and growth. In order to arrive at appropriate management advice ageing procedures must be reliable. Otolith processing methods and age reading methods might differ considerably between countries. Therefore, otolith exchanges should be carried out on a regular basis, and if serious problems exist age reading workshops should be organised to solve these problems.
Scientific justification and relation to action plan:	The aim of the workshop is to identify the present problems in *Mullus* spp. age determination, improve the accuracy and precision of age determinations and spread information of the methods and procedures used in different ageing laboratories. A number of samples of otoliths is circulating (2007) among different laboratories to assess the precision of age readers. At the workshop, in 2008, results from the otoliths circulation will be presented and discussed.
Resource requirements:	
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:	Additional funding will be required for facilitate the attendance of the scientists. The workshop will be eligible under the E.U. - DCR.
Linkages to advisory committees:	
Linkages to other committees or groups:	
Linkages to other organizations:	There is a direct link with the EU DCR and outcomes from this Workshop will be of interest to several RFOs
Secretariat marginal cost share:	

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

A Workshop on Sexual Maturity Staging of sole, plaie, dab and flounder [WKMSSPDF] (Chairs: Ingeborg de Boois and Cindy van Damme, The Netherlands) will be established and will take place in IJmuiden, Netherlands in November 2009 to:

a) Compare applied maturity scales and main criteria followed by the scientists/technicians involved in the national sampling, to classify each maturity stage for males and females.

b) Validate macroscopic maturity determination with histological analysis.? To be checked

c) Standardise the criteria to classify each maturity stage.

d) Propose a common scale, with common classification criteria, to be used by all laboratories.

e) Identify the optimal sampling time to estimate maturity ogives.

WKMSSPDF shall report to XX.

Supporting Information

Priority:	The maturity stage is an important biological parameter to be used in the calculation of maturity ogives (and therefore of Spawning Stock Biomass), for the definition of the spawning season of a species, for the monitoring of long-term changes in the spawning cycle, and for many other research needs regarding the biology of fish.
Scientific justification and relation to action plan:	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) has the goal of measuring in what extent the criteria to classify maturity stages is coherent between technicians, and to identify where are the major sources of disagreement. TOR b) validate with histological analysis the macroscopic maturity stage, mainly the resting stages that are incorrectly classified as immature. With TOR c) it is intended to minimise those sources of disagreement, by discussing the structure and the criteria to be used in the common scale. The expectation of TOR d) 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. The TOR e) is to selected the spawning season period considered to estimate maturity ogive. It is recommended that the Workshop be organised in 2009.

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. For all species, the sampling parameters are: total length; gonad visual inspection - maturity stage by a standard maturity scale and the usual maturity scale used by the institute; total weight; gonad weight; liver weight; gutted weight; gonad photo; age; histological maturity stage; microscopic preparation photo. This workshop will be based on the analysis of both digital photos of gonads and fresh gonads. Therefore facilities suitable to examine fresh biological material must be available during the workshop. It would be necessary to have a web server for storage and easy access to the photos collected by the participants before the workshop.
Participants:	In view of its relevance to the DCR, the Workshop is expected to attract wide interest from ICES Member States that participate in biological sampling of sole, plaice, dab and flounder.
Secretariat facilities:	
Financial:	To obtain all biological data before the Workshop, funding is needed for buying fresh ungutted fish, to estimate age and to process gonads histology. To ensure wide attendance of relevant experts, additional funding will be required, preferably through the EU, e.g. by making attendance to the Workshop eligible under the DCR.
Linkages to advisory committees:	
Linkages to other committees or groups:	This workshop is proposed by PGCCDBS. Outcomes from this Workshop will be of interest to all Working and Study Groups related to sole, plaice, dab and flounder, namely WGNSSK, WGBFAS, WGSSDS and WGNSDS, as well as to survey groups like the IBTSWG and WGBEAM.
Linkages to other organizations:	There is a direct link with the EU DCR.

[WKMSC] Workshop on Maturity Staging of Crustaceans (*Aristeus antennatus, Aristaeomorpha foliacea, Parapenaeus longirostris, Nephrops norvegicus*)

A **Workshop on crustaceans (*Aristeus antennatus, Aristaeomorpha foliacea, Parapenaeus longirostris, Nephrops norvegicus*) maturity stages** (Chair: Giulio Relini and Lidia Orsi-Relini, Italy) will be established and take place in Genova, Italy, by early 2009 (February):

a) Compare the macroscopic maturity scales for *Aristeus antennatus, Aristaeomorpha foliacea, Parapenaeus longirostris, Nephrops norvegicus* used in the different laboratories;

b) Standardizes the criteria to classify each maturity stages to be used for DCR and discuss on the existing maturity scales;

c) Formulate conversion rules to make possible the correspondence between the locally used scales and the common ones;

d) Validate the macroscopic maturity stages according to the common standardized scales eventually using histological confirmation;

e) Standardize the criteria to classify each maturity stage;

f) Propose a common scale, with common classification criteria, to be used by all laboratories;

g) Use of digital photos to identify the maturity stages for the different species.

WKMSC will report to RCM Med, PGMed and PGCCDBS by end of 2009.

Supporting information

Scientific justification and relation to action plan:	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 formally 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 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 each scientific Institution should collect digital photos of maturity stages as much is possible.
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:	None
Financial:	Attendance to the Workshop is eligible under the 2009 DCR
Linkages to advisory 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 organisations:	There is a direct link with the EU DCR

Annex 5: PGCCDBS Guidelines for Otolith Exchanges

PGCCDBS Guidelines for Otolith Exchanges

3–7 March 2008

Nicosia, Cyprus

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. 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. 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".

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.

Timetable

Small-scale exchanges consisting of relatively few recently collected otoliths 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. If the small scale exchanges reveal reading problems that need to be addressed, then a larger exchange must be carried out in preparation for a workshop. 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.

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 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 co-ordinator. The co-ordinator should recommend sending the sets by special courier in order to speed up the exchange and to reduce the possibility of losing one of the sets.

Analysing the Exchange Results

There are several ways of comparing age readings. However, the best way is by making age bias plots, which are easy to understand for the age readers (ICES, 1994 and Campana *et al.*, 1995). The "Age Comparison Tool" (Eltink *et al.*, 2000) offers an easy tool to analyse the data. The output of this tool is now widely used within fisheries laboratories in Europe.

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 6: PGCCDBS Guidelines for Workshops on Age Calibration

PGCCDBS Guidelines for Workshops on Age Calibration

3–7 March 2008

Nicosia, Cyprus

Introduction

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

Problems Indicated by the Exchange.

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

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

Topics to Consider When Preparing for a Workshop

The following topics can be and all should be considered:

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

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

Workshop Participants

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

Experimental Design in Age Reading Workshops

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

It is important to avoid running the before and after comparisons on exactly the same set of otoliths. This is necessary if there are small numbers of otoliths but otherwise is undesirable as improvements seen in agreement may be from remembering specific cases and not apply in general. The procedure for generating two sets of otoliths for comparison of exchange and workshop results should be: Define the relevant strata and assign otoliths by strata randomly to either the first or second set. The two sets do not have to be the same size. When the first set is for the exchange and the second set for the end of the workshop it is sensible to make the second set smaller. If the age workshop coordinator can specify changes in reading bias or CV that are biologically meaningful to detect then sample size calculations can be carried out to help decide how big the data sets should be.

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

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

Generic ToRs for ageing workshops

a) Provide information on participating laboratory procedures

- Sampling and storing of calcified structures.

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

b) Resolve interpretation differences between readers and laboratories.

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

c) Create or update an ageing manual

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

d) Collate agreed age reference collection.

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

e) Formulate follow-up actions

See the guidelines in the following section

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

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

Guidelines for follow-up actions

Dissemination of the results

Dissemination of the results is in principle the responsibility of the coordinator of the exchange and/or workshop. The full report of the workshop should be made available on the internet, and placed (in pdf-format) in the PGCCDBS document repository (http://www.ices.dk/reports/acfm/pgccdbs/PGCCDBSdocrepository.asp).

An extended summary of all workshops and exchanges should be submitted to PGCCDBS and to the relevant working groups. This extended summary should provide sufficient information to enable the working group to judge whether or not the quality of the ageing data (by country) is sufficient to include the data in a quantitative stock assessment.

The extended summary should contain the following information:

1) Description of sets of calcified structures included in the exchange and/or workshop:
2) The number of calcified structures in each set
3) Composition (age and/or length structure, area)
4) Preparation methods
5) Images available?
6) Description of participants (numbers per country etc.)
7) Number of readers, laboratories and countries
8) Expertise level of each reader (trainee, intermediate, experienced)
9) Which readers provide ageing data to the WG's
10) Which laboratories provide ageing data to the WG's but are not represented in calibration
11) Accuracy and precision estimates
i) Percentage agreement, CV and bias by age group
ii) Only readers providing data to WG's
iii) Readers combined
iv) By reader (anonymous, but lab/country stated)
v) If relevant, by stratum (spatial and/or temporal differentiation
12) Summarise currently existing ageing problems, either detected in exchange or not solved in workshop.
13) Evaluation of quality of age data provided to WG
i) Preferably a quantitative evaluation (i.e. in relation to target and threshold statistics)
ii) If not possible then a qualitative evaluation
14) A list of the expert groups to be informed.

Specific follow-up actions

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

- Validation exercises must always be encouraged. A continuous comparison of age readings does not always solve the problem (an example to be learned from: the bias in hake ageing).

- In some species in which the contrast between the structures is poorly visible it may be advisable to improve preparation methods.
- If one or a few readers are disagreeing with the majority of experienced readers, then small scale regional exchanges and/or meetings can be organised.
- If interpretation problems of the first annuli are occurring, then back-calculated growth can provide an indication on the correct interpretation. If samples of '0'-group fish are available throughout the 1st year of life, the period of annual translucent zone may be determined by marginal incremental analysis.

If age reading protocols are not available for all participants this should be remedied.

Annex 7: PGCCDBS Guidelines for Workshops on Maturity Staging

This document was drafted during the 2008 PGCCDBS meeting, 3–7 March in Nicosia, Cyprus.

Basic protocols required for maturity workshops:

a) Consider outcomes of similar species specific workshops when embarking on a species specific workshop.

b) Identify sources of data that, at present, are used to collect maturity data and their current sampling protocols.

c) Gather information on the reproductive biology of the species / stock of concern with emphasis on the timing of the different stages of the reproductive cycle.

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 in report of WKMSCWHS, 2007.

e) Identify the metadata that are needed to accompany samples collected for analyses and include in sampling protocols. This may include:

- Location of sample collection
- Date of sample collection
- Total length
- Sex
- Maturity (as noted at time of collection)
- Total weight
- Gonad weight
- Liver weight
- Gutted weight

f) Provide detailed protocols on collection of images required for fish and ovaries sampled.

g) Gather information on how the data are, or could be used, in the assessment process.

h) Maintain contact with participating countries to ensure adequate sample coverage is obtained prior to workshop sample analyses.

i) 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 ensured adequate samples are validated. Consider bi-lateral agreements to cover costs of such work.

j) 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.

k) 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.

l) Provide statistical report on comparison of observed maturity stage with validated histological stage for consideration of workshop participants.

m) The minimum output from species specific workshops should be an illustrated manual.

Annex 8: Recommendations

RECOMMENDATION	FOR FOLLOW UP BY TO:	TIMEFRAME
Test reporting system from AWG to EC/DCR and PGCCDBS (Section 3.2).	Jørgen Dalskov, Ernesto Jardim, Christoph Stransky and Joël Vigneau	PGCCDBS 2009
WKISCON report to be distributed	ICES Sec. to forward to EG.	asap
WKUFS report to be distributed	ICES Sec. to forward to EG.	asap
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
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
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
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
Liaison meeting recommendations to be forwarded.	ICES Sec. to forward to LM.	asap
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
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.	
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.
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 intersessionaly.	WKACCU 2008, PGCCDBS 2009
PGCCDBS recommends the quality assurance framework described in Section 6.2 to be implemented.	ICES Sec.	
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
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.	

RECOMMENDATION	FOR FOLLOW UP BY TO:	TIMEFRAME
PGCCDBS recommends the guidelines for otoliths exchange and guidelines for age calibration workshops to be included on the PGCCDBS repository.	ICES Sec.	asap
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.	
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
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
Set up a minimum sampling protocol for collection of otoliths.	Willie McCurdy will coordinate this work intersessionally.	PGCCDBS 2009
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
Evaluate google groups and sharepoint to establish a forum for age readers.	Gráinne Ní Chonchúir will coordinate this work intersessionally.	asap
PGCCDBS recommends an otolith exchange of North Sea Place.	Loes Bolle	PGCCDBS 2009
PGCCDBS recommends an otolith exchange of Mackerel.	Owen Goudie and Robert Watret	PGCCDBS 2009
PGCCDBS recommends an otolith exchange of Eel.	Willem Dekker	PGCCDBS 2009
PGCCDBS recommends an otolith exchange of Haddock.	Gordon Henderson, Mandy Gault and Willie McCurdy	PGCCDBS 2009
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.	
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.	
PGCCDBS recommends a Workshop on Age Calibration of Red mullet (Mullus barbatus) and Striped mullet (Mullus urmuletus) [WKACM] (See full proposal in Annex 4).	ICES Sec. to send to Council for approval.	
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.	
PGCCDBS recommends a Workshop on crustaceans (*Aristeus antennatus, Aristaeomorpha foliacea, Parapenaeus longirostris, Nephrops norvegicus*) maturity stages [WKMSC] (See full proposal in Annex 4).	ICES Sec. to send to Council for approval.	