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

17–21 February 2014

Horta (Azores), Portugal

ICES International Council for the Exploration of the Sea

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Executive summary

The Planning Group on Commercial Catches, Discards and Biological Sampling [PGCCDBS] (Co-Chairs: Mike Armstrong, UK, and Gráinne Ní Chonchúir, Ireland) met in Horta, the Azores, 17th February – 21st February 2014.

The PGCCDBS was established in 2002 in response to the EC-ICES Memorandum of Understanding (MoU) requesting ICES to provide support for the EU Data Collection Framework (DCF). It implements the ICES Quality Assurance Framework to ensure that data sets and parameters supporting assessments and advice for the ICES area are based on i) statistically-sound sampling schemes; ii) correct and consistent interpretation of biological material such as otoliths and gonads; iii) technology that improves accuracy and cost-effectiveness of data collection; iv) comprehensive and easily sourced documentation, and v) efficient collaboration between PGCCDBS, expert groups and other bodies in relation to data collection.

The 2014 meeting of PGCCDBS focused on work completed since last year, and planned work for 2014 and 2015, in the following topics which formed the basis of the Terms of Reference:

- Stock-based biological parameters from sampling of fishery and survey catches (age, growth, maturity, fecundity, sex ratio)
- Fleet/métier related variables (discards estimates and length/age compositions of landings and discards) and statistical design of sampling schemes
- Data collection technology and databases (hardware, and software such as WebGR and the Regional Data bases).
- Implementation of the ICES Quality Assurance Framework
- Addressing recommendations and requests for advice from ICES expert groups (including through PGCCDBS data contact persons), and RCMs.

PGCCDBS met in plenary to review the outcomes of a wide range of workshops and age exchanges conducted since PGCCDBS 2013 and the work plan for 2014. On the basis of this and the PGCCDBS long term planning process, further workshops and exchanges were proposed for 2015 and beyond. These include:

- *Age and maturity workshops:*
- *Sampling design workshops:*
- *Large-scale age exchanges:*

PGCCDBS 2014 also updated the list of national age readers and co-ordinators, and this updated list was uploaded onto the European Age Readers Forum (EARF).

Other proposals developed by PGCCDBS are:

- *Proposals for study contracts* on
  - Collaborative Study on anglerfish (Priority 1)
  - Collaborative Study on improvement of WebGR (Priority 1)
  - Improving accuracy in fish age estimation through understanding of the link between environmental conditions and physiological responses recorded in the otolith macrostructure (Priority 2)

- Exploration and Development of new facilities in RDB-FishFrame 5.0 (Priority 1)
- Support design based regional data collection programmes (Priority 1)

PGCCDBS further developed a work plan for intersessional work to more widely test prototype Quality Assurance reports for fishery sampling with selected ICES stock assessment expert groups, for evaluation by WGCATCH in November 2014.

The new ICES Working Group on Commercial Catches (WGCATCH) and the Working Group on Biological Parameters (WGBIOP) will take over many of the responsibilities of PGCCDBS. Cessation of PGCCDBS would lose many other important capabilities. A proposal was developed for a major revision of the PG to focus more on the end use of data. Renamed as the Planning Group on Data Needs for Assessment and Advice (PGDATA), the new group would: design a Quality Assurance Framework for assessment EGs to evaluate data quality and its impact on assessments, particularly within the benchmarking process, and test this in regional case studies; develop and test analytical methods for identifying improvements in data quality, or collections of new data, that have the greatest impacts on the quality of advice; engage with end users (ICES EGs & SSGs, RCMs/RCGs; stakeholder Advisory Committees, STECF, European Commission and other RFMOs) to raise awareness of what types and resolution of management decisions (e.g. by fleet or area) can realistically be supported by present or proposed data collections; advise on objective methods to apply criteria (e.g. as proposed by STECF EWG 13-02 on Review of DC-MAP) for evaluating requests by end-users for new or amended data collections within the new DCF/DC-MAP; and plan workshops and studies focused on specific methodological development needs. The proposal will be submitted to ACOM and SCICOM for consideration.

1 Introduction

1.1 Terms of Reference

2013 /ACOM. The **Planning Group on Commercial Catches, Discards and Biological Sampling** [PGCCDBS] chaired by Mike Armstrong, UK, and Gráinne Ní Chonchúir, Ireland, will meet in Horta (Azores), Portugal from the 17th –21st of February 2014.

a) Review last year's PGCCDBS recommendations and responsive actions taken.
b) Review the outcomes of workshops, study groups, exchange schemes and other intersession work related to sampling design, collection, interpretation and quality assurance of data on stock-related biological variables (age and growth; maturity and fecundity; sex ratio).
c) Review the outcomes of workshops, study groups and other intersession work related to sampling design, collection, interpretation and quality assurance of data on fleet/métier related variables (discards estimates and length/age compositions of landings and discards).
d) Respond to data issues reported to PGCCDBS by ICES Expert Groups, Assessment Working Groups (including PGCCDBS-AWG contact persons) and RCMs by providing advice on suitable actions and responsibilities for those actions.
e) Evaluate the future structure of this EG considering the establishment of two new experts groups dealing with sound statistical catch sampling (WGCATCH) and quality assurance of biological parameters (WGBIOP).

PGCCDBS will report by 28th March 2014 for the attention of ACOM.

Note that PGCCDBS and PGMED no longer meet in parallel.

The European Commission sent a query to PGCCDBS, at short notice, to provide responses on two additional topics:

- to prepare a real example of how the change from metier-based 'quota' sampling to stock-based sampling at a regional level will lead to reductions in the number of samples needed;
- to review an extract regarding data quality issues as provided to the stakeholder meeting on revision of the Data Collection Framework following STECF EWG 13-18 in 2014.

1.2 Participants

The list of participants for PGCCDBS is given in Annex 1

1.3 Purpose and scope of PGCCDBS

The PGCCDBS was established in 2002 in response to the EC-ICES Memorandum of Understanding (MoU) requesting ICES to provide support for the EU Data Collection Framework (DCF; EC Reg. 199/2008, 665/2008; Decisions 2008/949/EC and 2010/93/EU).

The PG implements the ICES Quality Assurance Framework to ensure that data sets and parameters supporting assessments and advice for the ICES area are based on i) statistically-sound sampling schemes; ii) correct and consistent interpretation of biological material such as otoliths and gonads; iii) technology that improves accuracy

and cost-effectiveness of data collection; iv) comprehensive and easily sourced documentation, and v) efficient collaboration between PGCCDBS, expert groups and other bodies in relation to data collection.

The work of the PG is structured around developing standards and guidelines for the types of data required by the DCF, principally:

- Stock-based biological parameters from sampling of fishery and survey catches (age, growth, maturity, fecundity, sex ratio)
- Fleet/*métier* related variables (discards estimates and length/age compositions of landings and discards) and statistical design of sampling schemes.

The general approaches adopted by PGCCDBS to fulfil its remit include:

- Establishing and implementing a longer-term plan for inter-calibration studies that include age reading and maturity staging and deal with promoting agreement among scientists classifying calcified age structure (e.g. otoliths) and gonads of specific species or groups of species.
- Proposing methodological workshops and study groups to establish the basis for interpretation of biological material, sampling survey design, statistical analysis of data and development of data quality indicators. These workshops are generally applicable to most areas, species and fisheries.
- Development of proposals for EU-funded Studies Contracts to allow more in-depth methodological studies addressing key issues within the scope of PGCCDBS & PGMED.
- Responding to data quality issues highlighted by ICES Expert Groups and Regional Coordination Meetings (RCMs) and identifying additional work needed to address these.
- Development of new technologies to improve the cost-effectiveness and accuracy of data collection.

The success of calibration exercises and workshops requires a substantial amount of preparatory work in the laboratories. This preparatory work is the responsibility of the national laboratories. ICES has been informed that this work is included in the DCF National Programmes.

All workshops are carried out as official ICES workshops and the reports stored on the "PGCCDBS Documents Repository", in PDF format and available to the public http://ices.dk/community/Pages/PGCCDBS-doc-repository.aspx#meth maintained by the ICES Secretariat.

As many of the activities of PGCCDBS are closely linked to the activities of the DCF, DG MARE is a member of the PG to ensure coordination with the DCF activities although did not attend in 2014. 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.

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

1.4 Cooperation and Links with PGMed

The main role of the PGCCDBS is to plan and coordinate the collection of data for stock assessment purposes and thus, to provide support to the Data Collection Framework. Following the proposal of the 2006 3rd Liaison Meeting, a specific planning group for the Mediterranean was created (PGMed) and met for the first time jointly with the 2007 PGCCDBS meeting in Malta (5th – 9th March 2007). Although organised as an autonomous group, it was agreed among all scientists that the contact and cooperation between the Mediterranean area and the ICES area (PGCCBDS) should be promoted and maintained.

During 2013 it was decided that in 2014 the PGMed would meet together with the RCM for the Mediterranean, and hence in 2014 PGCCDBS no longer met in parallel with PGMED. However, there remain strong common interests between the two planning groups in relation to quality assurance of biological parameter estimates, fishery sampling design, workshops, study proposals and other topics.

Since in 2014 the two meetings, PGMed and PGCCDBS, did not take place at the same time, the PGCCDBS report will be forward to PGMed, for information.

1.5 Work plan for 2014 PGCCDBS meeting

The meeting was structured as a mixture of plenary sessions and two subgroups working separately to address ToRs dealing with stock based biological variables and fleet-based biological data.

The plenary sessions mainly included presentations of the outcomes of workshops that took place since the previous PG meeting, presentations on other relevant topics (such as a presentation on the progress towards the new DC-MAP), periodic updates of subgroup progress, review of proposals for exchanges, workshops and studies, and review of key pieces of text for the report.

The subgroups were tasked with:

- Reviewing outcomes of the exchanges, study groups and workshops in 2013;
- Reviewing the programme of exchanges study groups and workshops in 2014;
- Proposing new exchanges, study groups, workshops and studies contracts for 2015 onwards, and drafting the ToRs and supporting information;.
- Responding to Expert Group (EG) and RCM recommendations relevant to the subgroup;
- Other specific tasks such as review of progress on regional data bases, development of WebGR, views of the PGCCDBS on its future role and mode of operation, updating age readers contact lists etc.;

An important outcome of the PG meeting is clear statement of actions, responsibilities and schedules to fulfil the tasks proposed.

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

In 2012 The PGCCDBS looked at how to streamline the system of recommendations between Expert Groups, RCMs, PGCCDBS and Liaison Meeting to make the process simpler, more effective and easier to track the outcomes. ICES had created a very useful recommendations database for recommendations from ICES EGs, but the number of recommendations moving around the different groups had increased and was becoming unmanageable. At the WGCHAIRS meeting 2012 the chairs of PGCCDBS proposed a limit of five recommendations per expert group. This suggestion was adopted by all and has resulted in a much reduced and more manageable list of recommendations for PGCCDBS to respond to this year.

1.6 Publication of PGCCDBS Outputs

PGCCDBS continues to promote the idea that the work done in (a group of) certain workshops should be published under the ICES Cooperative Research Report series (CRR) when ready for synopsis. Such a publication should constitute a major contribution to the literature by reporting the state of the art of scientific knowledge regarding a species or a group of species, or a development of methods. It is our view that this process will promote quality of this work and will constitute an important recognition of the scientists involved. An ICES cooperative research report (CRR) on protocols on the ageing of different fish species in the ICES area is currently in preparation and is intended to be completed by December 2014

PGCCDBS has been a major driver in promoting the application of statistically-sound sampling schemes for collection of biological and fishery data, through workshops including WKACCU, WKPRECISE, WKSMRF, WKMERGE and WKPICS. A proposed output of the WKPICS1-3 series is a reference book on catch sampling with contemporary methodology and examples, which is presently missing from the fisheries literature. This continues to be an aspiration of WKPICS and PGCCDBS.

1.7 Organisation of the report

This report is organised by Terms of Reference (ToR). A set of annexes is added including the list of participants, agenda, the WK proposals and recommendations, as well as other information that is too large for the main part of the report.

2 Review last year's PGCCDBS recommendations and responsive actions taken (TOR a)

PGCCDBS 2013 made only one recommendation to external groups. This was submitted to the RCMs in 2013.

PGCCDBS 2013 recommendations:

Recommendation	Addressed to	Responsive action
RCMs/RCGs provide measures of achievement both as numbers of sampling events and as numbers of fish measured or aged.	Regional Coordination Meetings / Groups	Reported to, and considered by, the RCMs in 2013

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

Reports on workshops completed in 2013 can be found at the following link, http://ices.dk/community/Pages/PGCCDBS-doc-repository.aspx#meth and are also presented in summary in sections 3.1 and 3.2 respectively.

From 2015, the PG work covered by this ToR will transfer to the new ICES Working Group on Biological Parameters (WGBIOP). The proposal for this was developed by WKNARC2, after the PGCCDBS 2013 meeting. The background to this is summarised below:

Until now PGCCDBS has been the forum for planning and reviewing the outcomes of workshops, study groups, exchange schemes and other inter-sessional work related to interpretation and quality assurance of data on stock-related biological variables (age and growth; maturity and fecundity; sex ratio). However, the biological parameters have been but a small part of the PGCCDBS. During the 2013 WKNARC2 meeting it was proposed that the work carried out in the Subgroup for Age determination and Maturity staging within the remits of the PGCCDBS would be better undertaken during a dedicated Working Group, which would allow more time to focus on its ToRs and develop its role to meet the changing demands for biological data in coming years. It was concluded that PGCCDBS is no longer the ideal vehicle for coordinating and developing the collection, interpretation and use of data on biological parameters, and that a new Working Group on Biological Parameters (WGBIOP) should be formed.

WGBIOP will act as an ICES Expert Group that continues with the work carried out by the specialised WKNARC1 and 2 as well as the upcoming WKSABCAL and will improve the allocation of efforts targeting highly warranted improvements of available biological parameters for stock assessment. Thus, the creation of a dedicate Expert Group will give the possibility to broaden and deepen this crucial area of expertise. WGBIOP will, among other things, provide guidelines for the various steps of the determination of statistically sound biological parameters in relation to: a) sampling protocols, b) sampling design and c) computation, facilitating precision and accuracy in estimating existing biological parameters and new biological parameters needed for integrated ecosystem assessments.

Additionally, such an Expert Group, devoted to all stages of the provision of biological parameters (methodological improvements, implementation, quality assurance, statistical analysis) at a national, regional and stock level will provide a bridge between the data collectors and end users that has often been lacking. This group will be able to provide expert advice (by request) to the European Commission, STECF, Liaison Meeting, PGDATA/PGMED, ICES assessment groups, multispecies working groups, and ecosystem working groups or other related Expert Groups, and Regional Coordination Groups (RCG's).

The proposal from WKNARC2 in 2013 was further developed and discussed during PGCCDBS 2014 and the amended draft ToR's and resolutions are presented in Annex 2

3.1 PGCCDBS Age Workshops.

3.1.1 Age Workshop outcomes 2013 and PGCCDBS response.

The following are summaries of the age reading workshops carried out in 2013.

3.1.1.1 Workshop on the Age Reading of Blue Whiting (WKARBLUE)

The workshop on age reading of blue whiting (WKARBLUE) was held in Bergen, Norway, from the 10th to the 14th of June 2013. The meeting was co-chaired by Jane A. Godiksen (Norway) and Manolo Meixide (Spain), and included 19 age readers from 11 countries, where one country participated by web-camera. The objectives of this workshop were to review, document and make recommendations on current methods of aging blue whiting (*Micromesistius poutassou*).

This workshop was preceded by an otolith exchange, which was undertaken using WebGR in the months prior to the workshop. The exchanged otolith collection included 158 images from the previous exchange, and 50 of these, along with 100 new otoliths, were also read during the workshop after establishing guidelines for reading.

The overall agreement with modal age of the pre-workshop exercise was 57%, with a precision of 13% CV. The three sets of otoliths read during the workshop had an agreement ranging between 55% and 74% with a precision (CV) ranging from 13% to 41%. The collection with the highest agreement and highest CV was from the Faroe Islands including many young fish, which are easier to read than older specimens.

The main issues during this workshop were identification of the position of the first annual growth ring, false rings and interpretation of the edge of the otolith.

These issues are the same as has been mentioned in previous reports, and thus a reoccurring problem among age readers. A reference collection of images from the workshop will be made and placed in WebGR, and this will be helpful when running into these issues during age reading.

Bias in age readings is an issue that could strongly affect the results of stock assessment. The workshop showed that the readers who provide data for blue whiting age compositions to the Working Group on Assessment of Widely Distributed Stocks (WGWIDE) presented null or low bias in three of the four samples used. Strong bias was observed in the last sample among both experienced and new readers, and that particular sample was considered by all readers as very difficult to age.

Blue whiting otoliths have proven to be quite difficult to age, and though guidelines have been constructed, the experience of the reader determines the interpretation of the otolith structure. It is therefore recommended to have regular exchanges and workshops in order to improve the agreement between readers.

Recommendations:

- New WKARBLUE2 Workshop in 2017
- Age validation study on daily growth rings to solve the growth rings interpretation
- Image Otoliths Exchange of *M. poutassou* in 2016 covering northern and southern subpopulations
- Update guideline of ageing criteria

PGCCDBS 2014 acknowledges the work done, and supports the WK recommendations on scheduling of future workshops, exchanges and updating of guidelines, and

(in principle) the need for validation studies where none exist and there is a potential for bias. WGWIDE should consider the implications of the workshop results in relation to the impact of age reading errors on the quality of assessments and advice. On the basis of this, WGWIDE and PGCCDBS/WGBIOP should decide on the necessity for an age validation study and if deemed necessary, develop a proposal for potential validation work needed.

3.1.1.2 Workshop on Age Estimation Methods of Deep Water Species (WKAMDEEP)

The WKAMDEEP met at IMEDEA (UIB/CSIC) in Esporles, Spain from 21 to 25 October 2013 to review age determination methods and growth patterns of several deep-water fish species in order to pave the way for solid input data of future age-based assessments for these species. The workshop was chaired by Ole Thomas Albert (Norway), Beatriz Morales-Nin (Spain) and Gróa Pétursdóttir (Iceland).

The species dealt with by the Group were: tusk (*Brosme brosme*), ling (*Molva molva*), blue ling (*Molva dypterygia*), roundnose grenadier (*Coryphaenoides rupestris*), greater silver smelt (*Argentina silus*), black scabbardfish (*Aphanopus carbo*) and black-spotted sea bream (*Pagellus bogaraveo*).

All relevant information was collated in species-specific annexes, in order to have a protocol which was easy to consult and use for each species. The main report sums up the discussions in the group and presents results from the small WebGR-exchanges of each species made prior to and during the meeting. The body of the report is found in the species-specific annexes, which describe the general biological knowledge of growth and longevity for each species; review available ageing protocols identify any unresolved problems with interpretation and recommend future actions.

WKAMDEEP recommendations:

- There are very few age validations made for deep water species, therefore the group recommends that validation methods be applied where possible.
- The small exchange showed that age estimation of deep water species is still carried out with low precision for some species, notably tusk, black-spotted sea bream and black scabbard-fish. The group therefore recommends performing more exchanges between laboratories for these species and that the WGDEEP evaluate the necessity to increase the quality of ageing data for each species assessed by the WG.
- It is recommended to use image analysis systems for measuring *annuli* and that all labs should build up a register of calibrated and annotated otolith images both for documentation and for training of new age readers.
- The workshop recommends that training on age reading of deep-water species in the future be less focused on individual species and more on the group of species. With good ageing protocols and the general similarities of slow growing species, it should be achievable to educate age readers to become specialists on all the species simultaneously. This will make future exchanges and age-reading workshops more feasible.

PGCCDBS 2014 agrees with these recommendations, and (in principle) the need for age validation studies where none exist and there is a potential for bias. WGDEEP should consider the implications of the workshop results in relation to the impact of age reading errors on the quality of assessments and advice. On the basis of this,

WGDEEP and PGCCDBS/WGBIOP should decide on the necessity for age validation studies and if deemed necessary, develop a proposal for potential validation work needed.

3.1.1.3 Workshop on Micro increment daily growth in European Anchovy and Sardine (WKMIAS)

The Workshop on Micro-increment daily growth in European Anchovy and Sardine (WKMIAS) met for the first time from 21 - 25th October 2013 in Mazara del Vallo, Sicily (CNR-IAMC). The meeting was chaired by Gualtiero Basilone (CNR-IAMC, Italy), Begoña Villamor (IEO, Spain) and Mario La Mesa (CNR-ISMAR, Italy). Six nations were represented by 22 participants.

WKMIAS was proposed by PGCCDBS in 2012. Although ICES has run a number of age reading workshops dealing with interpreting annual marks on otoliths, this was the first time that a workshop was dedicated exclusively to age reading at daily scale. The objectives of the workshop were to define and standardize methods, reading criteria and protocols of anchovy and sardine daily growth in different developmental stages (larvae and juveniles), and validate the first annual ring of these species to improve annual age estimates. The report summarizes the work in relation to each of the ToR's.

Given the terms of reference and objectives, the daily growth of these species is dealt with the following geographical areas / stocks / ecosystems: Bay of Biscay, Atlantic Iberian Peninsula (sardine only), Western Mediterranean, Strait of Sicily, Adriatic Sea and North Aegean Sea.

Before the workshop, a questionnaire was completed by each laboratory to provide information on their method of preparation and interpretation of the anchovy and sardine otolith microstructure. Following the analysis of questionnaire results, a common protocol was developed during the workshop regarding the methods and techniques of preparation of the otoliths. However, there was no agreement in relation to criteria for interpreting daily increments.

The workshop also was preceded by an otolith image exchange, which was undertaken using EARF in the months prior to the workshop. The exchanged otolith collection included 81 images (41 for anchovy and 40 for sardine) distributed in 10 sets from different anchovy and sardine distribution areas. In the case of sardine, also a small otolith collection (5) of known age (obtained from aquaculture) was used. The exchange proved the existence of differences between readers and areas of both species, with a precision CV ranging from 9% to 35% for anchovy, and from 9% to 18% for sardine. The comparison with the actual age of sardine (known from aquaculture specimens) showed that sardine readers are generally in good agreement; nevertheless all readers underestimated the age of fish in the older age classes.

During the workshop a reading exercise on live images of anchovy and sardine otoliths (thin sections) was carried out. The main aim was to increase the agreement among readers and to highlight differences due to the interpretation criteria adopted, or due to the differences in the growth pattern among areas. There were two criteria for interpreting the anchovy and sardine daily micro-increments according to double bands (called GBR) or individual bands (IMR) form. The application of these criteria was recurrently discussed during the workshop, and it was not possible to reach a consensus agreement on standardization. So it was agreed to use the GBR in all areas, except for the Strait of Sicily and Adriatic Sea.

Another of the main issues of the workshop was to identify the position of the first annual ring (*annulus)* in the otoliths of these species, since it is one of the main sources of error in the age readings. Based on different daily growth studies presented at this workshop, the position of the first annual ring is validated on anchovy in the Bay of Biscay and the position of the first ring false or check is corroborated in the sardine of North Adriatic Sea, providing a series of recommendations to the annual ageing readers of these species.

A reference collection of otolith images was also provided for larvae and juveniles of anchovy and sardine from each area. Finally, a literature review of recent research related daily growth of these species was performed and a new Workshop on Micro-increment daily growth in European Anchovy and Sardine was proposed for 2017.

WKMIAS Recommendations:

- It is recommended to annual ring readers to measure the distances between the nucleus and the inner edge of hyaline rings. This is usually well marked in otoliths and can be measured accurately.
- Based on the validation of daily ring formation in anchovy larvae and juveniles (Cermeno et al. 2003; Aldanondo et al. 2008), and the corroboration of the position of the false annual ring (check) formed before its first winter ring, through the micro increment counts, the first annual ring appears in anchovy at a distance of greater than 850 ± 100 microns from the nucleus. Therefore all rings less than 850 ± 100 microns should be considered as checks.
- According to another study, the Bay of Biscay anchovy first annual ring would be at 1155.7+- 69.6 microns. This calculation was based on the otoliths of individuals maintained in captivity, and as such this distance should not be used as a rule, since it could change depending on hatch-date, growth patterns etc….
- Based on the validation of daily ring formation in sardine larvae and juveniles (Alemany and Alvarez, 1994), and the corroboration of the position of the false annual ring (check) formed before its first winter ring, through the micro increment counts, it is suggested to measure the first ring and all the translucent rings laid down before a distance from the primordium of less than 1000 microns should be considered as checks.
- Alternative methods for the estimation of age by discriminant functions based on somatic variables and otolith biometry (Quintanilla and Garcia WD2013; Silva *et al*., WD2012) in order to reduce subjective factor and cost/benefit ratio related to direct readings should be considered.
- Is strongly recommended to use "collection of known age" otoliths in order to check and calibrate the age estimations of readers.
- Evaluate by further studies the seasonal variability in the growth micro-increments pattern in both species (anchovy and sardine) focused mainly on the recruitment period.
- Validation should be carried out to progress in the ageing criteria by conducting more studies on the life history events of the fish. Such studies have to be carried out by means of direct mesocosm experiments.
- A workshop should be convened in 2017 since some ageing difficulties still remain, mainly for some areas.

PGCCDBS 2014 acknowledges the methodological progress achieved during this workshop and recommends that the updated guidelines written in the recommendation section should be followed. WGHANSA 2014 should consider the implications of the workshop results in relation to the impact of age reading errors on the quality of assessments and advice. On the basis of this, WGHANSA and PGCCDBS/WGBIOP should decide on the necessity for age validation studies and if deemed necessary, develop a proposal for potential validation work needed.

3.1.1.4 Second Workshop of National Age Readings Coordinators (WKNARC2)

The Workshop of National Age Readings Coordinators (WKNARC) met for the second time from 13 - 17th May 2013 in Horta, Azores (UAC DOP). The meeting was chaired by Lotte Worsøe Clausen (DTU AQUA), Julie Coad (DTU AQUA) and Ângela Canha (UAC). Nineteen nations were represented by 28 participants.

WKNARC was proposed by the Planning Group on Commercial Catches, Discards and Biological Sampling (PGCCDBS) 2010. Many activities of this group are closely linked to the activities of the Data Collection framework (DCF). WKNARC2 builds on the review compiled by the group's first meeting in 2011 while aiming to further develop tools and protocols for intercalibration between laboratories.

Annual ageing and the inferred parameters (growth and mortality) can be used to infer population dynamics and stock status and are incorporated into stock assessment where the proportions of each age class are of primary importance. The age data is provided by National laboratories and is based on both validated and non-validated methods. International cooperation between laboratories aims to reduce the inherent uncertainty surrounding this data by standardisation of methods and procedures.

The meeting was preceded by an online questionnaire relative to the ToR's, the results of which were divided amongst sub groups and prepared for discussion prior to the meeting. The main points outlined that, in terms of standardization of methods: improvements have been made but there is a lack of supporting documentation and comparative studies between old and new methods. The European Age Readers Forum (EARF) needs to be updated and promoted to be more user-friendly and WebGR should be used for future exchanges and workshops. Quality control procedures should be summarized and shared on the EARF. Means of dealing with uncertainty in relation to age data in assessments were reviewed and as a result, the 3 point grading system should only be used for quality control and not as a quantitative measure of ageing error.

Gaps in age validation and growth formation studies will be identified based on the needs of the Assessment Working Groups. Guidelines for Task Sharing were outlined and its importance, especially in light of the new landing obligation (discard ban) legislation was highlighted. Plenary sessions were thus highly constructive and open to new proposals on how to progress with the objectives of the group. A full day was assigned to demonstration and hands-on training of the online WebGR tool. This package facilitates the annotation and exchange of images and a study proposal for its further development was compiled. State of the art validation protocols were collated and an outline for an ICES Cooperative Research Report (CRR) was suggested. A new Working Group on Biological Parameters (WGBIOP) was proposed; to continue the work of WKNARC and to facilitate a strengthening of the link between the end users and the national laboratories while supporting stock-based and ecosystem advice in terms of biological parameters.

WKNARC2 Recommendations.

- Major improvements of EARF to transform it into an operational and user-friendly website. Internal promotion of EARF in National laboratories. Continuous documentation of procedures in relation to new species to be published on EARF
- Establishment of WGBIOP as uniting follow-ups of WKNARC and PGCCDBS age/maturity subgroup.
- ICES to host WebGR
- WKSABCAL to take into consideration the findings of WKNARC in relation to the means of dealing with uncertainty of age data in assessments

PGCCDBS 2014 agrees with these recommendations

3.1.1.5 Workshop on Age Validation Studies of Gadoids (WKAVSG)

The WKAVGS met in 2013 from the 6th to the 10th of May in Imedea, Mallorca. The meeting was chaired by Karin Hüssy (Denmark) and Beatriz Morales-Nin (Spain), and the ToRs of the meeting were to:

1) Review information on age estimations, otolith exchanges, workshops, and validation works done so far on the following species: European hake, cod, pollock, saithe, haddock, whiting and blue whiting;

2) Assemble and compare the results of different validation methods (i.e. marking and recapture, marking the calcified structure, marginal increment analysis, marginal analysis, modal progression analysis, length back-calculation, etc.);

3) Discuss and propose the most appropriate validation methods of age and growth pattern of calcified structures (CS), for each species and stock;

4) Propose the appropriate validation methods to recognize the growth check as well as the spawning ring, demersal ring, migration ring, etc.;

5) Propose an ICES Cooperative Research Report on: Age Validation Studies for ICES and GCFM Gadoid Stocks, to ICES PGCCDBS, using previous studies and the outcome this workshop;

6) Based on results, conclusions and recommendations from this workshop to initiate and design an international cooperation project on validation methods (such as on the validation of checks and spawning rings) to commence after the workshop.

The WKAVSG considered that all TOR's were fulfilled, and all available information was compiled and discussed. The conclusions are specified in a comprehensive chapter for age validation studies for the ICES CRR.

For that reason the group thinks that, at present, a continuation of WKAVSG beyond its current term is not required. However, the group recommends that another meeting should be considered in approximately 3 years, depending on the progress made with respect to validation initiatives.

The PGCCDBS 2014 agrees with this recommendation.

3.1.2 Work plan 2014

The following age reading workshops will take place in 2014.

Acronym	Dates	Chairs	Venue
WKSABCAL	October 2014	Lotte Worsøe Clausen and Ernesto Jardim	Mallorca, Balearic Islands, Spain
WK on Age Validation (during the 5th international otolith symposium, http://ices.dk/news-and-events/symposia/otolith/Pages/Workshop%202.aspx)	22 October 2014	Ole Thomas Albert, Alf Harbitz, Richard McBride, Allen Hia Andrews and Iñaki Quincocoes	Mallorca, Balearic Islands, Spain
WK on otolith shape analysis (during the 5th international otolith symposium, http://ices.dk/news-and-events/symposia/otolith/Pages/Workshop-1.aspx)	22 October 2014	Deirdre Brophy, Lotte Worsøe Clausen, Antoni Lombarte nd Audrey Geffen.	Mallorca, Balearic Islands, Spain

3.1.3 Age Calibration Workshop Proposals for 2015

Proposals for age calibration workshops in 2015 are summarised in the table below, and ToRs and justifications are given in the subsequent text.

Priority	Age	Species		Comments and Recommendations of PGCCDBS 2014
1	Age	Seabass	*Dicentrarchus labrax*	The last exchange took place in 2013 and on the basis of these results, PG recommends a Workshop. **Workshop on Age reading of Seabass (*Dicentrarchus labrax*)** [WKARDL] (Co-chairs: Kélig Mahé, France, and Mark Etherton, England, UK; will be held 15 – 19 June 2015)
1	Age	Saithe	*Pollachius virens*	The last exchange took place in 2013 and on the basis of these results, PG recommends a Workshop. **Workshop on Age reading of Saithe (*Pollachius virens*)** [WKARPV] (Co-chairs Kélig Mahé, France, and Jane Godiksen, Norway; will be held in Boulogne-sur-Mer, France, 25-29 May 2015)
1	Age	Chub Mackerel	*Scomber Colias*	The last exchange took place in 2013 and on the basis of these results, PG recommends a Workshop. **Workshop on Age reading of Chub Mackerel (*Scomber Colias*)** [WKARCM] (Co-Chairs: Andreia Silva, Portugal, and Maria Rosario Navarro, Spain; will be held in

Priority	Age	Species		Comments and Recommendations of PGCCDBS 2014
				Lisbon, Portugal 2-6 November 2015
1	Age	Horse Mackerel, Mediterranean Horse Mackerel and Blue Jack Mackerel	*Trachurus trachurus*, *T. mediterreaneus* and *T. Pictatus*	A pre-workshop exchange is going forward in 2014 and PG recommends a Workshop for 2015 **Workshop on Age reading of horse mackerel, Mediterranean horse mackerel and blue jack mackerel (*Trachurus trachurus, T. mediterreaneus* and *T. Pictatus*)** [WKARHOM2] (Co-Chairs: Pierluigi Carbonara, Italy, and Kélig Mahé, France ; will be held in Sta. Cruz de Tenerife, Canary Islands, Spain, 26-30 October 2015)
1	Age	Dab	*Limanda limanda*	WK recommended to take place on the basis of the results of the Exchange that took place in 2013. **Workshop on Age reading of Dab (*Limanda limanda*)** [WKARDAB2] (Co-chairs: Holger Haslob, Germany, and Loes Bolle, the Netherlands; will be held in Hamburg, 23 – 27 November 2015)

3.1.3.1 WKARDL – Workshop on Age Reading of Seabass (*Dicentrarchus labrax)*

A Workshop on Age reading of Seabass (*Dicentrarchus labrax*) [WKARDL], chaired by Kélig Mahé, France, and Mark Etherton, England, UK, will be held Lowestoft, UK England, 15 – 19 June 2015) to:

1) Review information on seabass age estimations, otolith exchanges, workshops and validation work done so far.

2) Analyse the results of the exchanges 2013 and 2011

3) Clarify the better calcified piece (otolith or scale) to estimate the age

4) Analyze growth increment patterns and compile the guideline for the interpretation of seabass otoliths

5) eCreate a reference collection of well-defined otoliths

6) Address the generic ToRs adopted for workshops on age calibration

WKARDL will report by 3rd July 2015 for the attention of PGCCDBS, WGBIOP and ACOM.

Supporting information

Priority	Essential. Age determination is an essential feature in fish stock assessment to estimate the rates of mortalities and growth. Age data is provided by different countries and are estimated using international ageing criteria which have not been validated. The benchmark has been realised in 2013. There is necessary to continue to clarify this guideline of age interpretation especially seabass (*Dicentrarchus labrax*). Therefore, an appropriate otolith and scale exchange programme was carried out in 2014 for the purpose of inter-calibration between ageing labs. Results of this otolith exchange will discuss during WKARDL.

Scientific justification	The aim of the workshop is to identify the current ageing problems between readers and standardize the age reading procedures in order to improve the accuracy and precision in the age reading of this species from the otoliths and the scales.
Resource requirements	No specific resource requirement beyond the need for members to prepare for and participate in the meeting.
Participants	In view of its relevance to the DCF, 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	None.
Financial	No financial implications.
Linkages to advisory committees	ACOM
Linkages to other committees or groups	PGCCDBS, WGBIOP, WGHBIE and WGCSE
Linkages to other organizations	There is a direct link with the EU DCF.

3.1.3.2 WKARPV – Workshop on Age Reading of Saithe (*Polliachus virens)*

A Workshop on Age reading of Saithe (*Polliachus virens*) [WKARPV], chaired by Kélig Mahé, France, and Jane Godiksen, Norway, will be held in Boulogne-sur-Mer, France, 25-29 May 2015) to:

1) Review information on saithe age estimations, otolith exchanges, workshops and validation work done so far

2) Analyse the results of the exchanges 2013 and 2008

3) Analyze growth increment patterns and compile the guideline for the interpretation of saithe otoliths

4) Create a reference collection of well-defined otoliths

5) Address the generic ToRs adopted for workshops on age calibration

WKARPV will report by the 15th of June 2015 for the attention of PGCCDBS, WGBIOP, WGNSSK and ACOM.

Supporting information

Priority	Essential. Age determination is an essential feature in fish stock assessment to estimate the rates of mortalities and growth. Age data is provided by different countries and are estimated using international ageing criteria which have not been validated. There is necessary to continue to clarify this guideline of age interpretation especially Saithe (*Polliachus virens*). Therefore, an appropriate otolith exchange programme was carried out in 2014 for the purpose of inter-calibration between ageing labs. Results of this otolith exchange will discuss during WKARPV.
Scientific justification	The aim of the workshop is to identify the current ageing problems between readers and standardize the age reading procedures in order to improve the accuracy and precision in the age reading of this species.
Resource requirements	No specific resource requirement beyond the need for members to prepare for and participate in the meeting.
Participants	In view of its relevance to the DCF, 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	None.
Financial	No financial implications.

Linkages to advisory committees	ACOM
Linkages to other committees or groups	PGCCDBS, WGBIOP and WGNSSK
Linkages to other organizations	There is a direct link with the EU DCF.

3.1.3.3 WKARCM – Workshop on Age Reading of Chub mackerel (*Scomber Colias)*

A Workshop on Age reading of Chub Mackerel (*Scomber Colias*) [WKARCM], chaired by Andreia Silva, Portugal, and Maria Rosario Navarro, Spain, will be held in Lisbon, Portugal, 2-6, November, 2015, to:

1) Review information on age determination, otolith exchanges and validation techniques on this species

2) Estimate (relative) accuracy and precision of chub mackerel age determination in the main fishing areas of the European region.

3) Identify causes of age determination error and provide specific guide-lines for the improvement of precision and reduction of bias between readers and laboratories.

4) Elaborate an age reading protocol.

5) Create a reference collection of otoliths and a data base of images of otoliths.

6) Address the generic ToR's adopted for workshops on age calibration (see 'PGCCDBS Guidelines for Workshops on Age Calibration').

WKARCM will report by the 20th November 2015 for the attention of PGCCDBS, WGBIOP and ACOM.

Supporting information

Priority	Essential. Age determination is an essential feature in fish stock assessment to estimate the rates of mortalities and growth. Age data is provided by different countries and are estimated using international ageing criteria which have not been validated. There is necessary to continue to clarify this guideline of age interpretation especially Chub Mackerel (*Scomber colias*). Therefore, an appropriate otolith exchange programme was carried out in 2013 for the purpose of inter-calibration between ageing labs. Results of this otolith exchange will discuss during WKARCM.
Scientific justification	The aim of the workshop is to identify the current ageing problems between readers and standardize the age reading procedures in order to improve the accuracy and precision in the age reading of this species.
Resource requirements	No specific resource requirement beyond the need for members to prepare for and participate in the meeting.
Participants	The Group is normally constituted by Spanish and Portuguese members and guests.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to advisory committees	ACOM
Linkages to other committees or groups	PGCCDBS and WGBIOP
Linkages to other organizations	There is a direct link with the EU DCF.

3.1.3.4 WKARHOM2 – Workshop on Age Reading of Horse Mackerel, Mediterranean Horse Mackerel and Blue Jack Mackerel (Trachurus trachurus, T. mediterreaneus and T. Pictatus)

A pre-workshop exchange is going forward in 2014 and PGCCDBS recommends a Workshop for 2015, chaired by Pierluigi Carbonara (Italy) and Kélig Mahé (France) and held in Sta. Cruz de Tenerife (Canary Islands, Spain), 26-30 October 2015. Agreed by PGCCDBS 2013.

WKARHOM2 workshop ToRs:

1) Review information on age determination, otolith exchanges and validation techniques on this species

2) Estimate (relative) accuracy and precision of horse mackerel, Mediterranean horse mackerel and blue jack mackerel age determination in the main European fishing areas.

3) Identify causes of age determination error and provide species specific guidelines for the improvement of precision and reduction of bias between readers and laboratories.

4) Update age reading protocols for each species.

5) Update otoliths reference collections and a database of otoliths images.

6) Discuss and propose the most appropriate validation methods of age and growth pattern of otolith, for every species and stocks.

7) Address the generic ToR's adopted for workshops on age calibration (see 'PGCCDBS Guidelines for Workshops on Age Calibration').

WKARHOM2 will report by the 16th of November 2015 for the attention of PGCCDBS, WGBIOP and ACOM.

Supporting information

Priority	High. Age determination is an essential feature in fish stock assessment to estimate mortalities and growth rates. Age data are provided by the sampling different countries and are estimated using international ageing criteria which have not been validated. Hence there is a need to continue clarifying the guideline for age interpretation especially for horse mackerel, Mediterranean horse mackerel and blue jack mackerel (*Trachurus trachurus, T. mediterreaneus and T. picturatus*). Indeed the results of the last meeting evidenced a low level of agreement between readers/insitutes. Therefore, an appropriate otolith exchange programme will be carried out in 2014 for the purpose of inter-calibration between ageing labs. Results of this otolith exchange will be discussed during WKARHOM2.

Scientific justification	Stock-assessment quality is severely hampered by the lack of valid age-structured data and by the fact that the low agreement level of the supplied age data (as seen in previous exchanges) affects the precision in the diagnosis of the stock status. The aim of the workshop is to identify the current ageing problems between readers and standardize the age reading procedures in order to improve the accuracy and precision in the age reading of this species. The last workshop (2012) demonstrated that there was no agreement or understanding of the underlying growth patterns of these species. The expectation of: TOR a) is to review: the information on age estimation presently available in the literature: the validation techniques and in general the biology of these species to have an exhaustive picture of the state of art. TOR b) is to estimate the accuracy and precision in different areas by species, based on the exchange that will occur in the 2014. This work will be important to identify the source (e.g. identification of the first annulus, false ring as well as the spawning, demersal ring, migration etc.) of the discrepancies between readers and/or institute (TOR c) and to establish an age reading protocol with shared criteria for each species (TOR d). The references otolith collections will represent the important support to a correct application of the age estimations criteria (TOR e). Moreover, during the workshop, the more appropriate validation (age and pattern of otolith growth) method by specie/area will be discussed (TOR f).
Resource requirements	No specific resource requirement beyond the need for members to prepare for and participate in the meeting.
Participants	In view of its relevance to the DCF, and ICES WGs, 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	None.
Financial	None.
Linkages to advisory committees	ACOM
Linkages to other committees or groups	PGCCDBS, WGBIOP, WGWIDE, WGHANSA, WGMEGS and PGMed
Linkages to other organizations	There is a direct link with the EU DCF.

3.1.3.5 WKARDAB2 – Workshop on Age reading of Dab (*Limanda limanda*)

A Workshop on Age reading of Dab (*Limanda limanda*) [WKARDAB2], chaired by Holger Haslob, Germany, and Loes Bolle, the Netherlands (to be confirmed), will be held in Hamburg, 23-27 November 2015) to:

1) Analyse the results of an international otolith (image) exchange

2) Analyse growth increment patterns

3) Compile international guidelines for the interpretation of growth structures in Dab otoliths

4) Elaborate the reference collection of Dab otoliths

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

WKARDAB2 will report by 12th December 2015 for the attention of PGCCDBS, WGBIOP and ACOM.

Supporting information

Priority	Age determination is an essential feature in fish stock assessment and age data is provided by different countries. The results of an exchange held in 2013 indicated the neccesity of an age reading workshop. Another pre-workshop exchange will be held in 2015. Results of both otolith exchanges will be discussed during WKARDAB2. Furthermore, it is necessary to compile international guidelines for age interpretation and a reference collection of dab otoliths to further enhance inter-calibration between labs.
Scientific justification	The aim of the workshop is to identify the current ageing problems between readers and standardize the age reading procedures in order to improve the precision in the age reading of this species. Dab from both the North Sea and the Baltic will be included.
Resource requirements	No specific resource requirement beyond the need for members to prepare for and participate in the meeting, and the availability of WebGr.
Participants	In view of its relevance to the DCF, 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	ICES Secretariat support may be required when writing the final WK report.
Financial	No financial implications.
Linkages to advisory committees	ACOM
Linkages to other committees or groups	PGCCDBS, WGBIOP and WGNSSK/WGNEW
Linkages to other organizations	There is a direct link with the EU DCF.

3.1.4 Age Calibration Workshops proposed for 2016 onwards

On the basis of the Age and Maturity interactive tables and requests from various sources, the PGCCDBS produced a table containing all the possible exchanges and workshops for 2016 and beyond. These proposals were then arranged by priority. Three priority levels were defined as follows:

1) The proposal is very relevant and the exchange/workshop should be realized in 2016 or 2017;

2) The PGCCDBS requests that the relevant Expert Group considers if an exchange/ workshop would be useful and should take place. All comments/ recommendations from Working Groups can be forwarded to the PGCCDBS chairs. This priority level includes proposals for which:

- The last workshop or exchange has taken place more than 5 years ago (see PGCCDBS Exchange and workshop guidelines);
- The last workshop or exchange has taken place longer ago than what was specified in the last workshop/exchange;
- There is no record of a previous exchange or workshop

3) There is no Assessment Group for this species.

With this in mind and taking into account the fact that an age calibration exchange is planned to proceed in 2015, an age calibration workshop may be recommended on foot of the exchange results for *M. surmuletus* and *M. barbatus*. If so, this age calibration workshop would be considered as a priority 1 status and as such should be considered as a high priority for 2017

The workshop proposal, if requested, including the ToRs scientifc justification, chairs and locations will be agreed at the 2016 WGBIOP Meeting.

Priority	Age	Species		Comments and Recommendations of PGCCDBS 2014
1	Age	Red Mullet and Striped Red Mullet	*M. surmuletus* and *M. barbatus*	If the results of the 2015 age calibration exchange highlight the necessity of a follow on age calibration workshop WGBIOP will review the results of the exchange and any WK proposal, until then a Workshop is provisionally planned for 2017 (WKCAM3 - chaired by F. Ordines, (Spain) and K. Mahé (France), Palma de Mallorca, Spain)

3.2 PGCCDBS Age Exchanges

3.2.1 Age Exchange outcomes 2013 and PGCCDBS response.

Six exchanges were planned to take place in 2013 and are summarised below:

3.2.1.1 Small-scale otolith exchange for dab (*Limanda limanda*)

Nine institutes from seven countries participated in the exchange coordinated by the Thünen-Institute of Sea Fisheries in 2013. A set of approximately 200 dab otoliths was compiled. Otolith samples were circulated and digital images of the same set were also provided. In order to facilitate and to accelerate the whole exchange process a calibration exercise was established using the WebGR application which was used by some of the participants. Experts as well as beginners participated in the exchange. In the end, age reading results of 13 readers were compared. The overall agreement of all age readings was 78% (precision CV=18%). A separate analysis only including experts revealed a total agreement of 78% (CV=15%). The agreement was higher for otoliths sampled during the 1st quarter compared to otoliths sampled during the 3rd quarter. The agreement decreased considerably with modal age from 100% for 0-group to below 60% for the older modal ages.

Given the total agreement below 80% and different methodologies used by different laboratories for age reading of dab otoliths, a workshop was recommended for 2015 and it was proposed that the terms of references defined by WKARDAB 2010 for a follow-up workshop could be adopted. (The final ToRs for the 2015 WKARDAB2 are given in section 3.1.3.2 of the present PG report.) Additionally, the use of WebGR should be further promoted in such a workshop as it is a promising tool to facilitate age reading calibration exercises, otolith exchanges and workshops.

PGCCDBS 2014 acknowledges the work done during the exchange, and suggest that the recommendations are dealt with during the WKARDAB 2. A follow on Workshop with ToR's venue and dates is detailed in section 3.1.3.5.

3.2.1.2 Saithe (*Pollachius virens* L.) otolith exchange 2013

PGCCDBS identified the need of a second saithe (*Polliachius virens*) otolith exchange to take place in 2013 under the coordination of IFREMER.

A collection of 295 otoliths was compiled: 24 from the Barents Sea (ICES Division IIa), 34 from the North Sea (ICES Subarea IV) and 237 from western Scotland (ICES Division VIa). The length range of the fish was 37-96 cm, with mean of 60 cm.

Thirteen readers from five countries (France, Germany, Iceland, Sweden and Norway) participated. Mean precision of age estimates for individual fish was CV of 6% with 86% agreement to modal age. Of the 298 otoliths, 54 (18%) were read with 100% agreement (CV = 0%). There were variations in the precision of age estimates between individual readers, with CVs ranging from 0-27% and agreement of modal age from 40-100%.

Precision of age estimation from the North Sea was not as good as from other areas. However, the size and age of fish from the North Sea were bigger than those of the others areas. The differences are primarily explained by the position and the number of rings after the eighth and close to the otolith edge.

The exchange group recommended an age reading workshop to:

1) Review information on saithe age estimation, otolith exchanges, workshops and validation work done so far.

2) Analyse the results of the exchanges 2013 and 2008

3) Analyse growth increment patterns and compile the guideline for the interpretation of saithe otoliths

4) Create a reference collection of well-defined otoliths

5) Address the generic ToRs adopted for workshops on age calibration

PGCCDBS 2014 agrees with the recommendations and further recommend that attention should be paid to estimation of otolith spawning zones. A follow on Workshop with ToR's venue and dates is detailed in section 3.1.3.2.

3.2.1.3 Seabass (Dicentrachus labrax) otolith exchange 2013

The ICES Planning Group on Commercial Catch, Discards and Biological Sampling (PGCCDBS) identified the need of a seabass (*Dicentrarchus labrax*) otolith exchange to take place in 2013 under the coordination of IFREMER. It was the second exchange after that's of 2011.

A total of 223 fish were sampled for age material onboard French research vessels (RV Gwen-Drez and RV Thalassa) during 3 international surveys (EVHOE, CGFS and IBTS): 29 fish from the Bay of Biscay (ICES Subarea VIII), 149 from the Eastern English Channel (ICES Division: VIId) and 45 from the North Sea (ICES Subarea IV). The length range of the fish was 26-71 cm, with mean 42 cm. For each fish, the *sagittae* otoliths and a few scales were collected, and were used to compare the age estimation between the two materials.

Only three readers were participated: from France, Belgium and England. During the first exchange in 2011, there were only two countries (France and England). Only images were used during this exchange. The mean precision (CV) of age estimate for individual fish was 9%, with 69% agreement to modal age. Of 223 fish, 84 (37%) were read with 100% agreement and thus a CV of 0%.

The precision of age estimation from the scales (78% agreement; CV=1%) was better than that for otoliths (56% agreement; CV=13%). However, the number of otoliths read (149) was double the number of scales (74), and two readers (from France and Belgium)

preferred to read otoliths and one reader (England) was most experienced in reading scales.

The exchange group recommended to organise the Seabass age reading workshop and recommended the directions for future work:

- Review information on seabass age estimations, otolith exchanges, workshops and validation work done so far.
- Analyse the results of the exchanges 2013 and 2011
- Compare the ages recorded from both otoliths and scales, for each fish, in terms of precision and bias; taking into account the experience of the reader in reading either scales or otoliths.
- Analyze growth increment patterns and compile the guideline for the interpretation of Seabass otoliths/scales
- Create a reference collection of well-defined otoliths/scales
- Address the generic ToRs adopted for workshops on age calibration

PGCCDBS 2014 agrees with these recommendations. A follow on Workshop with ToR's venue and dates is detailed in section 3.1.3.1.

3.2.1.4 Chub mackerel (*Scomber colias*) otolith exchange 2013

The exchange was coordinated by Maria Manuel Martins, Portugal. This is a small exchange that is the first one between ICES readers Portugal (IPMA) and Spain (IEO) from Santander and other participants belonging to IEO from Murcia (Mediterranean area). Within ICES areas, Chub mackerel is only fished by Spain and Portugal, and Spain (IEO) has only recently started sampling this species (since 2011, new requirement of DCF).

Following a recommendation of PGCCDBS in 2010, an exchange of chub mackerel otoliths was carried out in 2012-2013 to assess difficulties in age reading, provide a first evaluation of the agreement, precision and accuracy of age determination. Five age readers from Portugal and Spain, with variable degrees of experience on the species participated in the exchange. A total of 244 otoliths were examined, from fish with 17.8 – 40.6 cm total length collected in 2011 off the ICES Divisions VIIIc and IXa and in the Mediterranean waters. Age readings were analyzed for the whole otolith set and separately for Atlantic and Mediterranean waters using Eltink Workbook on Age Reading comparisons. Two options were used to set a reference age, one where it corresponded to age readings of the most experienced reader on the species and another where it corresponded to the modal age of three readers with variable experience on chub mackerel but long experience on mackerel or other pelagic species.

Age readings ranged from age 0 to age 9. The two reference age options gave similar overall results. Considering the three readers modal age, the average level of agreement was 60%, the CV was 23% and there was evidence of bias especially for ages>=4 years. Ages 0 and 1 showed high agreement (99 and 93%, respectively), low CV (10% and 15%) and no signs of bias in relation to the modal age, suggesting that the identification of the first annual ring is not an issue in this species. The percentage of agreement dropped substantially at ages 2 (62%) and 3 (59%) and from age 3 onwards, agreement was generally below 50%. Age 2 showed particularly low precision (CV=27%) compared to neighbor ages (15% at age 1 and 22% at ages 3-5) possibly due to the frequency of false rings. Bias increases substantially with age but this effect is

mainly due to underestimation of ages>4 years by Readers 3 and 4 (experienced in Mediterranean otoliths).

The results suggest readers can be split in two groups: those with experience in Atlantic species and those with experience in Mediterranean species. The latter showed good precision and no bias in otoliths of younger individuals (until age 2) probably because they are used to identify false rings. On the other hand, their results on older individuals were poor. Readers with experience in Atlantic species performed joint readings and discussions before the workshop and therefore have a more similar interpretation of chub mackerel otoliths. Agreement between Atlantic and Mediterranean readers was generally poorer (34-47%) than agreement among readers of the same group, 84% for Mediterranean readers and 53-61% for Atlantic readers.

The exchange indicated that chub mackerel age determination can be done with acceptable precision and accuracy in younger individuals (up to ages 3-4 years). The major difficulties are the frequency of false rings in young individuals (until age 3), otolith edge interpretation (to distinguish the edge from false rings) during the 1st semester and the assignment of ages older than 7 years.

The group recommends a workshop be carried out in 2015 to discuss the results of the present exchange.

To improve age determination in this species, the group recommends that otolith exchanges be carried out regularly between all readers, focusing on young individuals and old ones (more than 5/6 years old). The legibility of otoliths should be recorded and taken into account in the use of otoliths to prepare age-length keys.

As chub mackerel otolith readings have never been validated in the ICES Divisions IXa and VIIIc; therefore it was recommended to perform validation studies. To be more effective, further exchanges and/or workshops should be carried out after finishing the validation studies.

It is also recommended to use a quality scale for readings (already used for other species) that goes as follow (recommended by WKNARC):

1) EASY (75-100% reliability)
2) DIFFICULT (25-75% reliability)
3) ILLEGIBLE (0-25% reliability)

PGCCDBS agrees with these recommendations. PGCCDBS/WGBIOP should decide on the necessity for age validation studies and if deemed necessary, develop a proposal for potential validation work. A follow on Workshop with ToR's venue and dates is detailed in section 3.1.3.3.

3.2.1.5 Sprat (*Sprattus sprattus*) otolith exchange 2013–2014 (on-going).

The PGCCDBS was informed about the ongoing (2013-2014) sprat otolith exchange.

Objectives of the present exchange are:

- Evaluation of consistency of sprat age readings in the North Sea between relevant institutes;
- Collation of age-length keys of sprat in the Celtic Sea and West of Scotland;
- Validate the ageing of sprat from this area.

100 otoliths from winter, spring and autumn were collected by two different labs around the North Sea ; and 99 otoliths from autumn and winter were collected by one lab from Divisions VIIe,f

Whole otolith pictures were uploaded in WebGR incl. metadata.

Number of participants involved in the age reading was 19 from 10 laboratories (Denmark, Sweden, Norway, UK England, UK Scotland, Ireland, Northern Ireland, Germany, Netherlands and France). Numbers of participants delivering data for stock assessment was 14.

The exchange group plans to finalise results prior to HAWG 2014.

PGCCDBS 2014 acknowledges the work done by the group and is looking forward for the final report.

3.2.1.6 Norwegian Spring Spawning Herring (NSS) otolith Exchange 2013–2014 (on-going)

The PGCCDBS was informed about the ongoing (2013-2014) herring otolith exchange. About 150 otoliths (and scales) were collected in Division IIa during quarter 1, 2/3 and 4. Otoliths and scales come from the same fish.

So far, 14 readers from seven countries are participating. From these 14 readers, 11 read both otoliths and scales.

The date for entering the exchange is set to end of February 2014, the final date for reading will be around end of April.

PGCCDBS 2014 acknowledges the work done by the group and is looking forward for the final report. The results of the exchange should be made available before WGWIDE who will meet in August 2014.

3.2.2 Full Scale and Small Scale Exchanges in 2014

The following is a list of small scale and full scale age exchanges taking place in 2014:

- Herring (Norwegian spring spawner) - Small scale exchange: Coordinator: Jane Amtoft Godiksen, Norway: Ongoing.
- Mackerel - Small scale exchange Jens Ulleweit, Germany: Ongoing.
- Sprat (North Sea and Celtic Sea) - Full scale exchange: Coordinator Lotte W. Clausen, Denmark. This exchange suffered under the WebGR breakdown. Results will be available for HAWG in March and distributed to PGCCDBS by correspondence.
- Whiting (*Merlangius merlangus*): Coordinators: Mark Etherton and Sally Songer, UK, England, starting Summer 2014
- Megrim (*Lepidorhombus spp*): Coordinator: Gordon Henderson, Scotland, starting Summer 2014
- Sole (*Solea solea*): Coordinators: Annemie Zenner, Belgium, and Loes Bolle, the Netherlands, starting in summer 2014.
- Horse mackerel and Mediterranean horse mackerel (*T. picturatus* and *T. mediterraneus)*: Coordinators: Pierluigi Carbonara, Italy, and Kélig Mahe France, starting in March 2014.
- European anchovy: Coordinators: Andres Uriarte, Spain, Begoña Villamor, Spain, starting June 2014.

3.2.3 Proposals for Full Scale Age Exchanges in 2015

- Red Mullet and Striped Red Mullet (*Mullus surmuletus* and *M. barbatus*): Coordinators: Francesc Ordines, Spain, and Kélig Mahé, France.
- Brill and Turbot (*Scopthalmus rhombus* and *Psetta maxima*): Coordinator: Annemie Zenner, Belgium.
- Sandeel (*Ammodytes spp.*): Coordinator: Lotte W. Clausen, Denmark.
- Herring (*Clupea harengus*); Atlantic and Baltic Sea: Coordinators: Jari Raitaniemi, Finland and Loes Bolle, The Netherlands (to be confirmed).

3.2.4 Proposed Age Calibration Exchanges for 2016 and Beyond.

PGCCDBS categorises proposed exchanges arising from Age and Maturity interactive tables and requests from various sources, using the same three-level priority scheme the as for age calibration workshops (see section 3.1.5).

PGCCDBS requests the relevant working groups to consider if an exchange is useful, and to advise PGCCDBS who will take responsibility for ensuring requested exchanges are actioned.

Proposals for age calibration exchanges are given below:

Priority	Age	Species		Comments and Recommendations of PGCCDBS 2014
1	Age	Sprat	*Sprattus sprattus*	The last workshop on Sprat in the Baltic Sea, Skaggerrak-Kattegat, Celtic Sea and West of Scotland was in 2008. Sprat in Irish sea has not had an exchange or workshop before. It is recommended to have an exchange on the age reading of these sprat stocks as soon as possible.
1	Age	Blue whiting	*Micromisistius poutassou*	The last workshop recommended to have another exchange in 2016.
2	Age	Lemon sole	*Microstomus kitt*	There is no known exchange or Workshop. PGCCDBS requests the relevant working groups to consider if an otolith exchange would be useful.
2	Age	Gurnards	*Aspitrigla cuculus, Eutrigla gurnardus, Chelidonichthys lucernus*	There is no known exchange or Workshop. PGCCDBS requests the relevant workinggroups to consider if an otolith exchange would be useful.
2	Age	Pollack	*Pollachius pollachius*	There is no known exchange or Workshop. PGCCDBS requests the relevant workinggroups to consider if an otolith exchange would be useful.
3	Age	Norway pout and pouting	*Trisopterus esmarkii* and *T. luscus*	There is no known exchange or Workshop. PGCCDBS requests the relevant workinggroups to consider

	if an otolith exchange would be useful.

Exchanges for witch flounder (*Glyptocephalus cynoglossus*), boarfish (*Capros aper*), ling (*Molva molva)* and blue ling (*Mola dipterigia*) were rejected by the PGCCDBS 2014 because there are too few age readers/institutes reading these species at the moment.

3.3 PGCCDBS Maturity Workshops.

3.3.1 Maturity Workshop outcomes 2013 and PGCCDBS response.

3.3.1.1 Workshop on the Sexual Maturity Staging of Gadoids (WKMSGAD)

WKMSGAD met 4-8 November 2013 in San Sebastian, Spain. The report is not ready yet, and the text below is a summary from the draft report.

Fifteen participants from seven countries joined the meeting. The meeting had the purpose of testing the applicability of the maturity scales proposed by WKMSCWHS 2007 and WKMSHM 2007 and enhances the maturity stage descriptions. A further aim was the validation of the macroscopic maturity scales, together with the identification of potential of staging errors, using histological investigations.

Evaluation of maturity scales and changes in stages descriptions

It was ascertained that the maturity scales, as proposed by the two WKs in 2007, have not been incorporated by all countries. Nevertheless most laboratories, succeeded in translating the national (or local) scale into the 2007 proposed scales.

Stage descriptions were evaluated and some changes were made in the assessing criteria, based on participants' expertise and experiences.

The baseline of the new proposed maturity scales was the universal scale (4+2), valid across species and time, developed during WKMATCH 2012. The new scale adopts the standardized terminology for describing reproductive development in fish (Brown-Petersen *et al*., 2011) and introduces the term code instead of stage. Moreover the macroscopic descriptors were revised in order to make the scale universal, i.e. suitable for all stocks. Consequently all the characteristics based on subjectivity, such as colour, size and presence/absence of blood vessels, were avoided as considered stock specific. Only objective and validated criteria were chosen by the group as stage descriptors. Concerning hake the group agreed on maintaining the stock specific criteria as indicative criteria. The modifications of the maturity keys do not have any impact on the currently estimated maturity ogive or on historical national time series.

Staging exercises

Three staging exercises were carried out; one using fresh fish, one using frozen gonads and one using pictures. In fresh sample exercise, the experts group obtained a 70% of agreement compared to 68% obtained by the entire group evidencing a decline in agreement compared to the 86% reached during WKMSHM in 2007. The agreement dropped to 60% when validated histologically, highlighting inaccuracies in macroscopic maturity stage identification. In frozen sample exercise a 60% of agreement was obtained. In WebGR exercise, the percentage of agreement based on agreed stage (modal stage) was between 70% and 80% in all gadoid species. This fairly high agreement was also confirmed when using histological validation, except for saithe and hake where the agreement dropped to 50-60%, providing evidence for inaccuracies in visual maturity stage assessment.

Next Meeting

Concerning hake, cod and saithe it is suggested to conduct an exchange (using pictures, e.g. WebGR) to test the validity of the new proposed scales but also for calibration purpose in order to evaluate the need of a follow-up workshop. Institutes are also strongly encouraged to conduct exchanges on a regular basis to monitor inter-annual variability. Concerning whiting and haddock WKMSGAD did not include enough participants from MS involved in the maturity staging of these species. Thus the possibility of a follow up workshop needs to be further discussed.

3.3.2 Work plan 2014

No workshops are planned for 2014.

3.3.3 Proposals for 2015 and Beyond.

On the basis of the Age and Maturity interactive tables and requests from various sources, the PGCCDBS produced a table containing all the possible exchanges and workshops for 2015 and beyond. These proposals were then arranged by priority. Three priority levels were defined as follows:

1: The proposal is very relevant and the exchange/workshop should be realized in 2015;

2: The PGCCDBS requests that the relevant Expert Group considers if an exchange/ workshop would be useful and should take place. All comments/ recommendations from Working Groups can be forwarded to the PGCCDBS chairs. This priority level includes proposals for which:

- The last workshop or exchange has taken place more than 5 years ago (see PGCCDBS Exchange and workshop guidelines);
- The last workshop or exchange has taken place longer ago than what was specified in the last workshop/exchange;
- There is no record of a previous exchange or workshop

3: There is no Assessment Group for this species.

On the basis of this table, the following species were assigned a priority 2.status.

PGCCDBS requests that the relevant Working Group 2014 considers if a maturity exchange would be useful.

Priority	Age	Species		Comments and Recommendations of PGCCDBS 2014
2	Maturity	Mackerel and Horse mackerel	*Scomber scombrus* and *Trachurus trachurus*	During the last Workshop 2007, WKMSMAC recommended having a Workshop on maturity of mackerel and horse mackerel every 3 years. A workshop on the maturity staging of mackerel and horse mackerel [WKMSMAC2] will take place in Lisbon, Portugal, 28 September – 2 October 2015, and co-chaired by Cindy van Damme, The Netherlands and Pierluigi Carbonara, Italy

3.3.3.1 WKMSMAC2 – Workshop on Maturity Staging of Mackerel and Horse Mackerel (*Scomber scomber* and *Trachurus trachurus*)

During the last Workshop 2007, WKMSMAC recommended having a Workshop on maturity of mackerel and horse mackerel every 3 years.

A workshop on the maturity staging of mackerel and horse mackerel [WKMSMAC2] will take place in Lisbon, Portugal, 28 September – 2 October 2015, and co-chaired by Cindy van Damme, The Netherlands and Pierluigi Carbonara, Italy.

WKMSMAC2 workshop ToRs:

1) Report on the use of the 2007 proposed common scale;
2) Check the description of the characteristics of the stages of the 2007 scale and create a new validated scale if necessary;
3) Calibrate staging of mackerel and horse mackerel using fresh fish, following the pattern of trial-discussion-retrial;
4) Calibrate staging of mackerel and horse mackerel using photographs, following the pattern of trial-discussion-retrial;
5) Validate macroscopic maturity determination with histological analysis
6) Create conversion tables, from the different scales used to the common scale, for the data already collected.

WKMSSPDF will report by 1 December 2015 for the attention of ACOM and WGBIOP/PGCCDBS.

Supporting Information

Priority:	The maturity stage is an important biological parameter to be used in the calculation of maturity ogives (and therefore of Spawning Stock Biomass), for the definition of the spawning season of a species, for the monitoring of long-term changes in the spawning cycle, and for many other research needs regarding the biology of fish. Moreover all these parameters are essential input data for the model of fish stocks-assessment ussualy used to establishing a diagnosis on stock status.
Scientific justification and relation to action plan:	During the 2007 workshop a common maturity scale with objective common criteria was proposed for mackerel and horse mackerel. Laboratories involved in collection maturity data agreed to use the common scale for reporting. 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 the usefulnes of the 2007 maturity scale and the conversion with the different scale used in the different lab/institute. TOR b) to validate the criteria and descriptions to classify maturity stages of the 2007 scale which takes into account the difficulties and / or inconsistencies of the maturity scales in use in different lab. TOR c and d) calibrate maturity staging between the different laboratories. TOR e)validate with histological analysis the macroscopic maturity stage, mainly the resting stages that are incorrectly classified as immature. TOR f) create conversion tables to have the possibility to calibrate the data already collected with different maturity scales. It is recommended that the Workshop be organised in September/October 2015. Participating institutes will be able to collect samples during 2014 and 2015.

Resource requirements:	Before the Workshop the chairs will setup a sampling plan for collecting samples for to be used during workshop. The sampling will be carried out during 2014-15. For all species, the sampling parameters are: total length; gonad visual inspection - maturity stage by the new common maturity scale; total weight; gonad weight; liver weight; gutted weight; gonad photo; age; histological maturity stage; microscopic preparation photo. This workshop will be based on the analysis of both digital photos of gonads and fresh gonads. Therefore facilities suitable to examine fresh biological material must be available during the workshop. It would be necessary to have a web server for storage and easy access to the photos collected by the participants before the workshop.

3.4 Responses to stock related biological variables data issues raised by ICES Expert groups and Regional Coordination Meetings.

Recommendations from ICES expert groups on age and maturity related issues were reviewed and a number of small exchanges, full (pre-workshop) exchanges and workshops are proposed in accordance with the current PGCCDBS cycle for these calibration exercises. Terms of reference, chairs meeting times and locations are identified. See Annex 3 and 4 for all recommendations forwarded to the PGCCDBS in 2014 by the AWG data contact persons and EGs. All expert group, and working group recommendations addressed to the PGCCDBS in 2014 and the PG responses are housed in the ICES recommendations database.

3.5 PGCCDBS intercessional work on stock-related biological variables:

3.5.1 Manuals from workshop reports on the European Age Readers Forum.

The terms of reference for age calibration (WKAC) and maturity staging workshops (WKMS) include updating the age reading or maturity staging manual for the species/stocks studied at the workshop. If no manual exists, the ToRs require that a manual is created. As the manuals will evolve over time and users require easy access to the most up to date versions, access to this information will be improved if the most up-to-date version of each manual is extracted from the relevant workshop report and a copy placed in the manuals section of the European Age Readers Forum (EARF).

During 2013 some intercessional work took place to extract age reading manuals from some of the more recent workshops. To date three manuals have been compiled for; *Anguilla Anguilla, Scomber scombrus* and *Micromesistius poutassou,* and these have now been uploaded on the EARF. Two main issues were identified when compiling these manuals:

1) Most workshops did not follow up the generic ToR of producing an agreed age reading manual. This is considered to be an important final step, which provides a valuable product to existing and new age readers and should be provided by the Workshop for upload onto the Age Readers Forum.

2) Several workshop reports refer to a "Reference Collection" of agreed age but provide no further details. The location and/or a contact person responsible for the reference collection of images should be highlighted in the report.

3.5.2 Update of the Interactive Age and Maturity Planning Table.

The Interactive table of age calibration reports by ICES species–stocks will be uploaded to the PGCCDBS document repository, with a link to this table on the Age Readers Forum.

The Age and maturity planning table "WKAC Ex and SG History Interactive master table_PGCCDBS2013 WG.xlsx" was updated with the information for the forthcoming workshops and exchanges planned in 2014 and 2015.

The launch of the new ICES website resulted in the loss of all text-hyperlinks in the interactive table (making it non-interactive). Despite the best efforts of the ICES Secretariat, during 2013, some links in the interactive table are still inactive. The ICES secretariat is asked to help modify all links to the new ICES website design to finally ensure that all the links to available age and maturity reports are live.

3.5.3 Updated Age Readers Contact List 2013.

The list of age readers' contacts was updated during the 2014 PGCCDBS Meeting in Horta. The list is now available on the European Age Readers Forum:

https://community.ices.dk/ExternalSites/arf/_layouts/15/start.aspx#/default.aspx

3.5.4 Maturity stage contact list 2014

A list of maturity stagers' contact list has been created during the 2014 PGCCDBS meeting in Horta. The list will be available on the Maturity Stagers Forum, which will soon be available, under the External Sites of the ICES SharePoint: https://community.ices.dk/ExternalSites/_layouts/15/start.aspx#/

3.5.5 Updated guidelines for Age and Maturity workshops

Guidelines for both age and maturity workshops have been updated during the PGCCDBS 2014 and will be uploaded to the PGCCDBS document repository. Age related guidelines have been uploaded to the European Age Readers Forum and the maturity guidelines will be uploaded to the Maturity Stagers Forum, once this site is live.

3.6 Update the list from PGCCDBS 2011 comparing the species in the MoU to those species included under the DCF.

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

In 2012, a new Memorandum of Understanding (MoU) between ICES and the EU came into force. The PGCCDBS notes that no new stocks have to be added to the DCF implementation rules to address these revised data needs, as the latest MoU does not contain any changes with regard to the list of stocks. Many of the listed stocks, however, fall into the category of 'data-limited stocks' (DLS), for which data needs are likely to increase in future. The species list for 2013 (2012 list with no updates) is available in the PGCCDBS 2012 report; Annex 6.

The latest MoU between ICES and the EC is available at:

http://ices.dk/explore-us/Documents/Cooperation%20agreements/EC/2013_EC_ICES_MoU_WEB.pdf

An overview of all MoUs is given here:

http://ices.dk/explore-us/how-we-work/Pages/Cooperation-agreements.aspx

3.7 Proposals for collaborative studies contracts.

Previous PGCCDBS meetings have forwarded proposals for funding consideration related to stock-based biological variables. In 2014 the PGCCDBS re-iterate the endorsement of a previously forwarded study; Recommendation for a collaborative study in European anglerfish (*Lophius piscatorius* and *Lophius budegassa*) and megrim (*Lepidorhombus whiffiagonis*) as this proposal was not funded and still is considered by PGCCDBS to be relevant and important.

In addition, the PGCCDBS has received a study proposal on further development of WebGR and also a call for a study on improving accuracy in fish age estimation through understanding of the link between environmental conditions and physiological responses recorded in the otolith macrostructure.

With regards to the previously forwarded proposal on "Age Determination and Maturity Staging of species not previously subjected to biological sampling for analytical assessments" which was rejected by the Liaison Meeting in 2013, it is suggest that it is reviewed by WGNEW in March 2014 especially in relation to the list of species, stocks and necessary precision of the required biological parameters and then submitted to WGBIOP or the successor of PGCCDBS for consideration.

3.7.1 Recommendation for a collaborative study in European anglerfish (Lophius piscatorius and Lophius budegassa) and megrim (Lepidorhombus whiffiagonis)

In the PGCCDBS meeting 2013, intercessional work on an anglerfish age and growth study proposal was proposed (see section 3.6.1 of the report). As a result a collaborative study in European anglerfish (*Lophius piscatorius and Lophius budegassa*) with a priority 1 status (considered as a high priority) was presented for comment to the 9th Liaison Meeting. The study proposal was endorsed by the 9th Liaison Meeting 2013 and they recommended that the scope of the proposal be widen to include areas IV, VI, VIII and IXa. The Study proposal was re worked to take the Liaison Meeting comments on board and an edited proposal was submitted to the 10th Liaison Meeting for further consideration: "Study on European anglerfish (Lophius piscatorius and Lophius budegassa) in all ICES areas and megrim (Lepidorhombus whiffiagonis) in VII and VIIIa,b&d" The revised study proposal was endorsed by the Liaison Meeting in 2013, but has not been funded.

PGCCDBS strongly supports the need for a study proposal on Anglerfish, but wishes to rework the proposal in the coming months, with inputs from the RCM's in September. Once an initial reworked proposal is completed it will be further refined in consultation with the scientists involved in the forthcoming anglerfish benchmark assessment: DCWKAnglerfish in November 2014, to ensure it is fully relevant to the anticipated needs of future assessments and can accommodate additional recommendations emerging from the benchmark.

This study proposal also has wide spread support across the South Western Water Regional Advisory Council (SWWRAC) and the North Western Waters Regional Advisory Council (NWWRAC).

3.7.2 Recommendation for a collaborative study of improvement of WebGR (PRIORITY 1)

WebGR is a set of Open Source web services developed within an EU tender project in 2008 to support studies of fish growth (age) and reproduction (maturity). This tool assists fisheries scientists in the organization and data analysis of calibration workshops for classification of biological structures and provides means to analyse the results of such exercises. The tool has not been further developed since 2010. Nevertheless, since 2010 several workshops and exchanges have used WebGR with variable success. Unanimously, the members of these expert groups saw a great potential in using this software and its tools. However they experienced different problems while using it and at the same time had several requests on how to improve this tool and obtaining more complex outputs. This feedback highlighted the strong need for further improvement of WebGR and it is the basis for the present study proposal.

The objective is to substantially improve the software, which will amend the contribution to improve the quality of growth and reproduction studies, by guaranteeing a consistent application of age reading protocols and maturity scales, ultimately influencing fisheries management advice. Additionally, the use of this tool is not necessarily limited to age and maturity studies. In principle WebGR can be applied to all situations, where individual scientists need to discuss the interpretation of a protocol, for the identification of the status of biological material.

The desirable upgrading of WebGR is manifold. First of all, a more user-friendly interface would be beneficial both for workshop managers organizing online exercises and for participants joining them. The arrangement of a workshop is currently troublesome, consisting in more steps than actually needed, therefore a process consisting of sequential steps and a detailed error report need to be implemented. Furthermore, there is a great need for improvement of the picture uploading mechanism and to enhance exploring tools, in terms of new measuring tools. Concerning the output, the most basic features are presently implemented and the easy export procedure allows users to use the data on a standard statistical package or spreadsheet. The main aim is to develop an R package and implement a set of statistical methods. An extended statistical output will give a more complete and standardized evaluation of potential differences among readers/stagers.

Presently, the service is freely provided at http://webgr.azti.es but without any warranties in case of problems, with a high risk of data loss. It would be rather beneficial both for ICES and the users, if ICES could host the server. This would guarantee a wider dissemination of this useful tool and ensure a better site management and support. Furthermore, an offline access to the workshop is to be aimed for. This features needs to be implemented so that all individual users' annotations will be synchronized with the server as soon as one goes online again)

The second Workshop on national age reading coordinators (WKNARC2) took place in May 2013 and embarked on the first phase through identification and debate on the more practical user interface improvements, and made an outline of a Study proposal for a full upgrading of WebGR. Subsequently, the Workshop on Statistical Analysis of Biological Calibration Studies (WKSABCAL), taking place in October 2014, will give

the necessary input to the second phase (i.e. statistical output) of the improvement of WebGR.

The project objectives will be achieved over 18 months through the realization of a list of tasks classified in 5 Work-Packages (WP). WP 1: Project Management; WP 2: Development; WP 3: Statistical methods; WP 4: Training and dissemination; WP 5: Site management.

Indicitative Budget: €300,000 to be spent over 18 months.

PGCCDBS strongly supports this initiative and study proposal

3.7.3 Recommendation for a collaborative study on Improving accuracy in fish age estimation through understanding of the link between environmental conditions and physiological responses recorded in the otolith macrostructure (PRIORITY 2)

The study aims at identifying the biological meaning of otoliths features such as annually recurring patterns, checks associated with spawning or other life stage events as well as periods of environmentally induced physiological stress. The timing of these features and the causal relationship between otolith feature and the fish's environment and behaviour can be validated by combining different validation techniques (micro and macrostructure analysis, microchemistry). Identification of the underlying processes affecting otolith macrostrucure should be based on species and stocks with an easily interpretable otolith structure. Results from these analyses will provide the necessary input data to calibrate generic simulation tools that can link bioenergetic processes and environmental conditions with otolith visual appearance. The applicability of such an approach should subsequently be tested on stocks of the same species with highly complex otolith patterns and known otolith growth rates. This study will provide an evaluation of the applicability of this approach and should therefore focus on a limited number of species from different geographical locations/stocks where samples from tag-recapture programs are available.

The objective of this study is improving the accuracy of age data used in stock assessments. It aims to validate different features within the calcified structure by combining well established validation techniques.

Background

Age estimates based on the interpretation of otolith macrostructure features have been used extensively in stock assessment for many years. For some stocks good precision in age estimation has been achieved, whilst in other stocks where otoliths are more difficult to interpret precision is lower. Even within the same species the otolith's visual appearance - and thus readability - may vary, presumably as a consequence of a combination of stock-specific environmental conditions and physiological responses. Validation of the biological significance of the structures used for age estimation is essential for improving both precision and accuracy of these estimates and, consequently, improving stock assessment. There are well-established techniques available that can provide information on the timing of the formation of specific otolith features (micro structure analysis) and reveal the relationships between visual patterns in the otoliths and physical and chemical properties of the environment experienced by the fish (micro-chemistry). Application of these methods simultaneously on known-age otoliths from tag-recapture programs will provide the key to understanding the biological meaning of otolith features.

Terms of reference

- References to ageing workshops, PGCCDBS, PGMED, WKNARC and WKAVSG
- Reference to projects TACADAR, EFAN, CODYSSEY, DECODE, AFISA, MARMER and French hake tagging
- Providing input to relevant ICES stock assessment working groups
- Validation of features within otoliths.
- Accurate age data
- Greater understanding of different life histories of stocks within the same species.

The main tasks to be undertaken by the contractor are the following:

1) Compile available material for re analysis from existing otolith archives.
2) Perform comparative micro increment and micro chemical analysis on selected otoliths.
3) Analyse increment patterns in otoliths from different stocks of the same species
4) Re-evaluate age estimates in light of findings.
5) Present the recommendations to end users, to establish expertise and international cooperation for further work on other species.

Timetable and Final Report

The duration of the study shall not exceed 24 months from the signature of the contract. An interim report of the study should be made available after 12 months of the signature of the contract and a final report should be made available within one month of the termination of the project.

Budget

The maximum budget allocated for this study is € 1,500,000 covering all expenses, including personnel, preparation and analysis of samples, meetings, consumables.

The study proposal was endorsed by the WKNARC2.

3.8 Proposal for ICES cooperative research report (CRR). Work Plan 2013/2014 –Protocols on the ageing of different fish species in the ICES area (identify editors/content/contributors/species).

PGCCDBS 2012 was approached by the ICES Publications Committee with a suggestion of combining the existing protocols on the ageing of fish species within the ICES area, and publishing them as an ICES cooperative research report (CRR). This idea was positively received by PGCCDBS. The proposed CRR was discussed further at the WKNARC-2 meeting in 2013 and agreement was reached on the general structure of the CRR, the chapter titles and chapter editors were also appointed. ACOM has endorsed this proposal and it was agreed by the ICES PubCOM. A plan was also agreed with milestones and deadlines highlighted. It is hoped that a final version of the CRR will be ready for submission in December 2014.

Feedback from chapter editors to PGCCDBS, on progress to date indicated the need for a clear chapter structure, to provide coherence to the CRR. This was taken up by the

age and maturity subgroup and the proposed chapter outline is presented in annex 5. This chapter structure will be sent to the chapter editors for comment.

The proposed work plan is as follows for the remainder of 2014:

- **August 2014: DEADLINE for DRAFT chapters**
- **October 2014: WKSABCAL: Statistical Analysis of Biological Calibration Studies**
  - Making the uncertainty of age estimations operational for all
  - Recommendations from WBSABCAL
- **20th – 24th October 2014: 5th International Otolith Symposium**
  - Poster/Presentation of the CRR
- **Final review of chapters based on feedback from Otolith Symposium and WKSABCAL inputs.**
- **December 2014: Submission of the CRR…!**

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

4.1 Review key outcomes of the 2013 fleet based sampling workshops (WKPICS3; SGPIDS).

The ICES Workshop on Practical Implementation of Statistically Sound Catch Sampling Programs (WKPICS) and the Study Group on Practical Implementation of Discard Sampling Programmes (SGPIDS) completed their three-year terms in 2013. The work done over the three years, and the achievements of these two groups, are reviewed below.

WKPICS and SGPIDS followed from the 2009 ICES "Workshop on Methods of Merging Métiers for Fishery Based Sampling" (WKMERGE; ICES, 2010). WKMERGE explored how at-sea and onshore sampling of fisheries can be carried out using statistically-sound, probability-based methods, and the problems associated with ad-hoc approaches and quota sampling based on highly resolved, dynamic fleet métiers. WKPICS (ICES, 2011a, 2012a, 2013a) and SGPIDS (ICES, 2011b, 2012b, 2013b) were initially developed independently to improve the design, implementation and documentation of catch sampling programmes to standardise processes and assure the quality of catch data, taking account of the practical problems that sampling staff are often confronted with. The topics covered by the workshops included:

- Developing sampling design guidelines
- Practical implementation of statistically-sound programmes
- Raising data according to the sampling design
- Developing a quality assurance framework for improving data for stock assessment and management advice

Using case studies, each of these series have been able to demonstrate the practical issues in trying to implement probability based approach and have been able to provide guidelines and standards which allow countries to optimise their resources to provide quality-assured, harmonised data. Many countries have gradually improved their programmes based on these workshops within the limitations of their DCF programmes but this process is not finished yet and the baton will be picked up by WGCATCH. The case study approach will continue to be useful to focus on common issues and the different processes and experiences arising from national sampling and raising schemes within multinational shared stocks.

A summary of each of these workshops and their key achievements is provided below.

SGPIDS1 (ICES 2011b) provided useful overviews about discard sampling plans by country in terms of sampling techniques, legal conditions, sampling protocols, data storage procedures, ways to improve cooperation with the fishermen, training procedures for sampling and safety and data delivery issues to end users. Its main achievements were:

- Identifying the main discard sampling techniques by country and their sources of error in discard sampling programmes (both onboard, self-sampling, reference fleets and onboard CCTV sampling)

- Reviewing the legal framework under which discard sampling is taking place and the impacts of a discard ban in onboard observer programmes and discard estimation
- Describing sampling protocols and highlighting the aspects that required standartization in the collection of the raw data used in discard estimates
- Evaluating data handling procedures, quality checks (internal and external) and raising procedures used in estimating national discards
- Listing data storage requirements and discussing the concept of a regional database procedures of primary discard data and proposed modifications
- Discussing ways to improve co-operation with the fishing sector to collect discard information
- Discussing sampling and safety training procedures used by countries
- Making recommendations to improve comunication and data delivery to other study groups, identifying problems and suggesting potential solutions

SGPIDS2 (ICES 2012b) provided a first attempt at defining quality standard levels for discard sampling programmes. The group provided suggestions for quality indicators and what should be incorporated in the regional database. The group also developed practical ways of improving vessel selection procedures and contact logs. Main achievements included:

- Defining and developing quality indicators for discard sampling programmes (e.g. non-response and refusal rates and measurements of 'goodness of fit')
- Developing practical ways of defining sampling frames and statistically sound practical procedures for selecting vessels.
- Comparing the outcomes of different onboard sampling procedures using concurrent case studies
- Considering ways of integrating the recording of Protected, Endangered and Threatened Species (PETS) into onboard observer programmes.

SGPIDS3 (ICES 2013b) looked at the practical issues when defining sampling frames for at-sea sampling programmes using national vessel registers for a number of case studies. The group provided further guidance on vessel selection procedures, documenting response and refusal rates, on-board sampling and estimation procedures. SGPIDS developed. Achievements included:

- Testing the application of probability-based sampling design and the quality indicators envisaged under DC-MAP in the definition of strata to sample fleets using case studies.
- Comparing response rates from case studies and developing further guidance on vessel selection to provide more comparable quality indicators.
- Documenting and analysing within-trip raising procedures of discard weight, lengths and ages
- Developing procedures and guidance on the minimum requirements for recording PETS as part of national observer programmes.

WKPICS1 (ICES 2011a) reviewed the design and current status of national at-sea observer and onshore sampling programmes. Most of these were heavily influenced by the requirements of the DCF with reference to métiers and mostly consisted of ad hoc

quota based sampling. This group introduced the concepts and terminology related to a probability-based sampling approach. This group achieved:

- Clarifying of concepts and terminology for fishery catch sampling schemes
- Categorizing catch sampling schemes to facilitate the development of best practices. Three types of fisheries sampling schemes were defined: at sea sampling for large scale fisheries, on shore sampling of large scale fisheries and sampling of small scale fisheries
- Identifying logistical problems affecting the implementation of these sampling schemes, using case studies as examples

WKPICS2 (ICES 2012a) developed guidelines for best practice that covers the design, implementation and analysis stages of catch sampling schemes. The group also realized that precision cannot be assessed by just a number in isolation, and started defining quality indicators for data used for stock assessment. Achievements included:

- Providing a table detailing "best practice" that covers the design, implementation and analysis stages of catch sampling schemes.
- Outlining four classes of probability based sampling schemes with examples of sampling units and stratification for multiple stages
- Reviewing best practice for data raising and precision estimates using case studies
- Reviewing SGPIDS, WKACCU and WGRFS quality indicators and drafting templates for quality assurance report (covering sampling design, and national contribution to regional and stock sampling).
- Providing a glossary of statistical terms
- Making recommendations to improve regional coordination in the most cost-effective way

WKPICS3 (ICES 2013a) focused on several classes of catch sampling schemes for estimating variables such as quantities discarded, and length or age composition of catches, taking account of the many practical problems that face people trying to obtain representative, randomised samples of catches. The core achievements include:

- Reviewing and proposing amendments to the Quality Assurance Reports developed by WKPICS2 and SGPIDS3.
- Reviewing the sampling design and estimation procedures currently adopted within Europe for estimating age compositions and weight-length relationships for retained and discarded fish.
- Documenting data quality indicators used in non-EU countries and providing advice on appropriate data quality indicators to be included in the DCMAP.
- Reviewing the regional approach and the optimization of national sampling schemes to meet regional goals.

PGCCDBS 2013 (ICES 2013 c) proposed merging this series of workshops into a single expert group (WGCATCH) aimed at continuing the work of WKPRECISE (ICES 2009), WKACCU (ICES 2008), WKMERGE, SGPIDS and WKPICS. The proposal was accepted by ICES and the first WGCATCH will take place in November 2014.

4.2 Work plan 2014

PGCCDBS strongly supports the following workshop proposal by the Regional Database Steering Committee:

4.2.1 Workshop to develop the RDB data format for design based sampling and estimation (WKRDB5), with particular emphasis for on-shore sampling.

WKRDB5 will be established and chaired by Alastair Pout (UK- Scotland) Liz Clarke (UK- Scotland) and meet in Aberdeen 27-31 October 2014 to:

1) Document, by means of case studies, the range of sampling protocols used to collect catch data on a variety of fish and shellfish sampled in a variety of situations across the regions, particularly those on-shore, e.g. at landing port, markets, and at processors. These case-studies will identify the primary sampling unit (PSU) and all stages in the hierarchical cluster sampling involved.

2) Determine the extent to which these sampling protocols can be effectively recorded on the present RDB data format (csData tables), and as appropriate develop a revision of the data format.

3) Generate appropriate sample weights for the PSU using the sampling data recorded in the (revised) data format.

4) Following design based sampling principles (i.e. based on sampling frames of ports, markets or processors), consider the extent to which population estimates for a variety of domains can be effectively derived from the sample data, and post stratification weights, using the available landing and effort data in CL and CE format. Suggest revisions to the CL and CE data format accordingly.

Priority	The workshop will be used to facilitate the development of the RDB
Scientific justification	The data formats inherited by the RDB are those developed for FISHFRAME. They consists of the CS data structure for commercial sampling data and CL and CE data structures for commercial landings and effort data respectively. While these data exchange formats meet most of the requirements for recording sampling data, and generating catch estimates, they are limited in important aspects. Therefore revision of these data format is required to accommodate: The recording of data from the full range of sampling situations encountered across the regions served by the RDB. The recording of appropriate data, and linkages, required for design based stratified sampling and estimation. The recording of data in raw form, as opposed to derived estimates This workshop will build on the changes the data formats identified in WKRDB 3 (Nov 2012), WKRDB 4 (4-6 June 2013) and SGPIDS 3 (June 2013) and look to consolidate the work on design based estimation procedures of WKPICS 2 (Nov 2012) and WKPICS 3 (Nov 2013).
Resource requirements	This workshop will be based on case studies of specific sampling situations and the data collected in these situations. Knowledge of the RDB exchange format and R would be advantageous.

Participants	This workshop will be looking to utilise the knowledge of individuals with experience of fish and shellfish sampling from all regions and in all types of fisheries, in conjunction with data providers with experience of the generation of catch estimates. The WK would encourage participants from all regions and countries providing data to ICES and or populating the RDB.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to advisory committees	There are no obvious direct linkages with the advisory committees.
Linkages to other committees or groups	The outcomes will be relevant to the RDB-SG, facilitate the work of the RCMs and be of particular interest to WGCATCH, and PGDATA.
Linkages to other organizations	Bodies within the EU and member states involved in commercial fisheries sampling and data provision.

The work of the PGCCDBS fleet-based subgroup will be taken over by the new Working Group on Fishery Catches (WGCATCH), proposed by PGCCDBS 2013. During PGCCDBS 2014, an update to the ToRs of WGCATCH was proposed, and further guidance on the future workplan of WGCATCH was developed.

4.2.2 Review of ToRs for WGCATCH

PGCCDBS 2014 reviewed and revised the ToRs for WGCATCH. An additional ToR (e) was developed for WGCATCH to evaluate responses to test applications of data quality assurance tables for onboard and port sampling developed by WKPICS, SGPIDS and PGCCDBS, to make improvements for further testing, and to develop clear guidelines for completing and interpreting the tables. The original ToRs (1) – (4) and the new ToR (5) are given below, followed by the basis for the revisions.

Updated ToRs:

The Working Group on Commercial Catches (WGCATCH), chaired by Mike Armstrong (UK) and Hans Gerritsen (Ireland), will be established and will meet in ICES HQ, Denmark, ICES, 10–14 November 2014 to:

1) Develop the longer term work plan for WGCATCH

2) Evaluate methods and develop guidelines for best practice in carrying out sampling of commercial fish catches on shore

3) Provide advice on adapting sampling protocols to anticipated changes in management measures (e.g. discard ban) or technical advances in monitoring.

4) Provide advice to the RDB Steering Group on development of the RDB to support design-based data collection and estimates.

5) Evaluate responses to test applications of data quality assurance tables for onboard and port sampling developed by WKPICS, SGPIDS and PGCCDBS, make improvements for further testing, and develop clear guidelines for completing and interpreting the tables.

Rationale for new ToR (5):

ICES PGCCDBS, WKPICS, SGPIDS and WGRFS (ICES 2013d) have proposed the implementation of a system for individual countries to supply information on design and

achievement of fishery sampling schemes, using quality assurance reports that will allow end users to easily identify data quality issues and propose actions to improve quality in future. Some limited testing has been conducted but a wider pilot application is needed. The reports will provide a baseline, not presently available, to monitor quality improvements over time at a national and regional level. WGCATCH will make this information available to 2015 RCMs to help them design the RCG process. Further information on the QA reports and a timetable for testing prior to WGCATCH, are given in Section 4.2.3.

4.2.3 Further proposals for WGCATCH workplan and deliverables

Context of WGCATCH over 2014 - 2016

Over the course of 2014 - 2016, RCMs (to become RCGs) will be working towards development of more integrated regional fishery sampling schemes in which national programmes of sampling on shore and at sea are, as far as possible, statistically sound and probability-based. A goal will also be to identify how sampling could be optimised between countries to achieve the most cost-effective use of DC-MAP (EMFF) funds. Such changes are required to meet fleet-based, stock-based and ecosystem assessment needs at the scale of regions and stocks, and are expected in many cases to bring about significant changes in the way commercial catch data are collected. In contrast to previous changes and adjustments made at the level of, e.g., lists of species to be sampled or sampling intensity, any quality-driven improvements to current DCF sampling design are expected to take longer to implement and will occur gradually through time. All changes made must be documented and the impact of changes in terms of bias and precision levels must be closely monitored so that the effects on time series can be understood. This will require detailed documentation of how sampling schemes have changed over time in each country, which is also needed as historical data are migrated into Regional Data Bases. PGCCDBS stresses that there are no logical arguments to continue ad-hoc, biased sampling schemes in a belief that they will maintain continuity of data sets. The lack of statistical design can lead to biases that vary from year to year as well as a tendency to drift over time if the schemes are altered in an ad-hoc way in response to changes in the fishery, staffing or working preferences of individuals involved in running the schemes. This is no different to the need for statistically-sound designs for research vessel surveys, which work best when they cover all or most of the population, obtain representative data on absolute or relative abundance, and adopt standardised, fully-documented procedures and rigorous quality assurance procedures.

PGCCDBS and PGCCDBS-supported groups, especially SGPIDS and WKPICS, have made substantial progress in evaluating both the need for, and difficulties of, moving towards statistically-sound catch sampling programmes, and testing some of the proposed changes in case-studies. Furthermore, these groups (along with the Working Group on Recreational Fisheries, WGRFS) have started the development of quality indicators and quality assurance reports that should allow the current state of sampling design and achievement to be to be documented and to act as a reference for monitoring quality improvements brought about by envisioned progressive changes in sampling design. PGCCDBS 2014 reviewed this work (Section 4.1) and further supports such conclusions and the need to achieve more statistically-sound catch sampling programmes in order to meet end-users' needs. Additionally, discussions at PGCCDBDS 2014 based on evidence presented in WKPICS reports (ICES 2011a, 2012a, 2013a) indicate that the move towards statistically-sound catch sampling programmes, where precision can be estimated and related to sampling effort, will open the way towards

statistical optimisation and improved cost-effectiveness of national and regional sampling programmes. On the other hand, PGCCDBS 2014 has identified a risk that if changes are implemented without proper documentation of the sampling-design used in previous years, the information on previous sampling schemes may become lost or difficult to reconstruct. This may make it difficult, or even impossible, to evaluate how the characteristics and quality of data sets have changed historically, information that is important for fitting and evaluating assessment models. It is also an issue for migration of previous catch data to RDBs.

The implementation of statistically-sound sampling is just one component of the assessment and advisory process. The present and future use of the data must also be considered, through consultation with end users. For example, the use of statistical assessment models such as SAM and Stock Synthesis is progressively increasing within Europe. Flexibility exists in a modelling framework such as Stock Synthesis to specify the precision or effective sample size of individual data sets, to apply different weightings to data according to perceived quality, or to remove subsets of data considered unreliable. In order to do this, there must be reliable information on precision and other components of data quality, including how changes in sampling design and implementation over time have affected the accuracy of assessment data. In many cases such information is lacking because previous assessment models have treated catch and catch composition data as exact. A key role of WGCATCH will be to promote the documentation of all the relevant information on sampling schemes, and development of quality indicators for precision and bias, in a way that is useful for stock assessment and other end users of the data. This is the driver behind the development and testing of data quality assurance reports for national sampling schemes. Although estimates of precision are desirable, in many cases the biggest uncertainties are related to bias – for example biases in landings estimates due to misreporting or inadequate reporting of landings, or biases in discards estimates related to high rates of refusal to take observers on board. The introduction of the landings obligation (discard ban) will bring more sources of bias to be identified and evaluated. These biases can translate into errors in time-series of abundance or fishing mortality estimates from assessment models using fishery catches and/or fishery-dependent abundance indices. In some cases, methods have been adopted to try and estimate biases in catches. These methods need to be evaluated, another potential role for WGCATCH to provide guidance based on case studies.

Work plan for WGCATCH: 2014-2016.

2014: as defined by the proposed ToRs for 2014: i.e.

1) First meeting will agree the longer term work plan and skills needed

2) Evaluate methods and develop guidelines for best practice in carrying out sampling of commercial fish catches on shore (this has largely been completed for at-sea sampling by SGPIDS).

3) cProvide advice on adapting sampling protocols to anticipated changes in management measures (e.g. discard ban) or technical advances in monitoring.

4) Provide advice to the RDB Steering Group on development of the RDB to support design-based data collection and estimates.

5) Evaluate responses to test applications of data quality assurance tables for onboard and port sampling developed by WKPICS, SGPIDS and PGCCDBS,

make improvements for further testing, and develop clear guidelines for completing and interpreting the tables.

In relation to the long-term plan, the required linkages and form of working relationships with end users of WGCATCH products – e.g. RCMs; STECF; other ICES EGs - should be identified.

2015

A wide range of topics are possible for 2015 and 2016, and are listed below. These are in addition to any special requests to the WG. The topics should be prioritised by WGCATCH 2014.

- The group should evaluate methods and develop guidelines for best practice in carrying out sampling of commercial fish catches from small-scale fisheries. (This links closely with methods developed for recreational fisheries by WGRFS.)
- In relation to sampling design, WGCATCH should initiate a survey of the historical changes in sampling programmes in Europe. Of particular interest are changes related to the demands of the DCR and DCF, and expectations for the future DC-MAP. The motivation is that important historical information may otherwise be lost, and changes in characteristics and quality of time series data need to be documented.
- To facilitate the goal of sampling optimisation within and between countries, WGCATCH should begin to compile case studies where sampling design allows reliable estimation of precision, and examine the relationship between achieved precision and sampling effort and cost. Statistical approaches to optimise sampling to achieve multiple goals (e.g. achieve desired precision for >X% of stocks or métiers) should be reviewed and case examples provided.
- The linkage and working relationships with end users of WGCATCH products – e.g. RCMs; STECF; other ICES EGs - should be clearly established by 2015.
- Moving towards wider implementation of the discard ban, WGCATCH should begin to compile experiences from national trials of how the legislation affects shore based and at-sea sampling programmes, and data quality, and advise on how sampling programmes could be adapted.
- WGCATCH will continue to provide advice on how the regional databases should be structured to archive design-based survey data and permit analysis of the data according to design.
- The accuracy of reported landings data during various historical periods is often in doubt due to suspected or known misreporting, mixed-species catch reporting, dispensations from reporting small catches, and methods of recording landings where no logbooks are kept. Changes in legislation, e.g. introduction of Buyers and Sellers regulations, can cause step changes in accuracy. In some cases, scientists post-process official data or use surveys to try and improve the accuracy of the data. Often these are not well documented or reviewed. This is a potential topic to be addressed by WGCATCH, to review the extent of these problems and methods adopted, and advise on better approaches where needed. An initial survey would be needed to document the extent of the problem and methods adopted.

- Fishery-dependent abundance indices are still used in many stock assessments, and for some species where RV surveys cannot provide reliable information, may be the only source of information on stock trends. There is no design base for fishery cpue, and various methods are applied worldwide to get round this problem for example using species composition data (Stephens and MacCall 2004) to exclude trips considered to have a very low probability of catching the species, and delta-lognormal models to provide relative abundance signal after factoring out the influence of area, season, vessel/gear characteristics etc. There is scope for WGCATCH to work in collaboration with other ICES EGs such as WGFTFB (gear technology) and the Methods WG to evaluate these approaches using case studies in the ICES area, given that much of the work of WGCATCH on the underlying catch data is relevant. This includes how the catch and catch composition data are collected, and precision and biases in these over time.
- It has been an aspiration of WKPICS to produce a textbook on fishery sampling design. Whether or not this happens, PGCCDBS considers that there would be great value in publishing key findings of the WKPICS/SGPIDS/PGCCDBS/WGCATCH series in ICES Cooperative Research Reports (CRR) and peer-reviewed publications. Planning of these should commence in 2015:
    - CRR on optimisation procedures and case-study application of sampling programme optimisation
    - CRR with synthesis of sampling design evolution towards best practice
    - Peer-reviewed publication with sampling design/optimisation case-studies from European waters

2016

In 2016, WGCATCH should aim for completion of the agreed deliverables for the first three-year term, either as final products or well-defined achievements for topics that require longer-term work:

1) Detailed evaluation of on-shore and small-scale fishery sampling design, implementation and analysis using case studies, and detailed guidelines for good practice;
2) Documentation of changes in sampling programmes in Europe
3) Finalisation of the "toolkit" of quality assurance reports for end users of fishery sampling data, tested through stock assessment benchmarks and RCM meetings.
4) CRRs and peer reviewed papers (or plans in place) on sampling design and optimisation
5) Establishment of clear working relationships with end users of WGCATCH products
6) Clear guidelines on how the RDBs should be structured to accommodate design-based sampling and analysis.
7) Survey to compile extent of issues around accuracy of official landings data and national approaches to making corrections.

8) Review of methods adopted in Europe and elsewhere for developing fishery-dependent abundance indices, and associated filtering and other processing of fishery catch and effort data.

9) Submission of proposal for a theme session at the ASC 2017, following from and building on the very successful "What's the catch" theme session in 2013.

10) Work plan for next three years.

This is an extensive set of deliverables and some may be "work in progress" after three years, requiring a further term to address, or postponed to the next term.

4.2.4 Revision of WKPICS Quality Assurance tables and schedule for testing

PGCCDBS 2013 proposed a trial for Quality Assurance Reports designed to document the quality of national sampling schemes and the relative catch and sampling contribution. The intention was for the scheme to run parallel to the ICES assessment cycle to ensure feedback could be collated from sampling programme designers, stock coordinators and assessment scientists.

Some intersessional work was carried out, and although WKPICS3 and SGPIDS3 were able to add to the development of these reports, the more formal trial proposed by PGCCDBS2013 did not occur. The draft quality assurance reports were tried out at the Western Baltic cod assessment and the benchmark meeting for Baltic Dab and Flounder (Figure 4.2.3.1).

Due to other more pressing data issues there was little time for the assessment groups to properly consider the efficacy of these reports although there was general consensus that they would be useful. Anecdotally, amongst those not familiar with these reports there appeared to be little interest. Whether this was a result of there being little time for the groups to properly consider the meaning of the reports, or was indicative of the gap between the data collectors and stock assessors, was unclear. No formal responses were gathered but the completion of the reports did not present a problem for the countries involved. For the uninitiated, guidance was provided by those countries familiar with them, usually people from PGCCDBS. It was clear that further guidance would be required in how to complete and understand these reports, the relevance of the quality indicators, and their potential use.

Building on this intersessional work, PGCCDBS 2014 has added to the original draft of the QA report to provide a more useable interface (Figure 4.2.3.2). The spreadsheet report will limit the responses to some of the key fields using dropdown lists, and comments will provide explanatory notes and guidance (Figure 4.2.3.3 & 4).

These reports will continue to evolve as more appropriate quality targets become clearer, as the functionality of the RDB improves (in whatever guise), and the role of RCGs expands and coordinated regional sampling programmes develop. It has already been mentioned at the RCMs, PGCCDBS and its WKs and SGs that the QA reports could be pre-populated using the information and data held on the RDB. The draft QA reports focus on the design, relative catch and sampling levels for different national schemes.

Currently there is patchy documentation on how stock based variables are derived nationally, or how the data are raised to population estimates, beyond the general descriptions in the Stock Annexes. PGCCDBS 2013 sent out a questionnaire relating to how age and weight data were collected and linked to length data during 2013 and the results were reviewed at WKPICS3. If data are to be raised and used in relation to how

they were gathered, then reference to historic data and sampling schemes will also need to be documented. All these aspects and stages in the process will ultimately need to be linked with the QA reports and could form part of a national and regional port folio on sampling quality for a stock and fleets. The QA reports will continue to develop, and WGCATCH and the RCGs will need to coordinate this.

PGCCDBS 2014 proposes a larger trial application for 2014/15 similar to that proposed last year. It will be stressed that this trial is not for the evaluation of national sampling programmes but to see how well these reports work - for sampling coordinators, stock coordinators, assessment scientists and auditors.

This task will require contributions from PGCCDBS, ICES, data submitters, stock coordinators, RCMS and WGCATCH. The WGCATCH will take responsibility for analysing these results and managing their development. A questionnaire will accompany the templates to formalise any feedback.

Adopting a similar time frame to that proposed in PG 2013, six stages are listed below (the months give the deadlines):

1) March-May 2014

2) PGCCDBS, through intersessional work, will be in charge of refining and compiling the Quality Assurance Report templates, and adding instructions on how to use them. An additional questionnaire will be developed to obtain feedback on the ease of use of the QA reports and their usefulness.

3) June 2014

4) The ICES Secretariat will circulate these templates to the data submitters of the countries involved, to be completed and returned to ICES for consideration at the RCMs in September.

5) September 2014

6) PGCCDBS/WGCATCH members at the RCMs will present the received reports for consideration on how the information can help the RCMs in relation to their role as coordinators and potential evaluators, and provide feedback to WGCATCH.

7) October 2014

8) ICES Secretariat will compile any further reports and questionnaires received from the data submitters and send them to the chairs of the WGCATCH.

9) November 2014

10) WGCATCH will then compile and review the results and where necessary modify the reports for consideration by PGCCDBS (or its proposed replacement, PGDATA) 2015.

11) February 2015

12) PGCCDBS / PGDATA 2015 will consider the possibility of forwarding these reports to subsequent benchmark data compilation and assessment meetings scheduled for 2015 for their feedback.

To ease the potential workload, PGCCDBS will limit the trial of these QA reports to only a few stocks:

- ✓ Hake in Division IIIa, Subareas IV, VI and VII and Divisions VIIIa,b,d (Northern stock) (hke-nrtn)

- ✓ Haddock in Subarea IV (North Sea) and Division IIIa West (Skagerrak) (had-34)
- ✓ Horse mackerel (*Trachurus trachurus*) in Divisions IIa, IVa, Vb, VIa, VIIa–c,e–k, and VIIIa–e (Western stock)
- ✓ NE Arctic Cod (benchmark) - Cod in Subareas I and II (Northeast Arctic cod);
- ✓ Southern hake (to be confirmed) - Cod in Subdivisions 22–24 (Western Baltic Sea);
- ✓ Anglerfish (*Lophius piscatorius* and *L. budegassa*) in Divisions VIIb–k and VIIIa,b,d
- ✓ Western Baltic Cod - Cod in Subdivisions 22–24 (Western Baltic Sea)

ICES will issue a request to DCF data submitters in countries with sampling obligations for these stocks, or to the appropriate contacts in non-EU countries, who will arrange for the QA reports for the species to be completed. Countries completing the detailed reports for the designated species will also be asked, within the questionnaire, for more general feedback on the utility for other species.

	AT-SEA-SAMPLING													
	Stock - Species - Area - Year (Cod 2224 2012)	**Total landings 2012: 16756 t (source: FishFrame, RCMBaltic 2013)**												
		Denmark		Germany		Sweden		Poland		Finland		Latvia	Estonia	
		Design Implemention		Design Implemention		Design Implemention		Design Implemention						
	Importance: Contribution to stock landing	53%		27%		14%		5%		2%		<1	<1	
	Sampling / design effect/diagnostic for randomness... (Description according to best practice)													
	Sampling design	probability based discard sampling		probability based catch sampling		Probability based discard sampling		probability based discard sampling						
	Primary sampling unit	Vessel* trips		Vessel		Trip		Vessel						
	Sampling frame	quartely vessel list		annual vessel list		Quarterly vessel list		annual vessel list						
	Periodicity	effort is following the		1-2 samples/week during		difficult to quantify		--						
	Contact protocol	yes		Yes		Yes		Yes						
	Sampling manual available	yes (Danish)		under preparation		No		under preparation						
	...													
	Strata from the sampling frame	Fleet 1	Fleet 2	Fleet 1	Fleet 2	Fleet 1	Fleet 2	Fleet 1	Fleet 2	Fleet 1		Fleet 2		
		active gear	passive gear	active gear	passive gear	active gear	passive gear	active gear	passive	active gear		passive		
	Importance: Contribution to national landing	70%	30%	67%	33%	50%	50%	47%	53%	100%		100%		
	Mean discard rate of the fleet in the year	9%	assumed	10%	4%	14%	2%	5%	1%					
	Importance: Contribution to national discards in fleet	100%	0%	84%	16%	93%	7%	71%	29%					
	Quality indicator													
1	Total number of vessels in the fleet*	151	199	58	887	40	101	44	69	1		3		
	Number of trips sampled onboard of vessels	34	0	28	32	4	40	1	2					
	Number of unique vessels sampled	15	0	15	17	4	19	1	1					
	Total number of trips conducted by the fleet	4686	11519	3891	22156	247	4043	275	565					
	Number of trips sampled where stock occurred in the discards	34	0	28	32	4	33	0	2					
	Number of trips sampled where stock occurred in the landings			28	32	4	39	1	2					
	Number of port samples	40	40					0	68					
	Age key quality indicator (e.g. Mean number of age samples per trip sampled from this fleet)	75	75	207	63	76	14	0%	0%					
2	Non-response rate	68%		45%	53%	75%	50%	0%	0%					
	Industry decline (refusal rate)	27%		9%	3%	23%	not	0%	0%					
3	Goodness of fit													
	Bias 1: Spatio-temporal coverage	tested and considered all right		tested and considered all right		Few trips achieved		sampling ICES rectangle 37G4						
	Bias 2: Vessel selection	6% are having a to small vessel for observers to		smaller passive gear vessels rejected		High refusal rate		no problem						
	Bias 3: ...													
4	Precision levels of e.g. parameter a, b, ...													
	e.g. CV, variance, relative sampling error													
	e.g. Input data for XSA model:													
	maturity at age													
	stock weight													
	catch weight													
	catch at age													

Figure 4.2.3.1 Copy of the completed trial QA report for Baltic Sea Cod. This focuses on the offshore component of the programme but a line was added in this report to refer to the number of onshore samples.

Country					
Stock					
Year					
Relative importance:	Landings (Tonnes)				
	% international TAC				
OFSHORE SAMPLING PROGRAMME					
Potential sampling bias	Hi	Lo			
RCM evaluation			DESIGN		
Signature and date			IMPLEMENTATION & achievement		
mpling design (Description according to best pratice)					
			Description		
Sample selection procedure	Simple random				
Primary sampling units (PSUs)	Site				
Sampling frame			*Description*		
a) Coverage	Full coverage				
b) Stratifications	None				
c) Periodicity	Annual				
Distribution of sampling effort...	Proportional to landings				
Hierarchical sampling	*Unit*		*Selection*	*Protocol*	*Description*
List tertiary sampling units	Primary	Site	Simple random		
e.g vessel- trip - haul - species - sex -	2				
fish ...	3				
List the selection process for each and	4				
	...				
Documentation and monitoring		*Available*	Description	Contact person	
Sampling manual available					
Where can these documents be found					
Monitoring					
System for recording non-response rates					
UALITY INDICATORS					
		Port group 1 (e.g. large ports sampled)	Port group 2 (e.g. minor ports - not sampled)		
Strata from the sampling frame					
Importance: Contribution to national landing		75%	25%		
Target and sample population.	***...in relation to***				
Number of ports in the stratum	*Frame*	3	12		
Number of active ports	*Stock*				
Number of active ports sampled	Stock	3	0		
Number of visits	Frame	12	0		
Number of vessel landings sampled	Stock	36	0		
Number of unique vessels sampled	Stock	28	0		
Sampling quality indicators	*Stock*				
Number of trips sampled for length		50	0		
Number of lengths		1800	0		
Number of trips sampled for age					
Number of ages		12000	0		
Number of trips sampled for both length and age					
Response rates (Vessel level)		8%	not determined		
Comments					
Representativeness					
Bias 1: Spatio-temporal coverage		tested and considered all right			
Bias 2: Vessel selection		no concerns			
Bias 3: ...		comment			
...					

Figure 4.2.3.2 Latest version of the Quality Assurance Report. This report will be further developed intersessionally

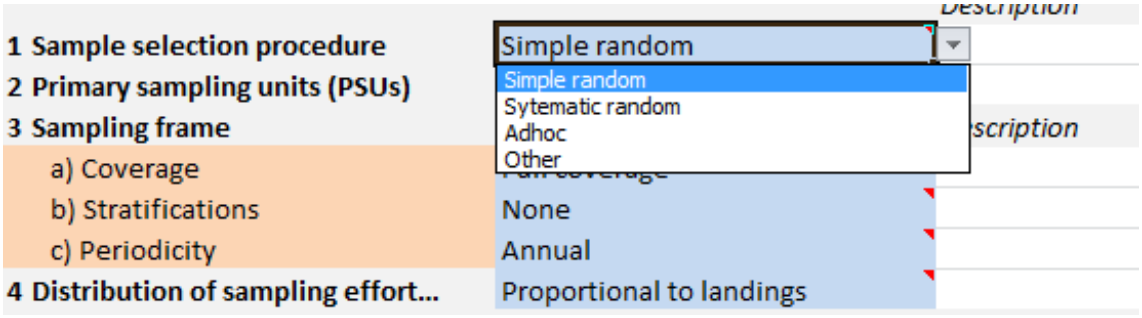

Figure 3 Example of the drop down menus limiting the response. Any further descriptions can provided in the comments field next to the selection.

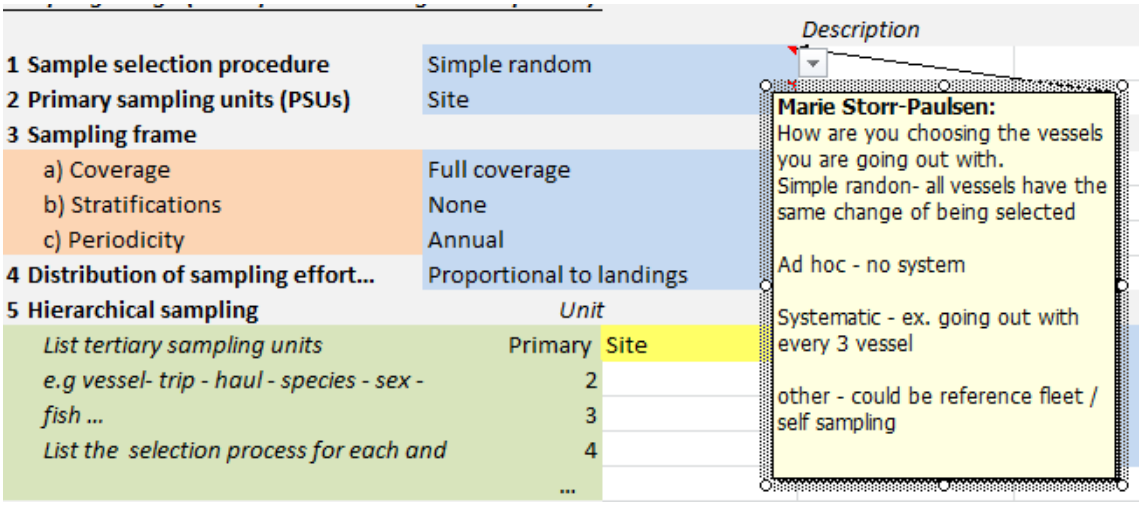

Figure 4.2.3.3. An example of the comments designed to help users to complete or interpret these reports.

4.2.5 Regional database developments

Regional Database in the future DCF

It is foreseen that the revised DCF / DC-MAP will support a more dynamic data collection. Key objectives in the revision process are "end-user driven data collection", "cooperation at the regional level", "improved data quality", "increased data availability", "ease the administrative burden" and "cost-efficiency". In order to meet these objectives, the availability of tools to support the processes is a prerequisite for a successful reform of the data collection procedures. The regional database (RDB) plays a key role for many of those objectives primarily because it provides / has the possibility to provide a common data source (allowing for overviews of available data, essential for regional cooperation), transparent estimation processes (allowing for quality evaluations) and a more standardized data submission procedures (increase data availability, ease the burden for MS). The progress of the changes in the data collection process towards some of the objectives will in fact be heavily dependent on the progress in the development of the RDB/common database.

The PGCCDBS is aware of the feasibility study (Scientific data storage and transmission under the 2014-2020 Data Collection Multi-Annual Programme (DC-MAP) – Feasibility Study) that examines different possible scenarios for storage and transmission of data collected under the future DCF / DCMAP. PGCCDBS emphasizes that the RDB concept is much broader than basic, simple storage and transmission of data. It is important to realize that the vast majority of data end-users require estimates that are

produced on the basis of data collected under the DCF not the detailed data itself. The estimates are the result of a series of (complex) data transformations.

Quality evaluations need to cover all the different steps in these transformations and all the types of data that is used when calculating the estimates. **PGCCDBS thereby stress that it is essential that estimation procedures are transparent and an integral part in the RDB/common database concept.** The RDB / DCF database needs to be developed to meet requirements emerging from statistically-sound sampling (and subsequent estimation) principles, a broader perspective on data quality, regional /cross-national sampling programmes and more streamlined data submission processes. The RDB-SC has expressed visions for the RDB in relation to the objectives of the future DCF / DC-MAP in their 2014 report. The overall vision is:

The RDB should be a central source of information (estimates, different types of aggregated and detailed data, metadata) for end-users working on the basis of DCF data.

*It has the possibility to evolve into an integrated system bringing data collectors, data providers and end-users together, by supporting **transparent** collection, processing, quality evaluation and submission of data on the **regional** scale. The future development of the RDB needs to be continued in close cooperation with all RCMs, different methodological expert groups and all end-users.*

RDB – progress during 2013

The regional database holds detailed data (anonymized "raw data") from sampling events, and data on landings, effort and value aggregated at a higher level. The database was, as in 2012, populated through a data call by the RCM chairs. Most countries responded to the call accordingly which meant that the RCMs could work more efficiently. Particularly RCM NS&EA made usage of the common data source and presented overviews on landing sites that could create the basis for future regional designs. The analyses show, for example, that 95% of the pelagic and industrial landings go into 28 harbours (Fig 4.2.4.1). If sampling was restricted to those harbours, most species would be well covered. Some species, may however, require specific sampling considerations. These types of analyses will be essential for a future regional approach to data collection and will not be possible without a common data source.

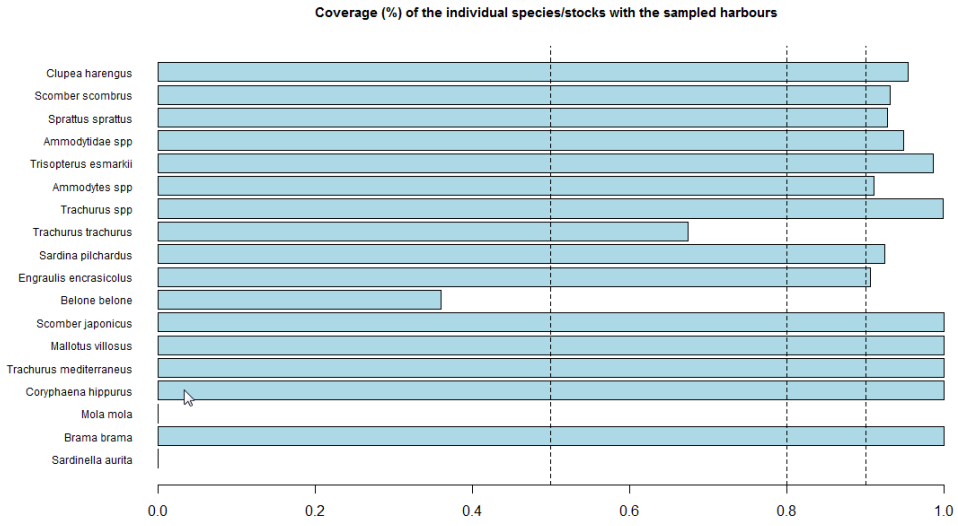

Figure 4.2.4.1 Percentage of landings of small pelagics and industrial species in the top 28 harbours accounting for 95% of the total landings (from RCM NS&EA, 2013).

The RCMs further focused on examination of the completeness and quality of the regional data. Several recommendations from the RCMs were thereby directed to the RDB-SC in order to improve usage and quality of the data in the RDB (Liaison Meeting, 2013). These recommendations covered areas such as completeness of data, harmonization of input data and suggestions for revisions of exchange format. The RDB-SC has reacted upon the recommendations and proposed follow up actions (RDB-SC, 2014). Some of the follow up actions though require that funding for development is made available. The 2012 and 2013 Liaison Meetings have supported a study proposal on development needs for the RDB but so far have this study not got funded. **The PGCCDBS strongly supports that this study is funded as soon as possible.** Without funding for the development will it be difficult to utilize the potential of the database.

The exchange format needs to be adapted to meet new requirements originating from for example, statistically-sound sampling principles and the regional approach. The revision should preferably be done at "one go" to ease the burden on data providers. SGPIDS has provided valuable information on new requirements on the exchange format for sea-sampling schemes. The same kind of information need to be gather for port-sampling. The RDB-SC has thereby suggested a dedicated workshop to do this (suggested ToR in RDB-SC report). WKPICS3 has emphazised that the present estimation procedures in the RDB do not meet the requirement for "statistically sound sampling" and that the exchange format need to be revised to fully encompass clustered designs. This will be the first step towards estimation methods respecting the design based approach. The RDB-SC will, when the workshop is completed, gather and discuss all suggestions for changes in the exchange format.

Data quality assessment based on Regional Database output

Most Regional Co-ordination Meetings (RCMs) in 2012 and 2013 have used output from the Regional Databases (RDBs) for investigating data quality, e.g. by comparing length-at-age or weight-at-age by country. Before interpreting these results, however, accompanying information on the sampling, estimation or age determination methods would have to be given and taken into consideration. The RCMs already found inconsistencies in the data series between countries, and it was not always obvious if they are caused by different interpretation in the age reading, temporal effects (time of sampling, before or after spawning etc.), area effects or any other factors. In some instances, data errors could be discovered via this route e.g. upload of gutted weight instead of total weight.

Without a doubt, these data mining possibilities have the potential to provide valuable information for assessing the quality of input data for stock assessment and should be further discussed and developed. The RCM Baltic recommended that some standard reports should be established in the RDB that present overviews of sampling intensities in maps, tables and figures. The reports would give the regional coordination, assessment working groups and other end users an overview of the quality of the data in an efficient way. Several examples of the possibilities to visualise sampling coverage and data quality are given in the 2013 reports of RCM Baltic and RCM NS&EA.

The RDB and transmission

The data in the RDB-FishFrame is owned by the Member States / countries. The RDB is populated through data calls from the RCM chairs and the present end-users are the RCMs. In the future is the aim that the RDB works together with InterCatch, which is the standard tool for stock coordinators to raise and prepare data to the stock assessment expert groups. The aim is to let the detailed data imported into the RDB be raised by the national data submitter, and then transfer the data automatically to InterCatch

where they will be raised on an international regional level by the stock coordinator. In the long run, the numerous currently employed data calls for specific areas and stocks for individual Expert Groups could be replaced by a single or few regional data call(s) populating the RDBs. Corresponding changes in the RDB data (access) policy, however, will be necessary to facilitate this process.

4.3 Proposals for 2015 and Beyond

4.3.1 Proposals for workshops

PGCCDBS strongly supports the following workshop proposals

4.3.2 Training course on fishery sampling design: 2014

Previous PGCCDBS and WKPICS meetings have proposed the establishment of a training course on design of fishery sampling schemes, building on the progress made within ICES on this topic. A 5-day course entitled "Design and Analysis of Statistically Sound Catch Sampling Programmes" will take place from 23-27 June 2014 at ICES in Copenhagen (application deadline 15 May 2014)[1]. The course introduces the principles of survey design and the basis of standard practices in the field to participants working with data collection. It is an applied statistical methods course, concerned almost exclusively with the design of commercial fishery data collection based on statistical sampling schemes. The course examines problems of applying sampling methods, particularly the principles of sample selection and basic estimation, using case studies to demonstrate practical application.

The course is at a moderately advanced statistical level, and while it will not develop the mathematical aspects of sampling theory, it will include statistical notation and give outlines of algebraic proofs.

Course basis

- Measurements of data quality are becoming increasingly important in stock assessments
  The EU multi-annual data collection programme (DC-MAP) is likely to have strong requirement for countries to demonstrate that their fishery sampling schemes conform to best-practice in statistically-sound design and analysis
- ICES Quality Assurance Framework workshops dealing with fishery sampling show that many national sampling schemes are still ad-hoc and therefore subject to bias
- However there is a lack of statistical expertise in the design and analysis of catch sampling programmes in many national institutes.
- The course will supply the expertise required for national institutes to start improving the design of their commercial fisheries sampling schemes

The trainers are Jon Helge Vølstad (IMR, Norway) and Mary Christman (University of Florida).

[1] http://www.ices.dk/news-and-events/Training/Pages/Design-and-Analysis-of-Statistically-Sound-Catch-Sampling-Programmes.aspx

4.4 Proposals for collaborative studies contracts.

PGCCDBS makes the following new or resubmitted proposals for collaborative studies contracts related to fleet-based sampling and the Regional Data Bases.

4.4.1 Study proposal on "Exploration and Development of new facilities in RDB-FishFrame 5.0" (Priority 1)

Background:

The demands from the users to a Regional Database is under constant change; firstly because the users discover new possibilities in the use of the data as they get more familiar with the use of the database and secondly because the data collection, fish stock management and modelling environment changes and new data types and processing facilities become important. The first one mostly requires design of new output reports to tabulate new combinations of the existing variables, while the second one quite often requires adding of new variables and processing functionality. A central point is the design-based approach in data collection, and, eventually, regional data collection programmes which are foreseen in the DC-MAP. Furthermore, RDB-FishFrame has now been introduced to additional regions. This has given rise to additional requests on how data should be centrally processed due to new sampling stratifications practiced in the Member States included compared to existing ones. It is essential that a database reflects new demands and does not act as a straightjacket preventing new progressive initiatives. A constant development is therefore very important in order to keep the momentum.

The development will be outsourced to the extent that external expertise is necessary in order to follow the time schedule.

Indicative budget: € 450,000

Development

The main fields for development in 2013-14 are identified by the RDB-Steering Committee and presented in no specific order of priority:

1) Development of additional tools for analysis and data tabulating to support regional coordination. (20% of total budget)

   Outputs: Technical report, programming development

   Development of output reports which provide:

   - Overview of data status by region; data coverage;
   - Support the planning of future regional based sampling schemes;
   - Overview of potential areas for task sharing between member states.

2) Testing of trial stocks from different expert groups for national raising, by borrowing age-length keys from own and/or other countries and correct functionality accordingly.
   - All data submitters for the selected stocks raise data in the RDB
   - Output compared and corrections made where needed

3) Stream line the interfacing with InterCatch

- Develop functionalities which when data have been raised to a certain level automatically will move data to InterCatch

4) Explore options and cost implications of implementing external tools (i.e. COST) in the RDB-FishFrame. (35% of total budget)

Outputs: Technical report, Technical Workshop(s), programming development

Such analysis should include the following elements:

- An inventory to collate and examine the tools present but also tools missing
- What level of documentation/quality controls would be required of a tool to be accepted into the RDB?
- What exports should the RDB provide to other formats/tools?
- What changes need to be made to the COST format/coding to comply with the RDB?
- Is COST sufficiently documented (methods, quality controls etc.)?
- Which level of integrating should the RDB.-FishFrame provide to COST (just export to COST or an interface that allows users to manipulate RDB data using COST tools/functions)?
- Proof of concept of programmatic interface to RDB-FishFrame

5) Requirements and automation of data calls procedures. (20% of total Budget)

Outputs: Technical report, programming development

- What is formally required from the regional database to reply to data calls?
- What data calls can we respond to at present/future? (The present functionalities and documentations in the regional database need to be compared with most common data calls)
- Alignment with FLUX developments

6) Development of more flexible structure to handle correct processing of design based sampling schemes to address regional differences in approach. (25% of total budget)

Outputs: Technical report, Technical meetings/workshops covering all regions

- What changes need to be made in the Exchange Formats in order to comply with design based sampling schemes?
- Which additional processing functionality need to be developed in order to comply with design based sampling schemes?

7) Development of procedures to ensure confidentiality on individual vessel level for CL, CE and on value.

4.4.2 Study proposal to "Support design based regional data collection programmes" (Priority 1)

This Study Proposal was developed and proposed by PGCCDBS (2012) but was not funded by the Commission. PGCCDBS considers that there remains an important need for a Study that will facilitate the countries in each region to design and implement statistically-sound sampling and help RCMs/RCGs to propose optimisation of regional sampling schemes.

Objective of proposed study

The Study will develop an operational framework for establishing and coordinating design-based sampling programmes at a regional scale for the most cost-effective delivery of fishery and biological data required by the revised DCF and any specific additional needs to support assessment and fishery management.

Duration of project

It is anticipated that the project would run for two years, and cover two periods of RCM and Liaison meetings to allow consultation and discussion of proposals.

Indicative budget: € 450,000

The need for the proposed study

A design based sampling strategy is a prerequisite for transparency in the data collection-assessment-advice process since it allows for straightforward estimation processes, assessment of bias as well as variance associated with different estimates. In particular, it supports estimators that do not depend on complex models and assumptions about the underlying stochastic process of the catching operations of the fleet. It also enables the use of DCF data in the wider scientific/management community since data are collected in a transparent way following sound statistical procedures including documentation of sampling protocols and sampling designs.

Due to severe logistical constrains in sampling of fisheries, many national sampling programmes may in reality be more or less ad hoc based. Recent ICES workshops including WKMERGE, WKPICS and SGPIDS have started to examine how sampling schemes can be adapted to deal with different types of logistical constrains without compromising the basic requirements of statistical design. Within these workshops it has become evident that countries need support to design and implement such statistically-sound sampling schemes.

Currently, the DCF Regional Coordination Meetings (RCMs) focus heavily on "task sharing" for metier and stock based sampling. It is foreseeable that in the new DCF, the role of RCMs may evolve more towards establishing and coordinating statistically-sound programmes of data collection to deliver the estimates for stocks and fleets required at the regional scale. This could include agreement of sampling frames, allocation of sampling effort amongst Member States, documentation of sampling schemes, and review of achievements and data quality. To adopt this role, RCMs would require guidance and a system of support because the sampling problems already encountered by individual countries will remain at the regional scale. If true progress should be made towards regional data collection programmes, it is crucial that sufficient resources and expertise are available for Member States and RCMs to carry out the necessary tasks.

Study specifications

The study will require setting up a core project team to work out principles for regional sampling designs, and to work closely with RCMs, ICES EGs, European Commission and Liaison Meeting to review how the structure and operation of RCMs should be adapted to best serve the needs of the revised DCF. The project team will focus particularly on:

- Understanding the fleet-based and stock-based estimates that are required to support assessments and advice at a regional scale.

- Defining an operational framework for RCMs to coordinate annual or multi-annual regional sampling programmes to deliver the estimates.
- Identifying logistical constraints to national sampling schemes within a region, and proposing solutions for how these could be handled in regional sampling plans and within the component national strata (ref: WKMERGE; WKPICS1–3).
- Establishing procedures for optimising sampling schemes and allocation of sampling amongst Member States in relation to regional objectives and available resources.
- Identifying the procedures for estimation and sample raising at the regional scale.
- Developing Quality Indicators for regional datasets.
- Identifying developments needed in the Regional Databases to support regional sampling programmes.
- Propose future support systems to help RCMs implement and evaluate regional sampling programmes.

RCM areas to be covered

The project will initially scope out the problem across all DCF regions in consultation with RCMs, European Commission and PGs, but depending on resources may then focus on one or two regions as case studies.

Project tasks

Subject to discussion with the European Commission, it is anticipated that a two-year Study would involve the following tasks:

- Initial workshops and WebEx meetings with key RCM, ICES Planning Group and European Commission representatives, and invited external experts, to agree the basic principles of implementing and optimising a regional programme of sampling to deliver the required estimates.
- Identification of the structure of a regional sampling programme allowing a fully coordinated international approach to delivering the required data and estimates, including documenting the characteristics of the fisheries and stocks to be sampled in each country, development of sampling frames, stratification schemes, sample selection procedures, optimal allocation of sampling effort amongst countries, estimation procedures and production of quality indicators.
- Presentation of proposals to RCMs, ICES EGs, European Commission and Liaison Meeting, for discussion and further development.
- Development of final proposals and report.

5 Responses to additional queries from European Commission

5.1 Response to Commission Query regarding potential cost savings moving from quota sampling to statistically-sound sampling

PGCCDBS was asked by the Commission to prepare a case example of how the change from metier-based 'quota' sampling to stratified, statistically-sound design-based sampling at a regional level would lead to reductions in the number of samples needed. The background for this question was the need to get best value-for-money from DCF and future DCMAP (EMFF) funds.

Given that statistically-sound sampling designs (as proposed by WKPICS and SGPIDS), are a work in progress and not fully developed and implemented, answering this request using case studies is currently not feasible. PGCCDBS thus did not have the opportunity to prepare an example covering this question during its meeting, especially at such short notice.

In general, to consider statistically-sound sampling (including in a regional approach) as a way of taking fewer samples by default and thus saving money, is not correct. The size and cost of a sampling programme has to be viewed in relation to what precision is needed or is acceptable for the end use of the data, for example in stock assessments and advice. In order to carry out that evaluation, it must be possible to obtain minimally-biased estimates of precision and to understand sources of bias, and this requires the adoption of statistically-sound sampling design and analysis. When this is sufficiently achieved, it will become clearer how sampling effort and its distribution across strata relates to precision of all the different stock-based or fleet-based estimates required. The relationship between cost and quality of data and advice can then be evaluated, and this may or may not imply a reduction in costs.

Metier-based "quota sampling" can lead to a complex range of data quality issues. Using highly-resolved métiers as strata for sampling, has particular problems: i) Métiers are dynamic (skippers can change gears, target species and mesh size in response to management controls or changes in species abundance or market forces) and this leads to poor control of sampling probabilities; ii) Quota sampling can be inefficient where considerable effort is expended trying to achieve sampling quotas for particular métiers which may be less active than expected, resulting also in reduced sampling or poorer coverage of other more abundant métiers, especially if these have become unexpectedly more active; iii) The goal of random sampling of individual métiers – where all trips in principle have a probability of being sampled - will be compromised by quota sampling if many trips of other métiers are being systematically ignored in order to fill a quota for a particular métier; iv) There is now considerable pressure on industry to develop innovative solutions to improving selectivity (including in relation to forthcoming discard bans) using various gear and selectivity-device designs and spatio-temporal measures, and this leads to an increase in the number of métiers where these are defined as group of fishing trips with similar selectivity characteristics; and v) The métier approach assumes that national catch reporting systems can accurately identify the metier of a trip. This is a particular problem for small-scale fleets where EU logbooks are not required.

PGCCDBS considers that sampling effort is better allocated to well-defined and more predictable strata such as vessel lists or port lists where a sufficient sampling rate can be assured and all primary sampling units have a controlled probability of being sampled. Stratification of these lists can be made using very predictable variables such as

region of home ports, typical trip duration (e.g. single or multiple day trips) or predominant gear groupings such as for fleet sectors using specialised gear, or polyvalent sectors using a defined range of gears. Within these strata, more resolved métiers will appear in sampling achievements in proportion to their activity, and unbiased estimates for these can be extracted through post-stratification. It is possible using this approach to optimise the available sampling effort across strata to achieve a range of objectives, which may be conflicting. For example, to maximise the precision of discards estimates or retained length composition of individual fish stocks will require a different sampling effort allocation to maximising the precision of estimates for as many individual métiers as possible. This conflict between precision requirements for stock-based and fleet-based estimates is a core issue to be resolved at a regional scale. Even with a statistically-sound design, it is very likely that, given the sampling effort available, there will be some lower-activity métiers with very low or zero sampling, and some abundant métiers with high levels of sampling. However, this will not undermine the overall quality of estimates at the scale of stocks or combined-fleet data. To get good data for all métiers, a much higher overall sampling intensity in one or more strata might be needed to get good data for all métiers even if they are minor, and this has cost implications. We emphasize however that low-activity métiers for some stocks may be high-activity métiers for other stocks. The final optimization at regional level is a complex process for which the outcome is presently unknown.

In some cases it may be possible to identify significant sampling reduction (e.g. if a country is taking a lot more samples than needed, given its contribution to the regional or stock total catch, or the combined regional estimates appear overly-precise in relation to end-user needs). There are other cases of statistically more efficient sampling that can save money. For example, Vølstad and Aanes presented a paper at the ICES Annual Science Conference in 2013 demonstrating how to maintain precision by ageing fewer fish, provided there is a good design that samples sufficient individual hauls. There are strong cluster sampling effects where additional fish sampled from a single catch provide progressively less information (the main axis of variability is between catches, not within catches).

The study proposed by PGCCDBS 2012 designed to help RCGs set up regional statistically sound schemes was submitted again in 2013. The proposal was resubmitted by PGCCDBS in 2014 (see section 4.4.2). This study would help answer this and similar questions related to optimising resources. This team would be able to look in detail at national schemes and see how they could be adapted to better meet any agreed regional end-user needs and be more cost-effective and achieve better data quality where possible. Additional contributions which should help answer optimisation-related questions are expected in the outcomes of WGCATCH.

5.2 Response to Commission query to review a document submitted to the 2014 Stakeholder Meeting on revision of the DCF, regarding data quality indicators

PGCCBDS was asked by the European Commission to review a document on data quality indicators for the DCF provided to the Stakeholder Meeting on revision of the DCF, which followed the STECF EWG 13-18 meeting. This document drew upon a larger report requested by the Commission under an ad-hoc contract and provided to STECF 13-18 (this report had input from WKPICS3 in 2013 and is included in the WKPICS3 report). PGCCDBS reviewed the short document submitted to the Stakeholder Meeting and commented on a paragraph by paragraph basis in the following section.

Revision of the Data Collection Framework Regulation (DCF) (Council Regulation (EC) No 199/2008). Proposed changes. Extracts regarding ensuring adequate quality of the data

Fisheries data quality has improved since the DCR (2002) and then the DCF (2008) were established, but quality could further improve. The current DCF Regulation contains provisions whereby Member States must report on their procedures and methods in their National Programmes (Art. 4.3), which are then evaluated by STECF. Member States must also report on the quality of the data collected in their Annual Reports (Art. 7(2), which are also evaluated by STECF. Furthermore, Member States are to standardize their methodologies within regions, to follow international quality standards and to estimate accuracy and precision of their data as far as possible (Art. 9(3) and 9(4)). Member States are responsible for the quality and completeness of the primary data collected under their National Programmes and for the detailed and aggregated data derived therefrom and provided to end-users (Art. 14). Should the quality control by the Member States be considered insufficient, the Commission may suspend, recover or reduce financial assistance from the Member State under Articles 8(4) and 8(5).

PGCCDBS response: *No comments*

The EU Multiannual Programme contains quality targets in the form of a measure of precision (Coefficients of Variations (CVs)) that needs to be met by Member States and on which they should report in their Annual Reports. Experience with implementing the DCF has revealed that CV values on their own are not a particularly good measure of quality and that the CV targets specified in the DCF are unrealistic and in practice, not achieved by Member States. STECF has recommended the EU legislation not to include pre-defined quality targets but instead should contain minimum sampling targets (i.e. number of samples to be collected) and that Member States include quality indicators in their Annual Reports so that these can be evaluated by the relevant scientific bodies or end users.

PGCCDBS response: *Agreement with the STECF recommendation not to include the pre-defined Quality Targets. However, instead of setting minimum sampling targets (i.e. number of samples to be collected), a minimum national sampling effort should be defined in a regional context. The total sampling effort should be decided, justified and recommended by the RCGs annually and should improve overtime, as it is an iterative process. Additional quality targets should be set and evaluated by the RCG. In the current situation a quality target in the form of CVs is not recommended which does not mean they are not useful in the future in a regional context. Some kind of regional precision target is a long term objective to reach in the RCG's*

Consultations in the context of the revision of the DCF and experience in implementing it have revealed that the present system of reporting data quality in DCF programmes is inappropriate. The main reason for this is that the present system only covers part of the data quality aspects , with a strong focus on precision but few requirements to assure representativeness of collected data and to reduce (the risk of) bias. **Quality assurance needs to be assured for all components** (including design and implementation of data collection schemes, data archiving as well as methodologies to derive final estimates).

PGCCDBS response: *The PG fully agrees with this (with understanding that "methodologies" includes post stratification and raising procedures)*

Furthermore, STECF recommends that the quality evaluation should be through a well-structured peer-review process supported by **clear documentation** of all components of the sampling programmes and the sampling outcomes. Quality of a sampling survey programme should be evaluated in relation to two aspects of sampling: 1) the ability of the programme to (in principle) deliver data that are fit for purpose, by reviewing the design of the programme against guidelines and standards for best practice; and 2) evaluation of the quality of the data following implementation of the sampling survey, covering each of the two components of accuracy: bias and precision.

PGCCDBS response: *fully agrees with this recommendation above*

Changes to the DCF:
The provisions in the current DCF could therefore be further strengthened by 1) increasing the emphasis on the Member States' responsibility for ensuring adequate quality of the data provided to end-users and 2) by improving the design of the sampling programmes based on end user needs, such that the intrinsic quality will improve.

PGCCDBS response*: At the end of the day, it will be the responsibility of MS to provide data with adequate quality. However, the design of the sampling programmes needs to be looked at from both fish stock and regional perspective (active role for both the end users and the RCGs) – because it may happen that the desired precision is achieved at the national level but the spatial and temporal coverage for particular stock is not sufficient for stock assessment purposes.*

Specifically, a new provision in the DCF should require Member States to set up **a process whereby they will ensure "quality certification" at national level**. This would involve Member States establishing documented quality assurance frameworks which can be compared with future agreed international standards and evaluated by STECF. Special attention needs to be given to the design of collection schemes to make sure that data is collected in a statistical robust way that is fit for purpose and allows for further assessment of the quality of the data. The concrete set up of this process should be explained in the national programme.

PGCCDBS response: *PGCCDBS agrees*

In addition to this legislative requirement, data quality will also be improved through a **move to regional, statistically-sound sampling**, following best practice guidelines. By improving and harmonizing the data collection methods, the quality of the data collected should inherently improve. **RCGs (for biological sampling) and the Planning Group for Economic Issues (PGECON) for economic sampling should advise** on the best practice guidelines that should be followed by their regions. As best practice evolves over time, the best practice guidelines themselves should not be set in the regulatory framework. Instead, **the DCF Regulation will specify that Member States should follow the recommendations of the RCG/PGECON, once these have been validated by STECF or the Liaison Meeting, regarding methodologies** for sampling. **RCGs and PGECON should also be tasked with evaluating the quality of the collected data at the regional level** (eg at the stock level for biological data).

PGCCDBS response*: the role of the RCG/PGECON should not be limited to advising on the best practice guidelines only but also to advise on the implementation of those best practices.*

The future IT systems/databases for DCF data provision to end-users should include **automated quality checking procedures**, building on those already being piloted by Member States, the JRC during their data calls, and in the DCF Regional Databases.

***PGCCDBS response**: PGCCDBS agrees. The Regional Databases and the underlying data quality checking procedures play a crucial role in efficient data provision. Moreover, Regional Databases containing quality-checked data are a prerequisite for efficient sampling design in a regional setting. It is however important to realize that it is not only the data that need to be quality checked. A substantial part of a quality assurance framework lies in quality checking of estimation/raising methods/processes that are used to arrive to the final estimates. Such methods/processes need to be an integral part of the RDB /common IT systems and need to be documented and quality checked as well.*

The fact that Member States follow best practice in terms of sampling methodology followed does not necessarily guarantee that the outcomes of the sampling (ie the data collected) are of sufficient quality for end users. **The question therefore remains as to whether some quality targets should remain at a national or a regional level**, and if so, what these should be, and who should set them (the EU multiannual Programme, the RCGs/PGECON?). Conversely, is it sufficient that Member States provide quality indicators (e.g. agreed on a regional base, depending on the regional sampling programme) to end users (eg via their Annual Reports), and that RCGs/PGECON assess these quality indicators and recommend remedial action if they are considered insufficient.

***PGCCDBS response**: the paragraph above is inconsistent with the second paragraph where the STECF recommendation is referred to: "STECF has recommended the EU legislation not to include pre-defined quality targets but instead should contain <u>minimum sampling targets</u> (i.e. number of samples to be collected)"*

As a general comment, PGCCDBS wishes to emphasize that the improvement in quality is a gradual process and not a yes/no "switch" for which progress can be easily be quantified by non-experts. Ultimately, a 100% quality, regardless the measure will not be achievable, but there is ground for significant improvements. As already suggested in various meetings, e.g. STECF EWG and RCMs, Members States should gradually adapt their sampling plans, as these changes will require statistics training at national institute level and changes to current sampling practices. Throughout the process, MS should continuously aim to improve the quality of their data collections and ensure that previous sampling programmes and estimation procedures, and all changes, are fully documented to allow progress to be monitored. They should be in a position to justify why some aspects do not evolve (or take more time) to approximate "best practices". Also, statistical training and regional statistical guidance should be given in order to ensure Member States are able to develop and implement statistical sound sampling schemes.

6 Respond to data issues reported to PGCCDBS by ICES Expert Groups, Assessment Working Groups (including PGCCDBS-AWG contact persons) and RCMs by providing advice on suitable actions and responsibilities for those actions. (TORd)

Sections 6.1 – 6.3 deal with the responses to issues raised by AWG data contact persons, the performance of the AWG data contact persons system, and an update of the contact persons list.

6.1 Data problems reported by the AWG contact persons

Annex 4 tabulates the data issues reported to PGCCDBS in 2013 by the AWG data contact persons, and gives a PGCCDBS response.

6.2 Updated list of AWG data contact persons.

An updated list of the assessment working group data contact persons in 2014 was compiled by Cristina Morgado and can be found in Annex 6 of this report.

6.3 Regional Coordination Meeting / Liaison meeting recommendations to PGCCDBS

No specific recommendations to PGCCDBS were made from the RCMs or LM.

7 Evaluate the future structure of this EG considering the establishment of two new experts groups dealing with sound statistical catch sampling (WGCATCH) and quality assurance of biological parameters (WGBIOP) (TOR e)

7.1 Introduction

Section 7 summarises the views and proposals of PGCCDBS concerning its future structure, following the removal of a large part of its present remit into the two new Working Groups WGCATCH and WGBIOP. The section covers:

- The background to the formation of WGCATCH and WGBIOP
- PGCCDBS views on important capabilities that would be lost if the PG was to terminate without any replacement;
- Proposals by the PG for future restructuring

7.2 Background to the formation of WGCATCH and WGBIOP

The background was summarised in a discussion paper tabled at the DCF meeting at the ICES Annual Science Conference in Iceland in 2013, and the following is based on that paper.

The body of data and knowledge, and the competences of PGCCDBS, have increased over time, but this has also served to highlight the limitations in data and understanding. Furthermore, by raising the level of awareness of these issues in other ICES Expert Groups, a wide range of requests for advice are being sent to PGCCDBS. As a result, the scope of the subgroups has expanded over the last few years. For example, the fleet-based subgroup has spent increasing time on issues of statistical sampling design (building on outcomes from the PGCCDBS-derived workshop WKPICS and study group SGPIDS) and how to report data quality, whilst the biological parameters subgroup is facing an ever-increasing body of information from age exchanges and calibration studies, and age/maturity workshops, along with the need to develop quality indicators for assessment expert groups. Whilst the subgroups have remained very productive, the amount and complexity of material being produced, and the volume of responses to external requests, has meant that PG outputs are not being reviewed as comprehensively as desired during the meeting, increasing the amount of post-PG work by the Chairs and subgroup members and reducing the synergy of having many experts together in the same room.

During the 2013 PGCCDBS meeting, members of the fleet subgroup proposed that their work would be better undertaken during a dedicated Working Group, which would allow more time to focus on its ToRs and develop its role to meet the changing demands for fishery data in coming years. This WG would also build on the comprehensive frameworks developed through SGPIDS and WKPICS and the earlier workshops on data collection and data quality evaluation WKACCU, WKPRECISE and WKMERGE. A proposal for a Working Group on Commercial Catches (WGCATCH) was developed and is available in Annex 6 of the PGCCDBS 2013 report. The ToRs and work plan are developed further in the present PGCCDBS report (section 4.2.1).

During the 2013 meeting of the Workshop for National Age Reading Coordinators(WKNARC), a similar conclusion was reached that PGCCDBS is no longer the ideal vehicle for coordinating and developing the collection, interpretation and use of data on biological parameters, and that a new Working Group on Biological Parameters

(WGBIOP) should be formed. The ToRs and supporting information for WGBIOP developed by WKNARC 2013 were developed further by PGCCDBS 2014 and are given in Annex 2.

7.3 PGCCDBS views on important capabilities that would be lost if the PG was to terminate without any replacement

PGCCDBS 2014 identified work not covered by WGCATCH and WGBIOP, and which would be lost if PGCCDBS is dissolved without replacement. These losses include (not in any particular order):

- A reduced ability to maintain a strategic overview of all aspects of data collection and data quality within the Quality Assurance Framework established by PGCCDBS;
- A reduced ability to provide coordinated advice on development of the Regional Data Base;
- Loss of momentum on aspects of the development and implementation of statistically sound sampling design and quality evaluation procedures common to fishery sampling and biological parameters;
- Reduction in synergy that was present by having a broad mix of different skills and experience in PG meetings (e.g. DCF National Correspondents; RCM chairs; assessment experts; data collection experts; statisticians);
- Loss of input from current PG members not attending WGBIOP and WGCATCH, which would also impede the dissemination of PG outputs in their own country.
- A loss of proposals for Studies not covered by WGCATCH and WGBIOP
- Assessment EG data contact persons would no longer have a single point of contact on data issues, possibly leading to some confusion in submitting requests to WGCATCH and WGBIOP;
- PG members previously working on fleet based sampling would no longer have an opportunity to review the outputs of the biological parameters subgroup, and vice versa;
- The linkage with the Working Group on Recreational Fisheries Surveys may be weakened.
- It would become more difficult for the separated EGs to interact in a coordinated way with the EU Commission and other RFMOs, RCMs and Liaison Meeting in relation to broader data issues;

The final bullet point is important because PGCCDBS has existed within a broader set of activities aimed at facilitating the process of data collection under the DCF, and ensuring the quality and cost-effectiveness of the data collection across Member States. Other related meetings linking with PGCCDBS include the Regional Coordination Meetings, PGMed, PGECON, and the annual Liaison Meeting (LM) which includes the chairs of STECF DCF EWG's, PGCCDBS, PGMed, PGECON, and the ICES secretariat and European Commission representatives. Currently there is a system of recommendations and responses passing between ICES assessment expert groups and PGCCDBS (via the PGCCDBS Contact Persons on the Expert Groups), and also passing between PGCCDBS, the RCMs and the Liaison meeting.

The timing of this change to PGCCDBS coincides with the move to the DCMAP and the period of CFP reform, and it is important not to lose capabilities that are an important contribution to these processes.

7.4 Proposals by the PGCCDBS for a future restructuring

A complete cessation of PGCCDBS would result in losses of capability as described in Section 6.3. The PGCCDBS proposes that it should continue in future, but with a major revision of membership and Terms of Reference that are shifted from the topics covered by WGCATCH and WGBIOP to focus on applying the Quality Assurance Framework (QAF) to the end-use of data by assessment Expert Groups, particularly in the benchmarking process. A goal will be to help ICES to develop advice using the most appropriate assessments given the quality of the data, and to be able to explain uncertainties in the assessments due to aspects of data quality and how these are reflected in the advice. A further goal is to develop objective procedures to identify where data quality improvements will have greatest impact on quality of advice, and to ensure that proposals to collect new data or amend existing data collection schemes can be made in an informed way taking account of factors such as feasibility, methods for collection and use of the data, impact on advice, costs of data collection relative to precision, implications for regional sampling schemes or surveys, and how the quality of the data can be evaluated.

To reflect this shift in emphasis, it is proposed to rename the PG as the Planning Group on Data Needs for Assessment and Advice (PGDATA). The responsibilities of the group, which would form the basis of its multiannual ToRs and workplan (Annex 7), would be to:

i) Design a Quality Assurance Framework for assessment EGs to evaluate data quality and its impact on assessments, particularly within the benchmarking process, and test this in regional case studies. The QAF will also cover other end-uses of the data.

ii) Develop and test analytical methods for identifying improvements in data quality, or collections of new data, that have the greatest impacts on the quality of advice;

iii) Engage with end users (ICES EGs & SSGs, RCMs/RCGs; stakeholder Advisory Committees, STECF, European Commission and other RFMOs) to raise awareness of what types and resolution of management decisions (e.g. by fleet or area) can realistically be supported by present or proposed data collections;

iv) Advise on objective methods to apply criteria (e.g. as proposed by STECF EWG 13-02 on Review of DC-MAP) for evaluating requests by end-users for new or amended data collections within the new DCF/DC-MAP.

v) Plan workshops and studies focused on specific methodological development needs.

An important change in focus of PGDATA is that it should cover all types of fishery dependent and fishery independent data, and biological parameters, used in assessments.

The inclusion of WGCATCH, WGBIOP, WGRFS and PGDATA within the remit of the joint ACOM-SCICOM Steering Group on Integrated Ecosystem Observation and Monitoring (SSGIEOM), will ensure that SSGIEOM has the most effective portfolio of EGs to support delivery of the SCICOM Science Plan and the ACOM Advisory Plan. These

Plans include further development of ICES science and advice in relation to marine environmental issues, data limited stocks, MSY, mixed fisheries, integration of multi-species considerations and further move towards integrated advice. The proposed PGDATA would also play a key role outside of the SSG through its direct involvement with other end users outside of ICES, ensuring that ICES advice and the needs and expectations of its clients are well aligned.

The QAF will cover all end users not just assessments, and therefore there are wide benefits to the formation of PGDATA.

It is envisaged that the development of Regional Data Base would be a vital resource for the new PGDATA in its work within ICES and with the other end users.

7.5 How will PGDATA implement the Quality Assurance Framework for assessments?

The PGCCDBS Quality Assurance Framework (QAF), as described by Nedreaas et al (2009)[2], focuses on quality assurance of input parameters for stock assessment in order to promote the confidence of scientists and stakeholders in the advice provided by ICES. Its implementation would ensure that the decision process is transparent, based on scientific information and full documentation, and that Institutions and individuals involved in providing input data to ICES are informed about the processing, usage and shortcomings of the data. The QAF as originally proposed by PGCCDBS is based on the concept of "quality indicators" that constitute meta information of the relevant parameters and allow decisions regarding the usage of data to be made based on objective criteria.

Until now, PGCCDBS has focused largely on quality assurance in relation to two aspects of data – i) promoting statistically sound methods for design and implementation of sampling schemes and analysis of the data, and ii) promoting consistency and accuracy in the interpretation of biological material (otoliths; gonads). This work has led to establishment of an extremely important body of knowledge, guidelines for best practice and other documentation on these topics, and much work has also been completed in developing ways of communicating data quality to different end users. Unfortunately, it has proved more difficult to extend the QAF to the end use of data by assessment experts carrying out benchmarks and update assessments. This is shown by the often limited investigation and presentation of data quality carried out in benchmark assessments. Frequently, quality is evaluated primarily in terms of how the aggregated data sets perform in an assessment model, rather than through direct investigation of the design, implementation and achievement of the data collection schemes and how the data are analysed and aggregated.

There is an urgent need to establish clear and fully documented QAF procedures covering the end-use of data in assessments (including single species, mixed fishery and multi-species assessments) and to test these in case studies. PGCCDBS (2011) first described how the benchmarking system could be extended to include dedicated data compilation and evaluation workshops carried out in advance of the assessment workshops. This was inspired by the stock assessment and peer review system in the USA.

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[2] Nedreaas, K.; Stransky, C.; Jardim, E.; Vigneau, J.(2009): Quality assurance framework – the concept of quality assurance applied to fisheries data and its operationalisation under the ICES scope. ICES CM 2009/N:06

The PGCCDBS (2011) provided some proposals on how the data compilation workshops could operate, and on types of quality indicators that would be useful in this context for highlighting major data quality issues. The importance of time series of quality indicators was emphasized, for example changes in sampling coverage (e.g. numbers of PSUs by stratum). Such data compilation and evaluation workshops are now standard for full benchmark assessments within ICES, but follow the PGCCDBS model to a very variable extent.

A problem faced by benchmark assessment scientists is how to act upon any data quality information provided. Some statistics, such as precision indicators, can be included directly in statistical assessment models. The sensitivity of the assessment to down-weighting or removing individual data sets that are considered too inaccurate can be investigated. For example, where age exchanges and workshops have shown very poor consistency and accuracy of age reading, this could result in an a priori decision that an age-based assessment is not appropriate. Alternative plausible scenarios can be developed to examine sensitivity to poorly known parameters (e.g. natural mortality) or biases in figures such as landings series, e.g. in periods of misreporting or poor recording. These are all established ways of dealing with data quality issues in assessments, but if this is done in an ad-hoc or incomplete way, ICES cannot conclude that its advice is supported by a properly quality-assured and transparent assessment process where the impact of data quality on advice is understood. PGCCDBS therefore proposes that an important role of PGDATA is to develop and test (through case studies) a Quality Assurance Framework for assessment data, for implementation by assessment EGs during the benchmark assessment process. The QAF should ensure that assessment models or other procedures supporting ICES advice are chosen and implemented with explicit understanding of the quality of available data and how this affects the quality of advice, and that there is an objective process for recommending data improvements that will have the greatest impact on assessments and advice, in the most cost-effective way.

The intention of ICES to move to a regional benchmark procedure means that data quality issues should not be considered independently on a species / stock basis. Where there are, for example, known problems with data quality related to design and implementation of sampling schemes or surveys, this will affect all species covered by the scheme. An important ToR for a regional benchmark should therefore be to document generic data quality issues within the region, and how they impact the assessments and advice, and communicate these to PGDATA for discussion with Regional Coordination Groups and Advisory Councils to identify where improvements are possible through the regional coordination process and collaborations with stakeholders. Other data quality issues, such as problems of ageing individual species or poor precision of data on rare species, would be documented on a stock-by-stock basis.

7.6 PGDATA road map for first three years

PGDATA structure

It is proposed that PGDATA should not follow the approach of PGCCDBS which had a single meeting a year with many ToRs addressed by a large group of around 40 people divided into subgroups. The reason for the present restructuring is that this model became unworkable due to the increasing complexity of the work requirements and skills needed. The model for PGDATA should involve a relatively small core executive team of people (maybe 10 – 15) with a breadth of skills and experience covering the

remit of the PG and who have links to groups with high-level experts needed for specific PG tasks. The core team would operate through a mixture of webexes and physical meetings to implement an annual programme of work and establish workshops when required to address specific deliverables. The workshops would draw in scientists from an identified wider pool of experts who would also be members of PGDATA and have access to the PG sharepoint site. This pool would also include national scientists who are not part of the core team but who wish to be kept aware of developments within PGDATA, provide input , and facilitate tasks that require communication with national scientists. The PGDATA core team would also contribute actively to the achievement of ICES' science and advisory plan as an Expert Group within the ICES Steering Group on Integrated Ecosystem Observation and Monitoring.

Preparatory work before 2015

An initial task prior to the first meeting in 2015 will be to establish the membership and skills needed for the core team and the pool of experts, in consultation with ICES and other end-users. It is anticipated that the breadth of PGDATA's remit is such that both the core team and the pool of experts will need draw upon a wide range of people with appropriate quantitative and practical skills appropriate to the tasks being completed, and who will contribute to the physical & webex meetings, intersessional work and/or workshops set up to address specific tasks. The core team is likely to include members with: expertise in statistical design of sampling surveys and analysis of the data; experience in stock assessment (including how to handle data quality indicators in assessments, and use of management strategy evaluations to examine sensitivity of advice to quality of input data); experience in practical aspects of data collection and interpretation; knowledge of the DCF/DCMAP; experienced contributors to RCMs; representatives of the European Commission; and external experts (e.g. from the USA). The core team will manage the PG process, engage with the broader pool of experts as needed, and contribute actively to the overarching ICES Steering Group on Integrated Ecosystem Observation and Monitoring.

In order to "hit the ground running", PGCCDBS will, during 2014, start to develop draft Quality Assurance Framework guidelines for benchmark assessments, and collaborate with a benchmark data compilation workshop (potentially anglerfish) to test ideas in a practical environment. This will be done also in collaboration with WGCATCH which will be testing Quality Assurance reports for fishery sampling data. PGDATA will evaluate the outcome of this process at its first meeting in 2015.

Work plan: 2015

First PGDATA meeting will be in spring 2015. At this meeting the core PG team will review, amend and prioritise the three-year work plan.

The PG will consult within SSGIEOM on broader QAF implementation (e.g. surveys);

It will establish links and working procedures with ICES EGs & SSGs, RCMs/RCGs; stakeholder Advisory Committees, STECF, European Commission and other RFMOs to raise awareness of what types and resolution of management decisions (e.g. by fleet or area) can realistically be supported by present or proposed data collections;

It will continue with development of QAF guidelines for benchmarks, evaluate the outcomes of the limited test application with a benchmark data compilation meeting prior to the first PGDATA meeting, and plan and carry out further test applications in 2015 collaborating with benchmark data compilation meetings and the subsequent assessment meetings where data quality indicators should be considered.

Work plan: 2016

Proposed tasks for 2016 (to be agreed at first PG meeting in 2015) are:

To plan and implement a workshop to develop Management Strategy Evaluation (MSE)-type tools for evaluating the contribution of data quality to variance of assessment estimates and quality of advice, and evaluating relative impacts of data improvements;

To collaborate with other SSGIEOM EGs on QAF implementation, for example RV survey data and their end-use;

Carry out further development and testing of QAF procedures in benchmarks;

Consultations with end users;

2nd PG meeting

Work plan: 2017

Review of progress / results in implementing QAF, and further implementation in benchmarks;

Plan and implement a methodological Workshop to develop and test criteria for evaluating data needs and requests within the DCMAP;

Consultations with end users on data needs;

3rd PG meeting;

Evaluate future PGDATA workplans.

PGCCDBS 2014 proposals for multiannual ToRs and the workplan for PGDATA are given in Annex 7.

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Annex 2. Revised ToRs for WGBIOP

A **Working Group on Biological Parameters** (WGBIOP), chaired by Francesca Vitale, Sweden and Lotte Worsøe Clausen, Denmark, will meet in Malaga, Spain, June 2015, to work on ToRs and generate deliverables as listed in the Table below.

WGBIOP will report on the activities of 2015 (the first year) by September 2015 to ACOM and SCICOM.

ToR descriptors[3]

ToR	Description	Background	Science Plan topics addressed	Duration	Expected Deliverables
1	Develop the work plan for WGBIOP; 3-year work plan including specific deliverables and milestones	In the first year of WGBIOP the specific workplan must be formulated within the remits of the group. Serious efforts will be made to link with the GFCM for inclusion of members from the Mediterranean	1.2, 1.7	1 year	Detailed workplan outlined in the report for WGBIOP to follow. Identified deliverables and milestones will be tabulated including responsible participants. The table will be available in August 2015. Template for requests to WGBIOP will be compiled during the meeting and delivered with the report in September 2015.
2	Identify and assess new biological parameters as input to integrated ecosystem assessments and continue the development of methods and guidelines for best practice in the analysis of biological samples providing such parameters meeting end-user needs	a) Consult steering groups on Integrated Ecosystem Assessment for list of potential biological parameters (SGEDP, SGEPI, SGIEA, SGIEOM)	1.2, 1.7, 3.2	3 years/Generic ToR	List of new requested biological parameters needed for an integrated ecosystem assessment to be delivered to the relevant EGs. Series of up to date methods and guidelines for best practice for the computation of the required biological parameters. Both deliverables will be available in 2017.

[3] Avoid generic terms such as "Discuss" or "Consider". Aim at drafting specific and clear ToR, the delivery of which can be assessed

3	Provide guidelines for the various steps of the determination of statistically sound biological parameters in relation to: a) sampling protocols, b) sampling design and c) computation facilitating precision and accuracy in estimating existing biological parameters and those defined in ToR 2	a) Consult WGCATCH, WGRFS for specification on sampling protocols and design b) Consult Survey groups (WGISDAA, WGISUR) c) Build on experiences gained within PGCCDBS, WKACCU, WKPRECISE, WKNARC 1 and 2, WKSABCAL and all past calibration workshops	1.2, 1.7, 3.2	3 years	Series of guidelines for ensuring high precision and accuracy when estimating existing and new biological parameters will be provided by 2017 to the relevant EGs dealing with sampling protocols, sampling design and assessment
4	Plan studies, workshops and exchange schemes or other inter-sessional work related to interpretation and quality assurance of data on stock-related biological variables and review their outcomes	Review in-coming suggestions for inter-sessional work from EGs, WKs and other ICES related groups, e.g. planned benchmarks	1.2, 1.7, 3.2	Generic ToR	Yearly provision of a prioritised overview of planned studies, workshops and exchanges will be delivered to the PGDATA for review
5	Identify and evaluate potential issues in relation to biological parameters in accordance with the Benchmark schedule and provide feedback using quality indicators	Yearly collation of Issue Lists from ICES secretariate will form the background for this ToR and form the basis of the Specific ToRs for each meeting	1.2, 1.7, 3.2	Generic ToR	Quality indicators, based on identified issues related to biological parameters will be produced by 2017 for each stocks/species for which a benchmark is planned.
6	Address requests for technical and statistical recommendations/advice related to biological parameters and indicators	Filled templates for requests send to WGBIOP before a specified deadline will be the basis for this ToR	1.2, 1.7, 3.2	Generic ToR	Each received request for technical and statistical recommendations related to biological parameters and indicators will be addressed and included in the WGBIOP work plan where appropriate
7	Update and further develop tools for the exchanges and workshops (e.g. WebGR, other statistical tools, age readers/maturity stagers forum)	Based feedback from users of these tools, improvement/alterations will be evaluated	1.2, 1.7, 3.2	Generic ToR	Potential improvement/alteration of the tools on a yearly basis.

Summary of the Work Plan

Year 1	Consolidate WGBIOP workplan (ToR 1). Initiate the collation of a) information related to potential new biological parameters; b) Benchmark Issue Lists; c) Guidelines. ToR 5-7 are generic ToRs and will be dealt with on a yearly basis in WGBIOP
Year 2	Implement the quality indicator for current Benchmarks; develop methods/guidelines for best practice for the computation of the new required biological parameters; further develop the Guidelines in ToR 3.
Year 3	Review the current status of issues, achievements and developments that falls under the remit of WGBIOP, identify future needs in line with the ICES objectives and Science Plan and the wider marine environmental monitoring and management within Europe and propose a future/alternative work plan

Supporting information

Priority	A main objective of WGBIOP will be to support the development and quality assurance of regional and national provision of biological parameters as reliable input data to integrated ecosystem stock assessment and advice, while making the most efficient use of expert resources. As biological parameters are among the main input data for most stock assessment and mixed fishery modelling, these activities are considered to have a very high priority.
Resource requirements	None.
Participants	All National Age Reader/Maturity Stager Coordinators (ICES and GFCM) will be invited. Experts relevant for the current Benchmark of the year of WGBIOP will be invited as well as relevant external experts such as statisticians or specific EG members.
Secretariat facilities	None.
Financial	Additional funding may be needed depending on the required external expertise
Linkages to ACOM and groups under ACOM	WGBIOP supports ACOM and SCICOM by promoting improvements in quality of biological parameters from fishery and survey data underpinning the integrated ecosystem assessment approach.
Linkages to other committees or groups	WGBIOP links with the SCICOM/ACOM Steering Group: Integrated Ecosystem Observation and Monitoring (IEOM). It links to stock assessment EGs and benchmark assessment groups by providing input on the data quality. WGBIOP also links with Regional Coordination Groups, the Regional Database Steering Group
Linkages to other organizations	The outputs of WGBIOP will be of interest to FAO and RFMOs, and productive linkages may be established over time.

Annex 3 Responses to recommendations to PGCCDBS from other ICES Expert groups

ID	Year	EG	Recommendation	PGCCDBS response
24	2013	WKSPRAT	Multispecies natural mortality depends heavily on the knowledge of stomach content surveys – the last of which took place in 1991. Update of this information is particularly important for the sprat assessment in the North Sea, and would provide novel information in VI and VII.	Stomach sampling will presumably become part of the ecosystem monitoring that is currently being developed in several ICES Integrated Ecosystem Assessment Groups and Survey Groups.
28	2013	WKSPRAT	Surveys that cover VI and VII should collect biological samples of sprat and report these to HAWG	DCF obligation for collection of biological parameters on sprat in VI and VII exists. If the data are not readily available, the countries involved should make these available to HAWG through a data call. PGCCDBS agrees that these data should be collected on surveys that can provide representative samples of the sprat population. The spawing/pre-spawning herring acoustic survey covering VIa and VIIa-g (directed at herring and sprat) seems to be the obvious candidate for this. Confirmation and identification of potential other surveys should be done by HAWG/SSGIEOM.
29	2013	WKSPRAT	There is a need to determine the connectivity of areas for early life-history stages of sprat, for example through drift modelling studies. These would be of use for future benchmarks for sprat and HAWG.	This falls outside the scope of PGCCDBS

38	2013	WGNAS	The Working Group recommends that further work be undertaken to address the issues raised by the second Workshop on Age Determination of Salmon (WKADS 2). The following issues were identified and the Working Group recommended that these should be followed up: *An inter-lab calibration exercise should be held remotely in the next two to four years. *Reference scale images and accompanying details should be hosted on ICES age readers forum website. *The importance of the initial positioning of the line on a scale along which measurement are made, should be emphasized to all readers.	The PGCCDBS Interactive table planning tool, ensures that all stocks are offered the possibility of an intercalibration exercise at 5 year intervals. If pressing age reading issues arise a workshop can be requested at any stage. PGCCDBS agrees that the EARF is an excellent location for the details of a reference collection for salmon. PGCCDBS agrees that there should be a clear age reading criteria for salmon.
88	2013	WGHMM	2. In order to provide an analytical assessment for all ICES stocks of anglerfish, the EWG considers that further work is needed on data and biological parameters. This includes the availability of data on discards, the production of appropriate tuning indices and CPUE's for both species and all stocks and the analysis of biological and length information already available from scientific surveys. Furthermore, the EWG recommends that in order to help validate growth as well as provide information on migration patterns international tagging studies be initiated.	The DCWKAnglerfish was established. PGCCDBS submitted a study proposal on anglerfish and megrim in 2013, which was endorsed by the Liaison Meeting in October 2013. During the PGCCDBS 2014, the anglerfish and megrim study proposal will be further edited, to include Mediterranean stocks and will be resubmitted for consideration by the EU Commission.
174	2013	WGCEPH	1. WGCEPH would launch another Data Call reviewing templates and clarifying variable contents. The, group will get in contact with National correspondants to inform about WGCEPH work	This is not a recommendation

			procedure from 2014 in relation to data required.	
175	2013	WGCEPH	2. Routine collection of cephalopod length–frequency data, by species, during research bottom-trawl surveys (e.g. IBTS) is suggested, in addition to provision of these data to the WGCEPH prior to the next meeting.	This is a request to the IBTSWG, and could also be sent to WGBEAM.
205	2013	SGPIDS	SGPIDS recommends that national at-sea sampling programmes are encouraged to set up appropriate sampling frames for at-sea sampling based on vessel lists, and supplementary data such as log books and sales notes. Additionally vessels should be selected using a probability based selection mechanism, that when a vessel is contacted the vessel's "next trip" is the criteria used to define the responses to the selection attempt, and that equal effort be expended to secure a trip for each selection attempt within the same stratum. As a minimum the responses to selection attempts should be classified into one of the six contact categories (Not available, No contact details, Observer decline, No answer, Industry decline, Successful sample) to enable standardisation of non-response and refusal rate calculations.	PGCCDBS endorses the recommendations of SGPIDS. Further follow-up under WGCATCH.
206	2013	SGPIDS	SGPIDS recommends national at-sea sampling programmes facilitate the recording of the bycatch of protected and endangered species (PETS) by including (in addition to accepted at-sea data) a check box for recording if sampling for PETS bycatch at haul level occurred, a check box for recording the use of Pingers and that the appropriate species codes (listed in table 6.2 SGPIDS report) are	PGCCDBS endorses the recommendations of SGPIDS. Further follow-up under WGCATCH, which should liaise with WGBYC on this issue.

			included in recording forms and national databases.	
211	2013	WKNARC	WKSABCAL to take into consideration the findings of WKNARC in relation to the means of dealing with uncertaintity of age data in assessments	WKNARC2 and WKSABCAL chair is the same - this will ensure the communication
213	2013	WKAVSG	WKAVSG recommends for another meeting to be held in approximately 3 years, depending on the progress made with respect to validation initiatives.	Recommendation for WGBIOP.
214	2013	WKAVSG	WKAVSG recommends and international cooperation project. Further information available on section 11	Not clear
215	2013	WKMSEL	Promote calibration workshops for maturity staging of elasmobranch inside and between laboratories.	PGCCDBS supports any initiatives to ensure that it's workshop recommendations are disseminated and implemented, both within and between laboratories.
220	2013	WKMSEL	Promote a proper dissemination of the proposed scale to all ICES and Mediterranean countries, but also to other geographical areas, through one or more of the following hypothesis: 8.1) Journal article (proposal: ICES Journal of Marine Science) 8.2) Publish the scale and Atlas through ICES website (with possible exchange of photos with other scientists) – the ICES will be contact by email about this option. 8.3) FAO Technical Paper 8.4) The option to upload the Atlas photos on WebGR should be explored. If someone already used or know anyone that used this tool can you please give us your feedback (http://webgr.wiki.azti.es/doku.php) (see Annex 7).	PGCCDBS supports any initiatives to ensure that it's workshop recommendations are disseminated and implemented. The chairs of WKMSEL were contacted and a have the template to submit a publication resolution.

222	2013	WKMSEL	From now onward, analyse maturity stage data according to the scales herein proposed in order to validate its application for stock assessment modelling (see chapter 7 for more details);	PGCCDBS endorses the need for all laboratories to adopt the new scale, to facilitate the consistent use of maturity data in assessments

Annex 4 PGCCDBS response to issues raised by ICES EG data contact persons.

EG	Stock	Data Problem	How to be addressed in	By who	PGCCDBS Response
HAWG	All stocks	HAWG is concerned about the lack of information on discarding levels in the herring fisheries.	All efforts should be made to maintain observer coverage across fleets that catch a substantial proportion of pelagic fish and to report on the observed discard levels. The implications of the discard ban on pelagic vessels in the revised CFP should be considered in relation to pelagic observer programmes.	PGCCDBS and RCMs	PGCCDBS agrees that there is a need to quantify slippage or other forms of discarding in pelagic fisheries, where monitoring or pilot studies indicate a need to collect data under the DCF. The impact of the discard ban on observer programmes is an on – going discussion for all MS (and all fisheries), with alternative monitoring approaches being suggested and tested, like the use of CCTV systems on board ship etc…
WGNSSK	Saithe in Subarea IV, VI and Division IIIa	Age sampling from commercial fleets	Possible cluster sampling due to few vessels in the reference fleet (Norway), needs review / redesign	ACOM (Norway); PGCCDBS	PGCCDBS advises that information on this should be sought from IMR which runs the reference fleet programme.
WGNSSK	Plaice in VIId	Discard time series too short to be included in the assessment	Sampling levels have increased in the recent years and more work needs to be done to raise the samples to the population and get reliable estimates of the discards levels	PGCCDBS; ACOM (France); ACOM (UK); ACOM (Belgium)	The potential extension of the discard time series is a task for a data compilation workshop when this stock will be scheduled for benchmarking. PGCCDBS advises MS to ensure that samples are raised according to statistically sound procedures that follow the sampling design as discussed in the WKPICS series and previous WK's such as WKDRP.

WGWIDE	Boarfish	Lack of sampling and age data.	Following the MoU between ICES and EU boarfish (Capros aper) was included into WGWIDE. Sampling data are still only very limited accessible. Therefore boarfish should be included in the list of DCF species.	PGCCDBS, RCMs, EU	Boarfish is already covered by the DCF unofficially and will appear in a revised list of species in the new DCF.
WGWIDE	Boarfish	Third year of the acoustic survey funded by levy on the Irish and Danish industry.	Following the MoU between ICES and EU boarfish (Capros aper) was included into WGWIDE. The Acoustic survey needs to be continued annually and should be considered under the DCF.	PGCCDBS, EU, ICES SSGESST	Surveys do not fall within the remit of the PGCCDBS, other than for the collection of biological parameters. New survey proposals should be addressed to the relevant RCMs (RCM NA in this case). However, given the current state of the DCF-development, no new surveys will be funded until the DCF has finally been agreed upon and the accompanying survey review procedure has been adopted.
WGWIDE	Horse Mackerel – North Sea Stock	Low level of sampling and survey data. Currently only IBTS data are available which are not entirely suitable for pelagic species	Collection of information from other working groups. Possible implementation of an acoustic survey for horse mackerel in 3rd or 4th Quarter.	PGCCDBS, RCM NS&EA	Commercial sampling: required sampling level should be more clearly defined by the end user, taking into account the current limitations on sampling programme changes under the rolled-over DCF. Surveys do not fall within the remit of the PGCCDBS, other than for the collection of biological parameters. New survey proposals should be addressed to the relevant RCMs (RCM NSEA in this case, as had been done). However, given the current state of the DCF-development, no new surveys will be funded until the DCF has finally been agreed upon and the accompanying survey review procedure has been adopted.
WGWIDE	Norwegian Spring Spawning Herring	Contrasting age distributions between laboratories in the May survey	It is recommended that a workshop on age reading is required for NSS herring to address discrepancies across nations, encountered during the recent May surveys.	PGCCDBS	An age reading exchange on NSS herring is on – going in 2014, with preliminary results expected in April.

Annex 5: Chapter structure for Cooperative Research Report on fish ageing

Introduction

Summary of age estimation methodologies in XX

Summary of general age estimation methods and problems

Ageing methods and problems of specific XX stocks

Age validation case studies in XX

Indirect validation methods

Direct validation methods

Conclusions on age validation methods in XX

Specific conclusions for each method

General conclusions

Future perspectives in XX

Generic manual for age validation

References

Annex 6 Updated List of AWG Data Contact Persons 2014.

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Annex 7 Proposed ToRs and supporting information for PGDATA

A **Planning Group on Data Needs for Assessments and Advice** (PGDATA), chaired by XX, Country, will meet in Town, Country, Date Year, to work on ToRs and generate deliverables as listed in the Table below.

PGDATA will report on the activities of 2015 (the first year) by Date Month Year to SSGIEOM.

ToR descriptors

ToR	Description	Background	Science Plan topics addressed	Duration	Expected Deliverables
a	Design and test a Quality Assurance Framework for assessment EGs to evaluate data quality and its impact on assessments, particularly within the benchmarking process, and test this in regional case studies.	The ACOM/SCICOM assessment and advisory process needs to be based on a better understanding of the impacts of data quality. Build on experience in PGCCDBS, WKPICS, SGPIDS and other EGs;Establish close working with case study benchmark workshops; consult with WGCATCH, WGBIOP, other relevant SSGIEOM EGs & ACOM.		Year 1-3	Draft QAF processes for ICES benchmark assessments; Reports on case study evaluations.
b	Develop and test analytical methods for identifying improvements in data quality, or collections of new data, that have the greatest impacts on the quality of advice	Objective procedures are needed to identify where data quality improvements will have greatest impact on quality of advice. Build links with statistical experts within and external to ICES; establish workshops to develop and test methods.		Year 2	Workshop Methods & software Case study results

c	engage with end users to raise awareness of what types and resolution of management decisions (e.g. by fleet or area) can realistically be supported by present or proposed data collections	Assessment and advisory groups need to understand the limits imposed by the quality and resolution of data. Consultation needed with ICES EGs & SSGs, RCMs/RCGs; stakeholder Advisory Committees, European Commission and other RFMOs.	Year 1 - 3	Consultation reports Documented guidelines
d	Advise on objective methods for evaluating requests by end-users for new or amended data collections within the new DCF/DC-MAP	Essential to prevent wasteage of resources on inappropriate data collection. Consultation with ICES EGs & SSGs, STECF, RCMs/RCGs; stakeholder Advisory Committees, European Commission and other RFMOs. Establish workshops to develop / test methods.	Year 1 - 3	Consultation reports Documented guidelines
e	Plan workshops and studies focused on specific methodological development needs	Workshops and studies are effective for attracting people with specific skills.		Workshop reports

Summary of the Work Plan

Year 1	**consolidate 3-year workplan; establish membership & skills needed; consultation within ssgieom on broader QAF implementation (e.g. surveys); establish links and working procedures with ices egs, externalbodies, external experts; develop draft qaf guidelines for benchmarks; work with test case benchmark in autumn 2014 (anglerfish?); first PG meeting spring 2015**
Year 2	Planning and workshop to develop MSE-type tools for evaluating contribution of data quality to variance of assessment estimates and quality of advice, and evaluating relative impacts of data improvements; guidelines to other SSGIEOM EGs on QAF implementation; Further development and testing of QAF procedures in benchmarks; consultations with end users; 2nd PG meeting
Year 3	Review of progress / results in implementing QAF; further implementation in benchmarks; Methodological Workshop – developing and testing criteria for evaluating data needs and requests; consultations with end users on data needs; 3rd PG meeting; evaluate future PGDATA workplans.

Supporting information

Priority	This PG has high priority for improving the effectiveness of the ICES benchmarking process and the quality of ICES advice, and for ensuring the best use of available resources for data collection. An objective of the PG is to help ICES to develop advice using the most appropriate assessments given the quality of the data, and to be able to explain uncertainties in the assessments due to aspects of data quality and how these are reflected in the advice. This objective addresses single species, mixed fishery and multi-species assessments carried out by ACOM and SCICOM EGs, with particular focus on regional benchmarking. A further goal is to develop objective procedures to identify where data quality improvements will have greatest impact on quality of advice, and to ensure that proposals to collect new data or amend existing data collection schemes can be made in an informed way taking account of factors such as feasibility, methods for collection and use of the data, impact on advice, costs of data collection relative to precision, implications for regional sampling schemes or surveys, and how the quality of the data can be evaluated.
Resource requirements	The national science programmes which provide the main input to this group are already underway, and will need to commit resources to support participation of staff in the PG. Due to relevance of the PG to fishery management under the CFP and to the DC-MAP, use of national EMFF funds to co-finance involvement in the PG should be agreed as eligible.
Participants	The core PG membership will include experts in statistics, sampling design, surveys, modeling, stock assessment, management strategy evaluation methods and other modeling approaches needed, DC-MAP implementation; RCGs. Other experts, including external experts from USA and elsewhere will be invited when required. EC DG-MARE involvement will be beneficial. A broader pool of experts and other national scientists will be identified for participation in workshops and to facilitate two-way communication between PGDATA and national institutes.
Secretariat facilities	Support needed from Secretariat involved in setting up benchmarks
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	This is a joint ACOM-SCICOM Expert group. There will be strong and direct linkages with ACOM and with assessment EGs involved in regional benchmarks targeted for case studies.
Linkages to other committees or groups	There will be a very close working relationship with all the groups of SSGIEOM and with ACOM benchmarking groups.
Linkages to other organizations	There will be linkages with STECF, RCMs/RCGs; stakeholder Advisory Committees, European Commission and other RFMOs

Annex 8 PGCCDBS workplan for 2014

(1): Workshops taking place in 2014.

The following age reading workshops will take place in 2014.

Acronym	Dates	Chairs	Venue
WKSABCAL	October 2014	Lotte Worsøe Clausen and Ernesto Jardim	Mallorca, Balearic Islands, Spain
WK on Age Validation (during the 5th international otolith symposium, http://ices.dk/news-and-events/symposia/otolith/Pages/Workshop%202.aspx)	22 October 2014	Ole Thomas Albert, Alf Harbitz, Richard McBride, Allen Hia Andrews and Iñaki Quincocoes	Mallorca, Balearic Islands, Spain
WK on otolith shape analysis (during the 5th international otolith symposium, http://ices.dk/news-and-events/symposia/otolith/Pages/Workshop-1.aspx)	22 October 2014	Deirdre Brophy, Lotte Worsøe Clausen, Antoni Lombarte nd Audrey Geffen.	Mallorca, Balearic Islands, Spain

(2) Small scale and full scale age exchanges taking place in 2014

Species/Stock	Type of exchange	Coordinator
Herring (Norwegian spring spawner)	Small scale exchange	Jane Amtoft Godiksen, Norway
Mackerel	Small scale exchange	Jens Ulleweit, Germany
Sprat (North Sea and Celtic Sea)	Full scale exchange	Lotte W. Clausen, Denmark.
Whiting (*Merlangius merlangus*)		Mark Etherton and Sally Songer, UK, England, starting Summer 2014
Megrim (*Lepidorhombus spp*)		Gordon Henderson, Scotland, starting Summer 2014
Sole (*Solea solea*)		Annemie Zenner, Belgium, and Loes Bolle, the Netherlands
Horse mackerel and Mediterranean horse mackerel (*T. picturatus* and *T. mediterraneus)*		Pierluigi Carbonara, Italy, and Kélig Mahe France
European anchovy		Andres Uriarte, Spain, Begoña Villamor, Spain

Annex 9 PGCCDBS proposals for 2015 and beyond

Proposed workshops for 2015

Priority	Type	Species		Comments and Recommendations of PGCCDBS 2014
1	Age	Seabass	*Dicentrarchus labrax*	The last exchange took place in 2013 and on the basis of these results, PG recommends a Workshop. **Workshop on Age reading of Seabass (*Dicentrarchus labrax*)** [WKARDL] (Co-chairs: Kélig Mahé, France, and Mark Etherton, England, UK; will be held 15 – 19 June 2015
1	Age	Saithe	*Pollachius virens*	The last exchange took place in 2013 and on the basis of these results, PG recommends a Workshop. **Workshop on Age reading of Saithe (*Pollachius virens*)** [WKARPV] (Co-chairs Kélig Mahé, France, and Jane Godiksen, Norway; will be held in Boulogne-sur-Mer, France, 25-29 May 2015
1	Age	Chub Mackerel	*Scomber Colias*	The last exchange took place in 2013 and on the basis of these results, PG recommends a Workshop**.** **Workshop on Age reading of Chub Mackerel (*Scomber Colias*)** [WKARCM] (Co-Chairs: Andreia Silva, Portugal, and Maria Rosario Navarro, Spain; will be held in Lisbon, Portugal 2-6 November 2015
1	Age	Horse Mackerel, Mediterranean Horse Mackerel and Blue Jack Mackerel	*Trachurus trachurus*, *T. mediterreaneus* and *T. Pictatus*	A pre-workshop exchange is going forward in 2014 and PG recommends a Workshop for 2015 **Workshop on Age reading of horse mackerel, Mediterranean horse mackerel and blue jack mackerel (*Trachurus trachurus, T. mediterreaneus* and *T. Pictatus*)** [WKARHOM2] (Co-Chairs: Pierluigi Carbonara, Italy, and Kélig Mahé, France ; will be held in Sta. Cruz de Tenerife, Canary Islands, Spain, 26-30 October 2015)
1	Age	Dab	*Limanda limanda*	WK recommended to take place on the basis of the results of the Exchange that took place in 2013. **Workshop on Age reading of Dab (*Limanda limanda*)** [WKARDAB2] (Co-chairs: Holger Haslob, Germany, and Loes Bolle, the

Priority	Type	Species		Comments and Recommendations of PGCCDBS 2014
				Netherlands; will be held in Hamburg, 23-27 November 2015.

Priority	Type	Species		Comments and Recommendations of PGCCDBS 2014
2	Maturity	Mackerel and Horse mackerel	*Scomber scombrus* and *Trachurus trachurus*	During the last Workshop 2007, WKMSMAC recommended having a Workshop on maturity of mackerel and horse mackerel every 3 years. A workshop on the maturity staging of mackerel and horse mackerel [WKMSMAC2] will take place in Lisbon, Portugal, 28 September – 2 October 2015, and co-chaired by Cindy van Damme, The Netherlands and Pierluigi Carbonara, Italy

Proposed large-scale age exchanges in 2015:

Species/Stock	Type of exchange	Coordinator
Red Mullet and Striped Red Mullet (*Mullus surmuletus* and *M. barbatus*)	Large	Francesc Ordines, Spain, and Kélig Mahé, France
Brill and Turbot (*Scopthalmus rhombus* and *Psetta maxima*)	Large	Annemie Zenner, Belgium.
Sandeel (*Ammodytes spp.*)	Large	Lotte W. Clausen, Denmark
Herring (*Clupea harengus*); Atlantic and Baltic Sea	Large	Jari Raitaniemi, Finland and Loes Bolle, The Netherlands (to be confirmed).

Proposed Age Calibration Exchanges for 2016 and Beyond.

:Priority	Type	Species		Comments and Recommendations of PGCCDBS 2014
1	Age	Sprat	*Sprattus sprattus*	The last workshop on Sprat in the Baltic Sea, Skaggerrak-Kattegat, Celtic Sea and West of Scotland was in 2008. Sprat in Irish sea has not had an exchange or workshop before. It is recommended to have an exchange on the age reading of these sprat stocks as soon as possible.
1	Age	Blue whiting	*Micromisistius poutassou*	The last workshop recommended to have another exchange in 2016.
2	Age	Lemon sole	*Microstomus kitt*	There is no known exchange or Workshop. PGCCDBS requests the relevant working groups to

				consider if an otolith exchange would be useful.
2	Age	Gurnards	*Aspitrigla cuculus, Eutrigla gurnardus, Chelidonichthys lucernus*	There is no known exchange or Workshop. PGCCDBS requests the relevant workinggroups to consider if an otolith exchange would be useful.
2	Age	Pollack	*Pollachius pollachius*	There is no known exchange or Workshop. PGCCDBS requests the relevant workinggroups to consider if an otolith exchange would be useful.
3	Age	Norway pout and pouting	*Trisopterus esmarkii* and *T. luscus*	There is no known exchange or Workshop. PGCCDBS requests the relevant workinggroups to consider if an otolith exchange would be useful.

Proposal for collaborative studies contracts

- Collaborative Study on anglerfish (Priority 1)
- Collaborative Study on improvement of WebGR (Priority 1)
- Improving accuracy in fish age estimation through understanding of the link between environmental conditions and physiological responses recorded in the otolith macrostructure (Priority 2)
- Exploration and Development of new facilities in RDB-FishFrame 5.0 (Priority 1)
- Support design based regional data collection programmes (Priority 1)