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Report of the Planning Group on Commercial Catches, Discards and Biological Sampling; PGCCDBS 2013

18 – 22 February 2013

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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 Belfast, Northern Ireland, 18th February – 22nd February 2013, in parallel with the Mediterranean Planning Group for Methodological Development (PGMed).

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 2013 meeting of PGCCDBS focused on work completed since last year, and planned work for 2013 and 2014, 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 (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.

During 2013, the PGCCDBS was requested to address an additional Term of Reference as follows:

- a) Identify reasons for differences between raised discards estimates provided by ICES and STECF, and make recommendations on how to resolve this problem in the short and longer term.

The PGCCDBS met in plenary with PGMed to review the outcomes of a wide range of workshops and age exchanges conducted since PGCCDBS 2012 and the workplan for 2013. On the basis of this and the PGCCDBS long term planning process, further workshops and exchanges were proposed for 2014 and beyond. These include:

- *Age and maturity workshops*: WKSABCAL, the Workshop on the Statistical Analysis of Biological Calibration Studies (which had been postponed); WKARA, workshop on age reading of anglerfish *Lophius* spp will be considered during the 2014 meeting, and a workshop will be proposed for 2015 if any advances in the knowledge of age reading of anglerfish have been made.
- *Sampling design workshops*: in order to take forward the work of the series of WKPICS (Workshop on the Practical Implementation of Statistical Sound Catch Sampling Programmes) and SGPIDS (Study Group on Practical Im-

plementation of Discard Sampling Plans) which finish in 2013, PGCCDBS proposes the establishment of a Working Group on Commercial Catches to provide ongoing support for the design, implementation and analysis of sampling programmes for commercial fisheries.

- *Large-scale age exchanges:* Whiting (*Merlangius merlangus*); Megrim (*Lepidorhombus spp*); Sole (*Solea solea*); Sprat (*Sprattus sprattus, all areas*); Horse mackerel and Mediterranean horse mackerel (*T. picturatus* and *T. mediterraneus*)

PGCCDBS 2013 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 i) anglerfish ageing (*Lophius piscatorius*); ii) Study proposal on age determination and maturity staging of species not previously subjected to biological sampling for analytical assessments.
- *Proposal for a training course* covering the design of statistically sound catch sampling for fisheries monitoring programmes.
- *ICES cooperative research report (CRR)* on the Protocols on the ageing of different fish species in the ICES area. PGCCDBS further developed its proposal for the CRR and developed a work plan for this.

PGCCDBS developed work plans for intersessional work related to development of Quality Assurance reports for fishery sampling, including testing a prototype QA report with selected ICES stock assessment expert groups, and circulating a questionnaire to collect information on national approaches to the construction and application of age-length keys.

The ToR's for PGCCDBS 2014 were also discussed and agreed, see Annex 11, and it was also agreed that the PGCCDBS 2014 meeting will be held in Constanta, Romania, Monday the 10th of February – Friday the 14st of February 2014.

1 Introduction

1.1 Terms of Reference

2012/2/ACOM49 The **Planning Group on Commercial Catches, Discards and Biological Sampling** [PGCCDBS] chaired by Mike Armstrong, UK, and Gráinne Ni Chonchuir, Ireland, will meet in Belfast, Northern Ireland 18–22 February 2013.

- 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) Report on the implementation of the Quality Assurance Framework (QAF) by ICES Expert Groups, and make recommendations for further development of the QAF and procedures for ensuring its full implementation in stock assessments and associated advice.
- f) Review and present practical examples of progress in developing enabling technologies and equipment for data collection from fisheries.
- g) Identify reasons for differences between raised discards estimates provided by ICES and STECF, and make recommendations on how to resolve this problem in the short and longer term.

PGCCDBS will report by 29 April 2013 for the attention of ACOM.

PGCCDBS and PGMED met in parallel and the TOR's and Participants list for PGMED are included in this report in Annex 1

1.2 Participants

The list of participants for PGCCDBS is given in Annex 2

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 bio-

logical 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. 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 (PGCCDBS) should be promoted and maintained.

It was agreed previously that the link between the two planning groups (PGs) should be maintained through:

- (i) the inclusion of each group's report as an annex of the other;
- (ii) the organisation of parallel meetings;
- (iii) the organisation of joint plenary sessions for generic issues;
- (iv) the organisation of joint workshops.

In 2012 a greater emphasis was placed on improving the extent of collaboration and cooperation between the PGCCDBS and the PGMed. This was achieved during the 2013 meeting preparation where the PGCCDBS agenda was designed to allow easy participation at work shop and project presentations for PGMed members.

For the reports in 2013: The list of ToRs of each group will appear in the other's report; as will the list of participants. A link will also be provided to the 2013 PGMed report in the PGCCDBS report and vice versa.

1.5 Work plan for 2013 PGCCDBS meeting

The meeting was structured as a mixture of plenary sessions involving PGCCDBS and PGMed, plenaries involving PGCCDBS only, and three subgroups working separately to address ToRs dealing with stock based biological variables, fleet-based biological data, and new technologies. The new technologies subgroup also dealt with the topic of reviewing options for collecting transversal data from small-scale fisheries at appropriate spatio-temporal scales and disaggregation levels.

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 sub-group 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 2012;
- Reviewing the programme of exchanges study groups and workshops in 2013
- Proposing new exchanges, study groups, workshops and studies contracts for 2014 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 the proposed discard ban, 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. This year's PGCCDBS built on the proposal of producing an ICES cooperative research report (CRR) on protocols on the ageing of different fish species in the ICES area. An extensive workplan was agreed and will be actioned during 2013 and 2014. The CRR proposal can be found in Annex 7 of the PGCCDBS 2012 Report.

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

The PG report was restructured in 2012 by moving many of the long recommendations tables into Annexes, and focusing more clearly on the key outcomes, actions and recommendations from the group. This new format was adopted also for the 2013 report.

This report is organised by Terms of Reference (ToR), starting with Section 2 for ToR a) to Section 8 for ToR g). A set of annexes was added including the list of participants, agenda, ToR's for 2013, 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)

The PGCCDBS 2012 recommendations were reviewed and responsive actions are highlighted, where applicable, in Annex 3. All 2012 recommendations were actioned or are ongoing. PGCCDBS recommendations from the 2013 meeting have been kept succinct and clear.

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 2012 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.

Only one age calibration exchange, the North Sea cod otolith small scale exchange 2011-2012, was completed in 2012.

One exchange was postponed until 2014 and three were postponed until the relevant stock assessment Working Groups review the need for such an exchange. Furthermore, four otolith ageing workshops and four maturity staging workshops were conducted in 2012. Recommendations from each of the completed workshops were reviewed by PGCCDBS 2013.

Furthermore, three age calibration workshops and three maturity staging workshops were conducted in 2012. Recommendations from each of the completed workshops were reviewed by PGCCDBS 2013.

The workshop on age estimation methods of deep water species (WKAMDEEP) was postponed until 2013, as was the workshop on sexual maturity staging of cod, haddock, saithe and hake.

In general, PGCCDBS notes that some workshops had very limited participation of various reasons. It is imperative for a successful workshop to have as wide a participation as possible and **PGCCDBS encourages ICES to ensure an appropriate attendance and a required level of basic knowledge, but also expert knowledge related to the workshop topic. ICES could be inspired by the tactics used for the benchmark process, where even external expertise is invited.** In order to take a first step to improve the situation, PGCCDBS has taken the initiative to update the Guidelines for Exchanges and Workshops to widen the range of invitations to all age reader coordinators regardless of their readers not being immediately relevant for the area or stock in question, as there may be an interest from age-readers with experience of other stocks in participating, in order to allow alignment with the age estimations for species in common.

3.1 PGCCDBS Age Workshops.

3.1.1 Age Workshop outcomes 2012 and PGCCDBS response.

The following are summaries of the age reading workshops carried out in 2012.

3.1.1.1. Age Determination of Salmon (WKADS-2)

A second Workshop on Age Determination of Salmon (WKADS 2) was held in Derry, Northern Ireland from September 4th to 6th, 2012. The meeting was attended by 12 people from six countries, representing nine laboratories. The meeting addressed recommendations made in the WKADS report (2011) (ICES CM 2011/ACOM:44) to review, assess, document and make recommendations for ageing and growth estimations of salmon (*Salmo salar*) using digital scale reading, with a view to standardisa-

tion. Available tools for measurement, quality control and implementation of inter-laboratory QC were considered.

Information on scale reading errors and inaccuracies was presented, including:

- possible scale deformation from jewellers press;
- differences in circuli number and spacings, on scales from different locations on smolts;
- measurements of smolt and adult scales made by different scale readers;
- measurements of adult scales made by the same scale reader.

The image collection gathered during WKADS (ICES CM 2011/ACOM:44) was augmented by addition of scale images showing complexities in their growth, including scales with growth checks and repeat spawners.

The meeting reviewed “Web services for support of Growth and Reproduction Studies” (WebGR), a server distributed PC application for organising scale reading comparisons and considered its application in supporting an inter-laboratory salmon scale reading exercise. While the application could support such an exercise, it is aimed at marine species, which do not exhibit the same diadromous growth (fresh-water and marine) and so would not be directly applicable unless it was further developed or two files per scale were created.

Open source software “Image-J”, an image processing and analysis application that enables measurements through microscope-mounted cameras was reviewed. This could be a useful tool, able to measure and export inter-circuli distances.

The back calculation of lengths from scale features was re-examined and different models presented. This practice is used to check age estimates from scale readings by estimating fish size at the specified age. Size estimates that do not appear realistic for the estimated age indicate that a scale needs further examination.

The processes of fish scale preparation, reading (microfiche, microscope and digital reading) and storage are all well documented; however references and details specific to salmon scale reading are disparate. Available material was reviewed and itemised so that references detailing the best practice pertinent to Atlantic salmon are available in one place

It was recommended that an inter-laboratory calibration exercises should be held in the near future (2 to 4 years). This should be implemented remotely, beginning with a video-conference meeting to detail the exercise. A two week period should be given for participants to read scales, followed by a week for the co-ordinator to produce an initial report. A further video-conference meeting should be held to review the exercise and report and allow for feedback. A final report should then be produced. Other recommendations of the group included:

- Reference scale images and accompanying detail should be hosted on ICES age readers forum website
- The general exchange of scales and images should be undertaken under the Creative Commons Attribution-Share Alike 3.0 Unported License
- Importance of initial positioning of measurement line should be emphasised to all readers
- Further work should be undertaken comparing scale readings of scales from different locations on salmon

- There is potential to assess the perceived shifts in salmon life styles across salmon scale archives and further scale collections

PGCCDBS agrees with these recommendations

3.1.1.1 Workshop on Age Reading of Horse Mackerel, Mediterranean Horse Mackerel and Blue Jack Mackerel (WKARHOM)

The workshop was held in Lisbon, Portugal from the 23rd to 27th April 2012, chaired by Alberto Murta, Portugal and Pablo Abaunza, Spain. There were 25 scientists and technicians participating, representing 11 laboratories from 8 countries: France, Germany, Ireland, Italy, Norway, Portugal (Mainland and Azores), Romania and Spain (mainland and Canary Islands).

There were 16 age readers participating in the otolith exchange which included 10 sets of images (382 images in total) of horse mackerel *Trachurus trachurus*, Mediterranean horse mackerel *T. mediterraneus* and blue jack mackerel *T. pictatus* from Ireland, North Spain, South Spain, Azores, Mauritania and Adriatic sea. Sectioned otoliths were read by seven of the institutions while three read whole otoliths, two read broken burnt whole otoliths and three read both sectioned otoliths and whole otoliths. The spreadsheet (Eltink, 2000) was completed according to the instructions contained in Guidelines and Tools for Age Reading Comparisons by Eltink et al. (2000).

The workshop focused on reviewing information on age determination and validation, and identifying sources of age determination error in terms of bias and precision: i.e. analyse different validation techniques and describe the corresponding interpretational differences between readers and laboratories, and agree on a common ageing criteria. Growth increment patterns were analyzed and specific guidelines for the interpretation of growth structures in otoliths have been provided.

The results of the re-reading at the Workshop revealed that the overall agreement rate for the set of otoliths was 48.2% with the range from 36% to 67% for different otolith sets. The average percentage of agreement across all ages and experienced readers in this set was 53.2% and the average CV was 32.5%. This result is better than that observed with all the readers but it remains only about 50% of agreement.

The study on the effect of otolith preparation techniques on age determination was undertaken. Age readings were made from otolith photos, that were firstly taken with the otolith intact, then after 12 h of immersion in thymol, and finally with the otolith sliced and mounted in resin. Each preparation of each otolith was read by 16 age readers, with variable previous experience reading otoliths of this species. The age data was structured in a split-plot design in which each otolith was treated as a block, with three treatments (intact, thymol and sliced) nested in it, and orthogonal to a fixed-effect factor corresponding to the age readers. The effects of otolith treatment, age reader, and the interaction between them were tested using Wald's tests after fitting a linear mixed-effects model to each of the two data sets, corresponding to small and large fish. The statistical tests indicated that all estimated parameters, and their interaction, had a significant effect (all p-values < 0.01) in both data sets. This means that there were significant differences in the age readings between readers and between otolith preparation methods, and also that the differences between methods were not the same across age readers. There were differences in interpretation primarily in the old individuals, with estimated age from sliced otoliths being higher than estimated age from whole otoliths.

A selection of 30 otoliths from horse mackerel (*Trachurus trachurus*, n = 23), Mediterranean horse mackerel (*Trachurus mediterraneus*, n = 5) and blue jack mackerel (*Trachurus pictatus*, n = 2)

churus picturatus, n = 2) were selected for the reference collection. All otoliths for the reference collection were chosen by the most experienced readers during the workshop and covered an age span from 0 to 18 years old. Ages were agreed on by all participants. The otoliths and fish information are uploaded to WebGR through a server at AZTI (<http://webgr.azti.es/>) and at the European Age Readers Forum (EARF).

During the workshop a manual was created which updated the text provided in ICES (1999) on the guide of horse mackerel (*Trachurus trachurus*) otolith reading, but also includes now the other *Trachurus* species, (*T. mediterraneus* and *T. picturatus*)

The main achievements of the workshop were the inclusion, for the first time, of *T. picturatus* and *T. mediterraneus*, a review on current otolith preparation and lab procedures, a quantification of disagreement between readers, the clarification of different ageing criteria previously used, an agreement on common criteria for ageing, the update of an ageing manual, and the assembling of an otolith reference collection for future use. Therefore, WKARHOM has set the basis for training of new readers and future improvement on otolith reading agreement. A follow-up workshop, to be chaired by Teresa Garcia (Spain) and Alba Jurado (Spain), was proposed to exchange information by correspondence in 2014 and meet in Sta. Cruz de Tenerife (Canary Islands, Spain), 26-30 October 2015.

Proposed new Workshop/ToRs:

- a) Review information on progresses on the age determination, and validation on these species;
- b) Describe the corresponding interpretational differences between readers and laboratories, and agree on common ageing criteria;
- c) Provide training in loco regarding the guidelines for the interpretation of growth structures in otoliths;
- d) Increase existing reference collections of otoliths and improve the existing data base of otolith images.
- e) Address the generic ToRs adopted for workshops on age calibration (see 'PGCCDBS Guidelines for Workshops on Age Calibration').

PGCCDBS agrees with this proposal for an exchange in 2014 and a workshop in 2015.

3.1.1.3 WKACM-2 Report of the second Workshop on Age Reading of Red Mullet and Striped Red Mullet

The workshop was held in Boulogne sur Mer, France, 2–6 July 2012. The meeting was chaired by Keling Mahé, France. Five countries took part in previous exchange (Spain, Greece, Cyprus, Italy, France, for a total of eight participants) during 2011, and three countries (Spain, Italy, France: six participants) have been involved in the workshop.

The report presented a review of age validation studies and state-of-the-art on ageing the two *Mullus* species. One of the tasks of this workshop was to review the results of the exchange in 2011: A collection of 540 images (370 otoliths and 163 scales) of *Mullus* spp were used: 175 whole or burned whole otoliths and 95 scales for *Mullus sur-*

muletus (from Mediterranean Sea and Atlantic Ocean); 202 whole or burned whole otoliths and 68 scales for *Mullus barbatus* (Mediterranean Sea).

Results among sets of calcified pieces showed large differences. The set of *Mullus surmuletus* otoliths from the Bay of Biscay presented the higher percentage agreement (74.8%). Difference in precision could be due to the sampling area and also to the composition of the samples.

Results between the first and the second readings (with the same set of otoliths and the same readers) showed that precision increase especially for *M. barbatus* in the Mediterranean Sea (mean agreement percentage from 58.7% to 76.5%; mean CV from 37.3% to 16.7%).

There was confusion between readers about the position of the first growth ring and the false ring. This first ring considered as “demersal” check is an important problem because we have no information to consider this ring as false or growth ring. Validation study as age estimation on juveniles by daily increments analysis could help to identify the first annual growth ring.

In order to clarify the interpretation of annual rings in the Mediterranean Sea, age interpretation is realized as Atlantic (date of birth, 1st of January), but in this area both species showed a marked spawning period, and there are in contradiction concerning the conventional birth date and assignment of age estimation (date of birth 1st July).

During the exchange, there was confusion concerning the reading protocol: some of the readers considered as date of birth the 1st of January, whereas others considered the 1st of July as date of birth.

The estimated age by the same reader between otoliths and scales showed certainty of bias ($p < 0.01$). Otoliths are the best calcified structure to ageing *Mullus* species.

A few images were selected as good examples for a reference collection of well defined otoliths. The images were chosen by all readers.

WKACM-2 Recommendations

1. Clarify guideline of ageing criteria (e.g.. date of birth) in the Mediterranean Sea.
2. Otoliths Exchange of *M. surmuletus* and *M. barbatus* in 2014.
3. A new Workshop in 2015 in Palma de Mallorca, WKACM3. Co-chairs: F. Ordines, (Spain) and K. Mahé (France), will focus on the analysis of exchange results, validation studies and formalized guideline of ageing for *M. surmuletus* and *M. barbatus*.
4. Age validation study to solve the growth rings interpretation.

PGCCDBS Comments.

1. Clarify the guideline for ageing with respect to the maturity information obtained from the DCF. This information should be used as a basis for taking a decision about the date of birth of the species according to the interpretation scheme suggested in WKACM2.
2. Make a peer review of the proposed ageing guidelines during the WKACM2 in order to check it for possible errors/misunderstandings, and to examine the new scheme proposed during PGCCDBS.

3.1.2 Work plan 2013

The following age reading workshops will take place in 2013.

ACRONYM	DATES	CHAIRS	VENUE
WKA VSG Workshop on age validation studies of Gadoids	6-10 May 2013	Karin Hussi , Denmark and Beatriz Morales-Nin, Spain	Mallorca, Spain
WKNARC2 Workshop of National Age Readings Coordinators	13-17 May 2013	Ângela Canha, Portugal and Lotte Worsøe Clausen, Denmark	Horta, Portugal
WKARBLUE Workshop on the Age Reading of Blue whiting	10-14 June 2013	Manolo Meixide, Spain and Jane Amtoft Godiksen, Norway	Bergen, Norway
WKMIAS; Workshop on Micro increment daily growth in European Anchovy and Sardine	21-25 October 2013	G. Basilone, Italy, B. Villamor, Spain and M. La Mesa, Italy	Mazara del Vallo, Italy
WKAMDEEP Workshop on Age Estimation Methods of Deep Water Species	21-25 October 2013	Ole Thomas Albert, Norway, and Beatriz Morales Nin, Spain	Esporles, Spain

3.1.3 WKAMDEEP – Workshop on Age Estimation Methods of Deep Water Species

This workshop was postponed from 2012 due to a lack of participants expressing their interest. It was generally felt the original TORs were too extensive and therefore TORs have been re-evaluated and refined. These have been discussed and agreed and the Workshop on Age Estimation Methods of Deep Water Species (WKAMDEEP), chaired by Ole Thomas Albert, Norway, and Beatriz Morales Nin, Spain, will meet at IMEDEA, Esporles, Spain, 21–25 October 2013.

There initially was a proposal for a separate workshop dealing with tusk, *Brosme brosme* as a follow up to the previous exchange, which highlighted quite serious issues with the age reading of tusk. However due to financial cuts, only Iceland could commit to a separate tusk workshop. PGCCDBS was advised by WGDEEP that it would be more effective to focus on tusk in the upcoming WKAMDEEP, than do the exercise alone within the Icelandic age readers.

PGCCDBS agrees with this advice and have passed on the relevant information to the chairs of WKAMDEEP

WKAMDEEP Revised workshop ToRs:

- a) Review information on age estimations, otolith exchanges, workshops and validation work done so far on the following species: tusk, ling, blue ling, roundnose grenadier, greater argentine, black scabbardfish, black-spotted sea bream, greater forkbeard and orange roughy;
- b) Compile all available studies and results on validation of growth rates and longevity in deep water species, including but not limited to those listed above, and develop recommendations concerning the need and methods for validation studies in the ICES area;

- c) Evaluate the results of small exchanges of otolith images from the individual species before the meeting;
- d) To revise the age estimation procedures and explore the possibilities to use supplementary information to verify estimated ages, this include: Otolith weight and/or morphometry, as well as Length distribution in surveys and catches;
- e) Develop a publication on ageing of deep water fish based on analyses done prior to and during the meeting, and including descriptions of general patterns and state-of-the-art for the deep water species individually and collectively;
- f) Address the generic ToRs adopted for workshops on age calibration (see 'PGCCDBS Guidelines for Workshops on Age Calibration').

3.1.4 Age Calibration Workshop Proposal for 2014

There is only one workshop proposal for 2014. WKSABCAL, the Workshop on the Statistical Analysis of Biological Calibration Studies, was postponed until 2014. The ToRs for this WK are available in Annex 4 of the PGCCDBS 2011 report.

As there is only one proposal for an age calibration workshop being put forward by PGCCDBS for 2014, it is an excellent opportunity for the EU Commission to consider funding the very important study proposals highlighted by PGCCDBS for support.

3.1.5 Age Calibration Workshops Proposed for 2015 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 2014 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 2014 or 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 XX 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, an age calibration workshop has been proposed for *Lophius spp* in 2015. This age calibration workshop has been given a priority 1 status and as such

should be considered as a high priority for 2015. PGMed members are very keen to be involved in the proposed 2015 workshop on age reading of Anglerfish (WKARA). The workshop proposal including the ToRs scientific justification, chairs and locations will be agreed at the 2014 PGCCDBS Meeting.

PRIORITY	AGE	SPECIES	COMMENTS AND RECOMMENDATIONS OF PGCCDBS 2013
1	Age	Anglerfish <i>Lophius spp.</i>	The last exchange took place in 2011 and on the basis of these results, PG recommends a Workshop [WKARA]

3.2 PGCCDBS Age Exchanges

3.2.1 Age Exchange outcomes 2012 and PGCCDBS response.

Four exchanges were planned to take place in 2012: turbot, brill, megrim and North Sea sole. However due to other work pressures the assigned coordinators could not initiate the exchanges as planned. The priority for exchanges was re-assessed again at this year's PG meeting and it was felt that megrim and sole should be subject to an exchange in 2014, but that there was less of a need to follow up on the brill and turbot exchanges.

A fifth exchange on North Sea cod, begun in 2011 and concluded in 2012, was also discussed by PGCCDBS.

3.2.2 North Sea cod otolith small scale exchange 2011–2012

The exchange was coordinated by Jane A. Godiksen, Norway. The last North Sea cod otolith exchange took place in 2009-2010. The overall result of this exchange was that there were significant variations in North Sea cod age estimates between readers. Both precision and relative biases between readers were better than during the last exchange, but there is still room for improvement, as overestimation of fish ages still seemed to be the problem. The Planning Group on Commercial Catch, Discards and Biological Sampling (PGCCDBS), recommended that a small scale exchange could be circulated to confirm the age reading criteria in the minds of the age readers. Therefore 62 otoliths from the previous exchange were chosen based on the percentage agreement, representing both highly agreed otoliths but certainly also the problematic otoliths; however ensuring a wide and representative modal age distribution. The institutes participating use different preparation and reading methodology. The preparation method was the same for all otoliths. All otoliths were sectioned and photographed and ages were decided from the images. Readers who are familiar with the broken method mentioned a difficulty in reading from images, but this didn't seem to have any effect on the results.

Otoliths from two regions were included in this exchange: ICES Division IVa, collected in Q2, Q3 and Q4 and ICES Division IVb, collected in Q2 and Q3. There were 10 readers from six research institutes participated (IMR, Marlab, CEFAS, Swedish Board of Fisheries, Johann Heinrich von Thünen Institute, and ILVA). All but one participated in the previous exchange and contributed with age data to stock assessment. Images of all otoliths were uploaded to WebGR The original WebGR manual and a self produced quick-read version were given to the readers. There were no is-

sues regarding the use of WebGR from the readers, however there were quite a few issues regarding the uploading of images and starting up the reading.

The overall percentage agreement for the 2012 exchange was 78% and the overall precision CV was 8.0%, which is not satisfactory. However, both precision and relative biases between readers were better than during the 2009/2010 exchange. Percentage agreement ranged from 40 to 100% with 18 otoliths read with 100% agreement and 38 with 80% agreement. CV ranged from 0 to 28% . No readers achieved more than 90% agreement with modal age. However, four readers achieved between 80 and 90% agreement. Relative bias plot shows only a slight overestimation of ages, which is an improvement from previous readings and the relative bias table demonstrates a low relative bias for most of the readers. Readers from the same institute often had high agreement, probably because of similar training received.

Overestimation of ages was previously a main problem when interpreting ages of North Sea cod, but this was improved in both the previous and the present reading. Compared to the seven previous readings in 2009/2010 there was a low inter-reader bias, as well as for each reader compared to modal age. This may be because all but one of the readers in this exchange are considered expert readers, and all except the intermediate reader participated in the previous exchange

The workshop concluded that an agreement level with the modal age between age readers of **at least 90%** would be desirable and achievable. Readers with some amount of experience should achieve this and any lower than this figure is cause for concern especially for those supplying ages to an ICES working group.

The results suggest that more workshops are needed to standardize the age reading between laboratories. **The guidelines and manuals developed during an earlier workshop have not yet had the intended effect on the quality of the age reading.** It should be investigate **why** in order to improve the guidelines and manuals and/or the implementation of them at the different institutes.

The use of WebGR for this exchange was recommended by PGCCDBS. WebGR is a tool new to most readers, but few problems arose during the reading. It was commented that the images of this exchange were good for image analyses and using WebGR was a much simpler way of carrying out an exchange without the problems of sending the actual otoliths around Europe.

Action: PGCCDBS will forward all recommendations, suggestions and comments to the Workshop on Age Validation Studies of Gadoids (WKAVSG) which will meet from 6 to 10 May 2013 in Mallorca, Spain, chaired by Karin Hussi, Denmark and Beatriz Morales-Nin, Spain.

3.2.3 Full Scale and Small Scale Exchanges in 2013

The following is a list of small scale and full scale age exchanges taking place in 2013:

- Sprat: full-scale exchange for North Sea and Celtic Sea, to be carried out in 2013. Appointed coordinator Lotte W. Clausen (DK - DTU aqua)
- Mackerel: small exchange, 2013. Appointed coordinator jens.ulleweit@vti.bund.de (Germany)
- Herring (Norwegian spring spawner): small exchange. Appointed coordinator Jane Amtoft Godiksen (Norway)

- Saithe: The last saithe exchange was 2008. A full exchange using only images for all areas, should take place in 2013. Appointed coordinator: Kélig Mahe (France).
- Capelin: There should be a small exchange between Iceland and Norway for capelin. Coordinator: Gróa Þóra Pétursdóttir (Iceland).
- Dab: The proposed 2012 dab exchange was postponed until 2013, and is now underway and coordinated by Holger Haslob, Hamburg, Germany.
- Sea Bass: Large scale exchange proposed for 2013. Appointed coordinator is Kélig Mahe (France).

3.2.4 Proposals for Full Scale Age Exchanges in 2014

- Whiting (*Merlangius merlangus*) :Coordinators: Mark Etherton and Sally Songer, Cefas Lowestoft
- Megrim (*Lepidorhombus spp*) : Coordinator: Gordon Henderson, MARLAB Aberdeen
- Sole(*Solea solea*) : Coordinators: Annemie Zenner and Loes Bolle, Ilvo and Imares
- Horse mackerel and Mediterranean horse mackerel (*T. picturatus* and *T. mediterraneus*) : Coordinators: Pierluigi Carbonara, COISPA Italy and Kélig Mahe (IFREMER-France).

3.2.4 Proposed Age Calibration Exchanges for 2015 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.

PGMed members are keen to participate in the exchanges on megrim and sole in particular.

Proposals for age calibration exchanges are given below:

PRIORITY	AGE		SPECIES	COMMENTS AND RECOMMENDATIONS OF PGCCDBS 2013
2	Age	Witch	<i>Glyptocephalus cynoglossus</i>	There is no known exchange or Workshop. PGCCDBS requests that WGNEW 2013 considers if an otolith exchange would be useful. ¹
2	Age	Lemon sole	<i>Microstomus kitt</i>	There is no known exchange or Workshop. PGCCDBS requests that WGNEW 2013 considers if an otolith exchange would be useful. ¹
2	Age	gurnards	<i>Aspitrigla cuculus</i> , <i>Eutrigla gurnardus</i> , <i>Chelidonichthys lucernus</i>	There is no known exchange or Workshop. PGCCDBS requests that WGNEW 2013 considers if an otolith exchange would be useful. ¹

2	Age	Pollack	<i>Pollachius pollachius</i>	There is no known exchange or Workshop. PGCCDBS requests that WGNEW 2013 considers if an otolith exchange would be useful. ¹
2	Age	Sandeel	<i>Ammodytes spp</i>	There is no known exchange or Workshop. PGCCDBS requests that HAWG 2013 considers if an otolith exchange would be useful. ¹
2	Age	Boarfish	<i>Capros aper</i>	There is no known exchange or Workshop. PGCCDBS requests that WGWIDE 2013 considers if an otolith exchange would be useful. ¹
2	Age	Ling and Blue ling	<i>Molva molva and Mola dypterigia</i>	An otolith exchange of ling from Norwegian area took place in 2012. PGCCDBS requests that WKAMDEEP 2013 (21-25 October) considers if an otolith exchange would be useful ¹ . This is similar to the situation for the other deep sea species.
3	Age	Conger eel	<i>Conger conger</i>	There is no known exchange or Workshop. PGCCDBS requests that WKNARC 2013 considers if an otolith exchange would be useful. ¹ .
3	Age	Norway pout	<i>Trisopterus esmarkii</i>	There is no known exchange or Workshop. PGCCDBS requests that WKNARC 2013 considers if an otolith exchange would be useful. ¹
3	Age	Pouting	<i>Trisopterus luscus</i>	There is no known exchange or Workshop. PGCCDBS requests that WKNARC 2013 considers if an otolith exchange would be useful. ¹
3	Age	Wolf Fish	<i>Anarhichas lupus</i>	There is no known exchange or Workshop. PGCCDBS requests that WKNARC 2013 considers if an otolith exchange would be useful. ¹

3.3 PGCCDBS Maturity Workshops.

3.4 Maturity Workshop outcomes 2012 and PGCCDBS response.

3.3.1.1. WKMSTB .- Workshop on the Sexual Maturity Staging of Turbot and Brill.

WKMSTB was held in IJmuiden, The Netherlands 5–8 March 2012 and chaired by Ingeborg de Boois and Cindy van Damme, The Netherlands. Seven participants from three countries (Netherlands, Poland and United Kingdom) attended the meeting. The meeting aimed to establish a common agreed maturity scale for turbot and brill and calibrate the maturity staging using the new proposed scale. WKMSTB proposes to adopt the six point scale as proposed by the previous ICES maturity staging workshops. The refined maturity staging scales from WKMSSPDF 2012 (ICES, 2012) were used as a basis for the descriptions of the maturity stages for turbot and brill.

Three staging exercises were carried out; one using fresh fish (25 fresh specimens per species for turbot and brill) and two using pictures (35 turbot and 32 brill). The per-

centage agreement in the fresh staging was higher than the percentage agreement in the staging exercises from pictures since the tactile impression is an important component in maturity staging and the presence of one hyaline egg is easier to detect in fresh samples than in pictures. Percentage agreement in the fresh staging was 94% for both turbot and brill. Agreement in the second exercise from pictures was 79% for turbot and 73% for brill. In the last calibration exercise from pictures the agreement increased to 81% for both species.

The macroscopic maturity stage was validated with the histological analysis after the calibration exercises. The descriptions of the macroscopically maturity stages in this report should only be used from two months before the spawning season until the end of spawning. If maturity staging outside this period is required, this should be based on histological information. A *Maturity Stages of Turbot and Brill* manual was updated with more precisions included for the different preparation protocols.

A follow-up workshop on turbot and brill were deemed unnecessary in the near future. Before organising another maturity staging workshop, it is suggested to organise a WebGR calibration exercise. Thus National Institutes should be strongly encouraged to put effort, in terms of money and time, into taking pictures.

In future workshops it should be decided if all staging should be checked against the microscopic stage or the modal stage.

The WKMSTB recommends the establishment of a maturity-stagers forum should be installed, in line with the age-readers forum.

PGCCDBS agrees with the organization of a WebGR exercise prior to a workshop and supports the encouragement addressed to National Institutes.

PGCCDBS does not agree with the use of modal stage for inter-stager calibrations and strongly encourage the use of microscopic maturity staging.

Action: Concerning the establishment of a maturity-stagers forum, PGCCDBS supports the proposal and together with the ICES Secretariat will work on it intersessionally.

3.4.1 WKMATCH 2012- Workshop for maturity staging chairs

The workshop was held in Split, Croatia, 11-15 June 2012, chaired by Fran Saborido-Rey, Spain. Twelve participants (two by correspondence) from six countries (Spain, Italy, Norway, Denmark, Sweden and Croatia) participated in the meeting.

In order to obtain a precise maturity scale, the protocols, methods, terminology and tools (WebGR) used for exchanges and workshops and Guidelines for maturity exchanges) were analyzed. A quality control study for determination of sexual maturity and the application of the maturity ogives in Assessment Working Groups were also reviewed and analyzed.

The maturity scales for females proposed for 24 species and five orders in 11 workshops differed, but some consistencies across scales allowed to define a single scale with 4+2 general stages that can be used for the majority of species except viviparous and hermaphrodites that need some adaptation.

These 6 stages can be subdivided for different purposes, but not necessarily in each species. It shall be avoided the merging of different stages when, even during the optimal sampling time, they can be confused macroscopically. For these species it was recommended to conduct histological analyses in subsamples to assess the propor-

tion of each stage. Similar results were produced for males although the work is still in progress. WKMATCH acknowledge that maturity staging of males has been addressed in most of the maturity Wks. However, in general little knowledge on male maturation and reproductive cycle exists, and few experts on this matter have attended Wks.

Furthermore the terminology is crucial to standardize scales and universalize its use. Report will thus include a comprehensive revision of terms, with definitions, uses and misuses.

The PGCCDBS guidelines for collecting maturity data and developing maturity are being revised by WKMATCH.

Concerning the use of maturity ogives in Assessment Working Groups, in the 148 stocks revised, only in 88 stocks it is described how maturity data are used and in 29% of cases a knife edge ogive is used or maturity is not used at all. In 39 stocks a single maturity ogive is used across years, i.e. no variation in maturity is incorporated into the assessment. In spite of the effort on collecting maturity data, almost in 100% of the cases sex-specific ogives are combined without analysing the impact of this.

There is a general lack of information in the reports on how the maturity data was collected, ogive estimated and about quality control. Thus WKMATCH recommends that experts groups should report much better on how the maturity ogive is estimated.

Moreover, maturity Workshops should discuss the new and general scale and evaluate the uncertainties and the problems this new general scale may cause.

PGCCDBS agrees with WKMATCH recommendations and acknowledges that the use of a six-stage maturity key conforms to the results of all the latest ICES workshops on maturity staging of different species.

3.4.2 ICES Workshop on Sexual Maturity Staging of Elasmobranchs (WKMSL2)

The workshop was held 11-14 December 2012 in Lisbon, Portugal, chaired by Bárbara Serra-Pereira, Fabrizio Serena and Monica Barone. The purpose of the workshop was to document the application of the new maturity scales proposed by the WKMSL, in 2010, and review the main constrains in the scales.

The workshop focused on updating the maturity scales and simplification of the descriptions for each stage. New maturity scales were produced by sex, two for oviparous and two other for viviparous elasmobranch species. The group proposed illustrated photo-template sheets by species, for lab and field use. Seven photo-templates were produced for the main species selected to represent the different types of reproductive strategies. It was suggested that the annotated draft table summarizing the utility of maturity data for the estimation of basic life history parameters of most relevance to assessment should be reviewed by experts in stock assessment and fisheries management.

The workshop proposed to continue to collect information on more species especially those that attain relatively large size, such as pelagic elasmobranchs and on all the different viviparous modes of reproduction, particularly lamnoid and carcharhinid oophagy and histotrophy (both limited and lipid). It was recommended that from now onwards maturity stage data should be analyzed according to the scales herein proposed in order to validate its application for stock assessment modelling. In order to increase the geographical range of the data collection, the information from the

Atlantic, North Sea, Baltic and Eastern and Southern Mediterranean countries should be collated, as well as some information from long distance fisheries (e.g. Pacific, Arctic etc.) exploited by European fleets. The group recommended a proper dissemination of the proposed scale to all ICES and Mediterranean countries, but also to other geographical areas (e.g. through journal article, publish the scale and atlas through ICES website, FAO Technical Paper). As a final and important recommendation, it was proposed that the new maturity scales be revised and commented by the ICES Working groups responsible for data collection, like PGCCDBS, IBTSWG and WGBEAM, as well as by the advisory groups for elasmobranchs, WGEF, before further dissemination inside and outside the ICES. A future calibration workshops inside and between laboratories should be promoted.

PGCCDBS agrees with this recommendation.

Action: In order to facilitate this PGCCDBS will contact National Correspondents and make them aware of work carried out by WKMSSEL2

3.4.3 Work plan 2013

One workshop is planned for 2013, the Workshop on sexual maturity staging of cod, whiting, haddock, saithe and hake (WKMSGAD):

ACRONYM	DATES	CHAIRS	VENUE
WKMSGAD	28 October – 1 November	Francesca Vitale, Sweden, and Maria Korta, Spain	San Sebastian, Spain
Workshop on sexual maturity staging of cod, whiting, haddock, saithe and hake	2013	Korta, Spain	

3.4.4 Proposals for 2014 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 2014 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 2014;
- 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 XX 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 2013 considers if a maturity exchange would be useful.**

PRIORITY	AGE/ MATURITY	SPECIES		COMMENTS AND RECOMMENDATIONS OF PGCCDBS 2013
2	Maturity	Mackerel and Horse mackerel	<i>Scomber scombrus</i> and <i>Trachurus</i> <i>trachurus</i>	During the last Workshop 2007, WKMSMAC recommended having a workshop on maturity of mackerel and horse mackerel every 3 years. PGCCDBS recommends that the relevant assessment groups clarify the need for a new maturity exchange.
2	Maturity	Eel	<i>Anguilla anguilla</i>	The last workshop took place in 1998. PGCCDBS advises WGEEL 2013 (18-22 March and 4-10 September) that the last Eel maturity WK took place in 1998 and requests clarification of the need of an investigation into maturity staging of eel.

PGMed members are keen to participate in the maturity workshops where relevant and it was PGMed who recommend the workshop on maturity of mackerel and horse mackerel.

3.5 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 4 for all recommendations forwarded to the PGCCDBS in 2012 by the AWG data contact persons. All expert group, and working group recommendations addressed to the PGCCDBS in 2012 and the PG responses are housed in the ICES recommendations database. For RCM Recommendations to the PGCCDBS in 2012 and the PGCCDBS responsive actions please refer to Annex 8.

3.6 PGCCDBS intersessional work on stock-related biological variables:

3.6.1 Anglerfish studies

An exchange was organised in 2011, using illicia and otoliths images and considering a new ageing criteria for illicia. The age estimation for stock assessment of white anglerfish (*Lophius piscatorius*) in the ICES area has been traditionally based on two different calcified structures, the illicium (used in most of the European countries) and the sagitta otolith (used in only two countries).

Growth studies alternative to the age estimates on calcified structures (CS) of white anglerfish, such as tagging-recapture (Laurenson et al., 2005; Landa et al., 2008a), dai-

ly growth (Wright et al., 2002) and length frequency distributions of catches (Dupouy et al., 1986; Thangstad et al., 2002; Landa, 2004; Jónsson, 2007), showed that the growth pattern estimated using the traditional standardized age estimation criterion based on illicia (Duarte et al., 2002) was underestimated and that criterion was not accurate, although it was standardized and used in several age estimation anglerfish workshops.

Modifications in the methodology of illicia preparation and in the traditional standardized age estimation criterion from have allowed a new age estimation criterion on illicia. The use of this new criterion allows a better cohort tracking of the catch at age data from survey data (Landa et al., pers. com.) and is consistent with length-frequency analyses of survey data in Porcupine Bank. Another study (Ofstad et al., 2013) has been presented in 2013 on the age and growth of *L. piscatorius* in Faroese waters. These two studies presented a growth pattern similar from illicia and also consistent with length frequency and mark-recapture analyses. A recommendation on the growth of this species was made by PGCCDBS in 2012, and PGCCDBS prepared a study proposal of a growth study (see section 3.9.1. of 2012 PGCCDBS report, ICES, 2012) on indirect growth validation using the new illicia ageing criterion for testing if cohort tracking.

Several recommendations related with age and growth studies were made by the WKROUND (ICES, 2012), where the anglerfish stock in Subareas VI and IV was benchmarked. The information from the SCO-IV-VI-AMISS-Q2 survey, should be used as to check survey length-frequency distribution, cohort tracking based on otoliths and illicia, etc.

PGCCDBS proposes that intersessional work on anglerfish age and growth estimation continues in 2013, independently of the approval of the study proposal. The results of this intersessional work should be evaluated by PGCCDBS 2014, with consideration of a possible follow-up age reading workshop.

3.6.2 Manuals from workshop reports on the document repository.

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 PGCCDBS 'docs repository'. Where manuals are at an early stage of development they should be labelled 'Draft Manual for xxx'. PGCCDBS nominated Gráinne Ní Chonchúir as the main driving force for this task.

3.6.3 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 docs repository, with a link to this table on the European Age Readers Forum, and all age calibration reports will be moved to the PGCCDBS docs repository, with links back to the original ICES database locations (e.g. the European Age Readers Forum SharePoint site (Cristina Morgado).

The list and hyper-links to finalised reports from 2011 and 2012 on workshops and exchanges devoted to particular fish species for age and maturity staging intercalibration can be found in the Interactive Table "WKAC Ex and SG History Interac-

tive master table_PGCCDBS2013 WG.xlsx". The table also contains information about forthcoming workshops planned in 2013. In 2012, four workshops and four exchanges on fish age calibration were planned. Report from WKACM2 (red mullet, striped red mullet) is ready and related presentation was made during the PGCCDBS/2013 meeting. Regarding WKARHOM (horse mackerel, Mediterranean horse mackerel and blue jack mackerel) and WKADS2 (salmon) only presentations at the PGCCDBS/2013 SharePoint site are accessible; reports are not ready yet. The WKAMDEEP (deep-water species) was postponed to 2013.

During the PGCCDBS 2012 meeting, four maturity-staging workshops were planned in 2012 and additional WKMSPDF2 (sole, plaice, dab, flounder) from 2011 was shifted to 2012. Reports concerns WKMSPDF2, WKMSTB (turbot, brill) are ready and accessible on the ICES website. Regarding WKMSEL2 (elasmobranchs) and WKMATCH (workshop for maturity staging chairs) reports are not ready yet and only presentations were available to the PGCCDBS 2013. The WKMSGAD (cod, whiting, haddock and saithe) is postponed to 2013.

New ICES website and it's impact on the Interactive Table

The launch of the new ICES website resulted in the loss of all text-hyperlinks in the interactive table (making it non-interactive). ICES secretariat will try to restore the links, however, if this is not possible, the updating of the Interactive table will have to be done as Intersession Work

Given the changes made to the ICES website and the suggested synchronising of the Benchmark process and the Interactive Age and Maturity Planning table PGCCDBS nominated Annemie Zenner to maintain the Interactive Table and get it in sync with both the new ICES website and the benchmark process adopted by ICES.

3.6.4 Updated Age Readers Contact List 2013.

The list of age readers' contacts was updated during the 2013 PGCCDBS Meeting in Belfast. The list is now available on the European Age Readers Forum: <http://groupnet.ices.dk/AgeForum/Age%20Readers%20Contact/Forms/AllItems.aspx>

3.7 WebGR Study Contract Proposal from WKNARC2.

WebGR is a European project that aims to develop open-source software to support studies of fish growth and reproduction. The WebGR's task is to develop web services to help fisheries scientists to organize calibration workshops for otoliths and gonads classification and provide means to analyse the results of such exercises. This will contribute 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. The WebGR consortium provides the Internet service in <http://webgr.azti.es>. The service is provided freely but without any warranties and the tool has not been developed since 2010. It would be beneficial both for ICES and the users, if ICES could instead host the server. This would guarantee a wider dissemination of this useful tool and ensure a better site management.

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 obtain-

ing more complex outputs. This feedback highlighted the strong need for further improvement of WebGR and is the basis for a study proposal.

The desirable improvement of WebGR is two-folded. On the one hand it is necessary to upgrade the user interface, improve picture uploading and enhance exploring tools. Moreover, at the moment the most basic features are implemented and the easy export procedure allows users to use the data on a standard statistical package or spreadsheet. The original idea is to develop an R package and implement a set of statistical methods. An extended statistical output will give a more complete evaluation of potential differences among readers/stagers, i.e. a step forward towards the standardization.

The second Workshop on national age reading coordinators (WKNARC2) taking place in May 2013 will embark on the first phase and will, through identification and debate on the more practical user interface improvements, make 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 2014, will give the necessary input to the second phase (i.e. statistical output) of the improvement of WebGR.

PGCCDBS strongly supports this initiative and study proposal

3.8 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.

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

In 2012, a new Memorandum of Understanding (MoU) between ICES and the EU came into force. A draft MoU was available to the PG meeting, in particular the list of stocks for recurrent advice. The PGCCDBS notes that no new stocks have to be added to the DCF implementation rules to address these revised data needs.

The MoU Species list for 2013 (2012 list with no updates) is available in the PGCCDBS 2012 report; Annex 6.

3.9 Proposals for collaborative studies contracts.

Previous PGCCDBS meetings have forwarded proposals for funding consideration related to stock-based biological variables. These were (i) A collaborative study on anglerfish (*Lophius piscatorius*), and (ii) Study proposal: Age Determination and Maturity Staging of species not previously subjected to biological sampling for analytical assessments. As neither of these proposals were funded and are still considered by

PGCCDBS to be relevant and important, they are both being proposed again in 2013 for consideration.

3.9.1 Recommendation for a collaborative study in anglerfish (*Lophius piscatorius*) (PRIORITY 1)

The age estimation of white anglerfish (*Lophius piscatorius*) in the ICES area for stock assessment has been traditionally based on two different calcified structures (CS), the illicium (used by the majority of the European countries) and the sagitta otolith (used only by two countries). Growth studies alternative to the age estimates on CS of white anglerfish, such as tagging-recapture (Laurenson et al., 2005; Landa et al., 2008a), daily growth (Wright et al., 2002) and length frequency distributions of catches (Dupouy et al., 1986; Thangstad et al., 2002; Jónsson, 2007), showed that the growth pattern estimated using the traditional standardized age estimation criterion based on illicia (Duarte et al., 2002) was underestimated and that criterion was not accurate, although it was standardized and used in several age estimation anglerfish workshops (Anon 1991, 1997, 1999; Landa et al., 2002; Duarte et al., 2005). The age estimation using illicia of a decadal time-series was performed for the southern stock assessment of white anglerfish using the traditional standardized age estimation criterion (Duarte et al., 2002). A catch-at-age by year matrix was built, but inconsistencies in cohort tracking were found (Azevedo et al., 2008).

Modifications in the methodology of illicia preparation and in the traditional standardized age estimation criterion have allowed obtaining a new age estimation criterion on illicia (Landa, pers. com.). Using it, the catches-at-age have been able to be more successfully tracked. Therefore this new criterion was judged to be more accurate and it was used for the age estimation in the “Anglerfish (*Lophius piscatorius*) illicia and otoliths exchange 2011” (a working document presented to the 2012 PGCCDBS Meeting). The results of this exchange have showed similar results to those from the 2004 workshop (Duarte et al., 2005):

- i) Illicia and otoliths age readings comparison. Strong discrepancies between illicia and otoliths readings were found. It is not possible to use the age estimates of both CS together, illicia and otoliths, for stock assessment purposes.
- ii) Illicia. Although the relative bias values among the assessment readers can be considered good, the agreement values and precision suggest that they are not still sufficiently acceptable for building a valid ALK. The re-search for a reliable criterion for age estimation of white anglerfish based on CS is more advanced in illicia than for otoliths. There is an illicia age estimation criterion that allows cohort tracking (indirect age validation) but only in the Porcupine Bank of the Atlantic.
- iii) Otoliths. The age estimation of white anglerfish, based on otoliths, is difficult mainly due to the occurrence of confusing false annuli and to the increase of opacity with age. The location of the first annulus is also a problem, even among expert readers, in the last and present exchanges. There have also been advances in daily growth studies (Wright et al., 2002; Woodroffe et al., 2003) that can help locate the first annulus more precisely.

Further research should enhance our knowledge of the true growth of white anglerfish by developing and using methodologies that allow validation, before the attempt to standardize reading criteria. It is unproductive to go further in estimating white anglerfish growth patterns and age without progress being made in age validation (Duarte et al., 2005). Improving the precision in the absence of accuracy cannot, under any account, guarantee data quality (de Pontual et al., 2006).

A collaborative study among several European countries could be based on the following issues:

- i) Indirect growth validation using the new illicia ageing criterion for testing if cohort tracking is possible in other areas (after the age estimation a time-series of illicia, similar to what has been done in the Porcupine Bank).
- ii) Direct growth validation studies. The tagging–recapture of specimens of white anglerfish could be very useful to a further advance on growth validation, especially on that of the large specimens, where information is very scarce. Tagging is a direct method of validating the growth of a fish during its time at liberty. Two tagging programs have been undertaken for white anglerfish, one on the Atlantic northern shelf stock (Laurenson et al., 2005) and another on the two stocks of the Atlantic southern shelf (Landa et al., 2008b). Acceptable recovery rates were obtained in both studies (3.8–4.5%). Given the difficulty of tagging a large number of specimens of this species, it was not possible to obtain information from specimens which had spent much time at liberty. Most of the available information from those tagging–recapture programs corresponded to information from small and medium specimens, but not from large specimens. Despite this, invaluable information was obtained to advance on the validation of the growth pattern of white anglerfish, and to obtain more information on the movements and interaction between stocks (Laurenson et al., 2005; Landa et al., 2008b).

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

A proposal for a call-for-tender was put forward during the PGCCDBS meeting in 2009, and supported by this group. The construction of the call-for-tender was decided to be postponed to 2010 after the PGCCDBS meeting in 2009 as a small-scale project (MARE 2008/10: Lot 4: Improving the knowledge of the biology and the fisheries of the new species for management [NESPMAN]) was already running at that time, mainly dealing with basic data collection of parameters necessary for assessment. NESPMAN has now finished and the results were discussed in WGNEW 2010 and evaluated regarding their use in the advisory process in 2011.

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

Following the comments of the Liaison Meeting, PGCCDBS 2011 further fine-tuned the proposal, making the species list shorter, identifying appropriate areas per species and defining work packages. PGCCDBS 2013 learned that the Study proposal had been on the EC Work Programme for 2012, however, did not receive funding. **Given the focus on Data Limited Stocks in the revised CFP and the high relevance in this relation of the Study Proposal, PGCCDBS decided to bring the Study Proposal forward to the DCF Liaison Meeting 2013, asking for inclusion of the proposal in the EC Work Programme 2014.**

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

Duration: 18 months

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

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

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

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

- No previous internationally co-ordinated work has been done with respect to age determination and maturity staging for these species, but the required biological material and some experience (and view on potential problems) is already available in at least one national institute (all species).
- The species are included in the MoU between ICES and the EC (all species except tub gurnard and John Dory) OR were included in the NESPMAN-project but not subject to age determination and maturity staging studies (tub gurnard and John Dory).
- No ICES-advice was given for these species before 2011.

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

Species/area-combinations were selected on the basis of species/area-combinations for which advice is requested by the EC for the first time under the MoU 2011 (all species except tub gurnard and John Dory), extended with areas not in the MoU where the selected species occur, and where current or potential future fisheries for these species exist. A good spatial coverage of the DCF-area was developed this way.

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

- Pollack (*Pollachius pollachius*) (MoU 2011 in all three areas)
 - Greater North Sea
 - Celtic Seas
 - Bay of Biscay and Iberian Coast
- Grey gurnard (*Eutrigla gurnardus*) (MoU 2011 in first four areas / NESP-MAN)
 - Greater North Sea
 - Celtic Seas
 - Bay of Biscay and Iberian Coast
 - Azores
 - Mediterranean
- Red gurnard (*Aspitrigla cuculus*) (MoU in first four areas / NESPMAN)

- Greater North Sea
- Celtic Seas
- Bay of Biscay and Iberian Coast
- Azores
- Madeira and Canary Islands
- Mediterranean
- Tub gurnard (*Chelidonichthys lucernus*) (NESPMAN)
- Greater North Sea
- Boarfish (*Capros aper*) (MoU 2011 in first two areas)
- Celtic Seas
- Bay of Biscay and Iberian Coast
- Azores
- Madeira and Canary Islands
- Mediterranean
- John Dory (*Zeus faber*) (NESPMAN)
- Greater North Sea
- Celtic Seas
- Bay of Biscay and Iberian Coast
- Madeira and Canary Islands
- Mediterranean
- Lemon sole (*Microstomus kitt*) (MoU 2011 in first area / NESPMAN)
- Greater North Sea
- Celtic Seas
- Witch flounder (*Glyptocephalus cynoglossus*) (MoU 2011 / NESPMAN)
- Greater North Sea
- Ballan wrasse (*Labrus bergylta*)
- Greater North Sea
- Celtic Seas
- Bay of Biscay and Iberian Coast

WORK PACKAGES:

Work Package 1. Stock Identity and Age Determination Material

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

As much as possible otoliths will be taken from the same specimens as gonads (WP2.1)

Work Package 2. Maturity Staging Material

WP 2.1. To collect a sufficient amount of gonads (ovaries and testes) for the selected species in each proposed area. This collection should consider temporal variation, i.e. sexual cycle of each species, so the collection of material will be distributed along the year to determine the optimal sampling period, normally the spawning period. In the case of males, the majority of the collected data will be based on macroscopic deter-

mination of maturity, although a limited number of testes will be collected for histological analysis for the maturity ogive validation.

Ovaries of females will be regularly collected and stored in formaldehyde. Macroscopic determination will always be recorded.

WP 2.2. Histological analyses of the selected males and all females will be conducted in this WP. Only histology produces accurate maturity staging, and this will be the basis for WP4. Considering the use of this methodology, it is important that institutes with relevant skills on histology and microscopic determination of maturity are being involved here.

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

WP 3.1. Compile inventory of age determination practices used in different institutes, and compare results obtained from different methodologies.

WP 3.2. Review and summarise stock identity literature using CS and genetic information for the selected species.

WP 3.3. Validate age determination and stock identity methodologies applying available methods such as known-age CS if available, otolith microstructure analysis of marginal increments, otolith shape and modelling exercises (length distributions, otolith weight distributions, etc.)

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

WP 4.1. Review of maturity staging protocols and methods developed in latest years in the context of ICES Workshops and the COST Action Fish Reproduction and Fisheries.

WP 4.2. Microscopic determination of maturity, ovarian developmental stage and definition of key periods of sexual cycle, particularly spawning.

WP 4.3. Definition of optimal sampling strategy for maturity on the selected species based on the results on WP 4.1 and WP 4.2;

Work Package 5. Collation of the 'Toolbox'

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

EXPECTED RESULTS

The expected outcome of the Study is a 'Toolbox' encompassing a roadmap based on existing validation techniques and further development of applied methodology for ageing and maturity staging techniques. These will be stated in agreed manuals through a network of excellence. The manuals will then form the general protocol (the 'toolbox') that subsequently can be used in order to achieve sound parameters for analytical assessment on any stock not previously subjected to an analytical assessment. The 'Toolbox' will be available to the public through the upload of the documents in selected document repository.

The results of the project should allow to managers to implement basic regulations based on sound biological information of currently unregulated species. This will reduce the risk of over-exploitation in species where their status is ignored.

Also it is expected to produce an optimal sampling scheme that will ease the collection of key biological information for the future implementation of analytical assessment for these species.

DISSEMINATION OF RESULTS

The results from the Study will be disseminated through various channels providing information to stakeholders (the EC, the Science community, the Fishery Industry):

The National Correspondents in the DCF system will be informed on the Study progress by a News Letter every 6 months of the duration of the Study.

Specific species information will be reported in ICES Working Documents and presented to the relevant Expert Groups within the ICES system and more broadly at the ICES Annual Science Conference. For the Mediterranean stocks, relevant GFCM expert groups will be addressed. If so evaluated by the participating partners, peer-review papers will be produced on relevant parts of the Work Packages, however, this is not a success criterion for the Study.

Finally the 'Toolbox' will be made fully available on the internet by uploading the Final Scientific Report in a selected document repository which will provide a DOI (digital object identifier). In this way, the results are always available for the entire scientific community.

3.10

3.11 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. It is important to summarise the state of knowledge for key species and to scrutinize by peer review, the work done during the many calibration exercises and by doing so promote an increase in quality. The CRR will provide a comprehensive manual on the methodology of age reading and validation. Having a collation of all hitherto validated and effectuated methodologies facilitates a fast and quality assured development of a method suitable for a new species given the power of example.

The proposed CRR represents a collation of the state-of-the-art scientific work on the methods and validated age estimation of commercially exploited fish species across Europe. Improving precision in age reading is extremely important for many species and the information included in existing protocols should be more widely available. Given the wide span of validated methods already existing within the ICES community, the collation of these protocols would provide a useful resource to the ICES community and will potentially facilitate the production of validated protocols for species new to sampling for biological parameters.

PGCCDBS 2013 specified the following time schedule for the production of a CRR:

- **18th – 22nd February 2013: PGCCDBS Planning Group Meeting**

- Agreement on contents and editors
- Defining a timeline
- **22nd – 26th April 2013: WKA VSG: Age Validation Studies for Gadoids**
- Responsible for the Chapter on Gadoids. Editors=the chairs of WKA VSG
- **13th – 17th May 2013: WKNARC-2: National Age Reading Coordinators meeting**
- Nomination of Chapter editors
- Location and distribution of all available material starting with what was collated during WKNARC1 (suggested drivers: Kelig and Willie)
- Agreeing on headers for the introduction ('topic sentences')
- Chapter 11 and 12 started
- Chapter 8 a) discussion, hopefully with an external expert on implementation of uncertainty in age-based assessment input
- **October 2013: DEADLINE for draft versions of Chapter 1 – 7 and 10 – 12**
- **May 2014: WKSABCAL: Statistical Analysis of Biological Calibration Studies**
- Making the uncertainty of age estimations operational for all
- Recommendations from WKSABCAL
- **June 2014: DEADLINE for Chapter 1 – 7 and 10 – 12**
- **September 2014: DEADLINE for Chapter 8 on statistics**
- **20th – 24th October 2014: 5th International Otolith Symposium**
- Poster/Presentation of the CRR
- **December 2014: Submission of the CRR...!**
- a) **Proposed Chapters:**
 1. Executive Summary
 2. Introduction – ToR for WKNARC2 2013
 3. Gadoids – ToR for the WKA VSG 2013
 4. Flatfish – to be appointed at WKNARC2
 5. Widely Migrating Species – to be appointed at WKNARC2
 6. Small Pelagic Fish – to be appointed at WKNARC2
 7. Deep Sea Fish – to be appointed at WKNARC2
 8. Statistical handling of uncertainty in age estimations
 - a. The grading system suggested by the WKNARC1; facilitating implementation (age-matrix with uncertainty as an output from WebGR?). To be written at WKNARC2
 - b. Outcomes of WKSABCAL and recommendations
 9. Acknowledgements

10. References
 11. Acronyms
 12. Annex with links to individual reports where available. Suggestion is to have all reports uploaded to the EARF and then categorize them by Chapter. Each 'owner' of a report/manual should make a template front page stating Chapter relation, species and how to cite the publication
- b) Contents of individual chapters:**
1. Introduction to agreed age estimation methodologies per group of species.
 2. Case study to illustrate the protocols
 3. Key Issues and Future Work

3.12 Data quality assessment based on Regional Database output

Most Regional Co-ordination Meetings (RCMs) in 2012 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 these 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 co-ordination, assessment working groups and other end users an overview of the quality of the data in an efficient way.

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 2012 fleet based sampling workshops (WKPICS2; SGPIDS).

4.1.1 General overview of WKPICS and SGPIDS series

PGCCDBS continues to embrace the outcomes of both SGPIDS and WKPICS. These two groups are playing a very important role in steering the community down the route prescribed by PGCCDBS 2011 and 2012, moving us away from more ad-hoc, quota based sampling whilst considering the practical difficulties in implementing more random probability-based programmes. Both groups provide clear guidelines and promote “best practice” in designing and implementing probability-based catch sampling programmes. SGPIDS 2012 continued to focus on the more practical issues in setting up and documenting at-sea commercial sampling schemes and WKPICS2 provided more of a focus for the theory and more statistical aspects using case studies for both on-shore and at-sea schemes. Throughout these series both groups have benefited from each other’s outputs.

The work of SGPIDS and WKPICS aligns with the roadmap given by PGCCDBS 2012 to develop fully documented statistically-sound sampling schemes on a regional basis. It was proposed that these schemes will ultimately be coordinated by RCMs or RCGs and this map would be followed by the countries represented at these coordinating bodies. There were seven stages to the road map (See PGCCDBS 2012 report for details)

1. Countries to evaluate their schemes
2. Countries to move away from quota sampling to fully-documented and statistically-sound random sampling schemes.
3. Develop quality indicators
4. Establish a catch sampling expert group within the ICES framework with the expertise to augment the SGRN review group
5. Improve communication between PGCCDBS, RCMs and end users to agree on primary objectives with countries, listing the structure and sampling effort for their schemes.
6. Incorporate national schemes into a regional design
7. Establish regional databases to allow the regional coordination of these schemes

The infrastructure and funding mechanisms would have to endorse and adopt this roadmap to ensure that we move more swiftly down it, and there is an expectation that DCMAP will provide the support for this development.

Random sampling scheme: Evaluation and documentation

Both WKPICS2 and SGPIDS continued in 2012 to move us further down this road. They both provide a forum and the practical and theoretical tools for national scien-

tists to evaluate, adapt and document more rigorous random sampling schemes. To facilitate this process, the two groups review aspects of the design and implementation of sampling schemes being adopted by participating countries. WKPICS2 provides a glossary of the statistical terms that are now in common parlance e.g. *sample population* and *target populations*; *sampling frames* and *strata, domains* and *primary sampling units*, and this glossary should be maintained as a reference for further catch sampling Wks, SGs and RCMs/RCGs. Understanding these terms is key to describing these sampling schemes and as such they are also a measure of the quality of them.

WKPICS2 describes the four principal classes of probability-based sampling schemes within which a national sampling scheme should fall. The class of scheme used will be influenced by the catch estimates required, the relative importance of different components of the fleet and their activity, the resources available, access to samples and whether sampling is on shore or at sea. The classes are based around the primary sampling units - A: Trip; B: Vessel; C: Site*Time and D: Site (the first two more commonly relate to at-sea sampling; and the latter two to on-shore sampling). The practical issues with processes, sampling and estimation procedures will be common to each class of scheme, and as such will allow these issues to be considered more effectively in turn. A country should be able to identify the schemes they have adopted, and PGCCDBS recommends that all countries should document their schemes using these classifications.

Both WKPICS and SGPIDS provide clear guidance on how to set up such schemes and WKPICS2 provides a practical table detailing “best practice” that covers the design, implementation and analysis stages of catch sampling schemes. This was requested by the European Commission to help evaluate the quality of national sampling schemes included in the Data Collection Framework.

Quality indicators

SGPIDS 2 provided a ready reference to some simple quality indicators for offshore sampling schemes which were then adopted by WPICS2 as metrics in proposed Quality Assurance reports for both on-shore and at-sea fishery sampling schemes (See section 6).

Catch sampling expert groups, communications and RDB

Although WKPICS2 has proposed a QA report for evaluating fishery sampling schemes, and makes some suggestions as to the roles of RCGs in this process, it is clear that the RCGs will need the expertise and time to make those evaluations if, indeed, that is what is expected of them. PGCCDBS proposes that a single ICES expert group (WGCATCH) be set up to continue the work of WKPRECISE, WKMERGE, WKACCU, SGPIDS and WKPICS beyond 2013 to provide advice and support in documenting, developing, implementing and using the data collected from statistically-sound catch sampling schemes. The proposal for the WGCATCH Expert Group is developed in Section 4.3. This expert group would also provide the forum for the further enhancement of the Regional Databases.

The executive summaries of the WKPICS2 and SGPIDS meetings in 2012 are reproduced below.

4.1.2 Second ICES Workshop on practical implementation of statistical sound catch sampling programmes (WKPICS2)

Executive summary

This workshop, chaired by Jon Helge Vølstad (Norway) and Mike Armstrong (UK) was held at ICES headquarters, Copenhagen, from 6–9 November 2012.

Prior to the workshop, participants from each country were provided with a questionnaire to summarize the survey sampling schemes and estimation procedures employed in national sampling programmes. These were collated and developed further at the workshop. WKPICS2 outlines four principal classes of probability-based sampling schemes, and discusses how sampling frames, primary sampling units and strata can be developed and optimised to deliver the required estimates for species, fleet métiers, fishing grounds or other variables of interest. Methods for design-based estimation procedures are described. Stratified probability-based sampling has the advantage that sample sizes per stratum can be controlled, thus minimizing the need for imputations to fill in data-gaps. The design-based estimators allow samples to be easily extrapolated to the target population using weighting factors based on inclusion-probabilities. Detailed description of design-based estimation is provided for an at-sea sampling programme where vessels are primary sampling units and for an on-shore catch sampling programme where site-days are primary sampling units. In the latter, vessel-trips are sampled for a random selection of ports and days. These two design classes result in a clustered sample of trips, and in general it is not reasonable to assume that a simple random sample of trips is obtained from the fleet. Detailed advice on estimation procedures for all principal design classes will be finalized in WKPICS3.

WKPICS2 has developed guidelines for “best practice” that covers the design, implementation and analysis stages of catch sampling schemes, assuming that regional objectives and data needs are clearly defined. Ideally, all national surveys should clearly document the sampling frame, sample selection procedures, response rates (e.g. refusals to take observers), imputation methods for missing data and weighting procedures employed to derive national estimates. Best practice can be defined as sampling designs, implementation and data analysis that lead to minimum bias and an accurate estimate of precision, and which make the most efficient use of sampling resources. For example, probability-based sampling with accurate control of the inclusion probabilities would be considered an example of best practice. However, if logistical, legal, and economic constraints dictate the use of a non-probability based scheme to select primary sampling units (for example legal requirements in the selection of a reference fleet), it is good practice if the selection is done in a way that ensures representative coverage of the target population and minimises bias, and if this can be demonstrated with suitable diagnostics. Bad practice would be an ad-hoc, non-probability based sampling scheme, particularly where there are no census data to show how representative the samples are of the population or to re-weight the samples during analysis.

WKPICS2 also proposes revised data quality indicators, including a simple one-page form that can be used to evaluate quality of data used for stock assessments. It is recommended that the quality indicators be further refined through practical testing by

Regional Coordination Groups and stock assessment working groups, based on several case studies.

WKPICS2 advises on future development of regional databases (RDB) and analysis software (FishFrame, Intercatch, and COST) to accommodate analysis of data that are collected according to best-practices survey sampling methods advocated by ICES WKPICS and SGPIDS. In particular, it is recommended that the RDB and analysis framework be further developed so that catch sampling schemes that result in clustered samples of trips can be accommodated."

PGCCDBS 2012 comments:

PGCCDBS commends the continued efforts by WKPICS in defining "best practice" and developing clear guidelines that cover the design, implementation and analysis stages of catch sampling schemes. The PG fully endorses the recommendations that all countries should clearly document their schemes covering the scheme class, the sampling frame, sample selection procedures, response rates (e.g. refusals to take observers) including the imputation methods for missing data and weighting procedures employed in deriving national estimates.

WKPICS2 proposed relatively simple quality assurance reports that for each stock, summarise national sampling schemes using revised quality indicators but acknowledges these need to be tested and refined. PGCCDBS agrees that these reports need testing and refining and proposes a trial covering a number of stocks and regions with input required from individual countries, Regional Coordination Groups, ICES Assessment Expert Groups and WKPICS3. Further details of this proposal are provided in section 6.1.

WKPICS2 acknowledges the benefits of the regional databases and highlights room for improvement of the current system in particular its inability to accommodate and analyse the data that describes the structure of national sampling programmes. These data would allow more appropriate estimation procedures to be used. PGCCDBS endorses WKPICS advice on the future development of regional databases and analysis software (see Section 6.2).

4.1.3 The Study Group on Practical Implementation of Discard Sampling Plans (SGPIDS2)

Executive summary

The Study Group on Practical Implementation of Discard Sampling Plans (SGPIDS; chaired by Edwin van Helmond, The Netherlands) met 18 June – 22 June 2012 in Copenhagen, Denmark. Sixteen participants representing 10 countries were present at the meeting, including the chair, Bram Couperus, of ICES WGBYC (Working Group on Bycatch of Protected Species). SGPIDS was proposed by ICES PGCCDBS (2010) in response to a request from the Regional Coordination Meeting for the North Sea and Eastern Arctic (RCM NS&EA; 2010) to foster the exchange of experience and expertise between experts on discard sampling, planning and implementation of PGCCDBS recommendations and ultimately synchronize coordination and data collection procedures of discard sampling between members states.

To address the terms of reference more efficiently the group split up into subgroups. The group regularly meet in plenary to discuss and synchronize output and results produced during subgroup sessions.

During the first meeting in 2011, the study group identified potential sources of bias within discard sampling programmes. Bias in vessel selection and sampling effort allocation were reported to be common to all national sampling programmes. In the attempt to improve data quality and reduce bias, the study group provides the practical tools to implement unbiased sampling frames, random vessel selection procedures and data quality indicators.

Since cooperation between member states for at-sea sampling schemes is strongly promoted (PGCCDBS 2012), the study group started to design its data collection framework at a regional level. This regional sampling frame is divided into national strata. These national strata could be further divided into sampling strata. Fundamental to these schemes is a move away from national ad hoc, quota based sampling schemes, where a sampling event was conditional on where and how a vessel has fished or was going to fish, to a random vessel selection process, where the sampling frame describes the population (of vessels) to be sampled. Besides the concept of randomised, unbiased sampling frames, the study group drafted a rough guide on how to implement such sampling scheme based on the experience of members states currently adopting the approach. Three steps are identified in the process of implementation: 1) Defining the frame and creating vessel drawlists. 2) Selecting a random vessel. 3) Monitoring and recording the selection process.

To synchronize data collection procedures of discard sampling between member states, the study group completed its first step in 2011: To make an inventory of different discard sampling methods used across Europe. In 2012, areas of overlap, where the same, or very similar fleets are sampled by different member states using different sampling methods, are evaluated and assessed. Based on three case studies the study group concluded that differences in methods are caused by a mixture of restraints, i.e. logistic, financial, cultural, historical or practical. Also dissimilar research objectives were identified as an important bottle neck for synchronizing sampling methods between member states.

To be able to evaluate and compare performance levels of (national) sampling programmes, one reporting standard is essential. The study group agreed to further develop standardized reporting during the next meeting in 2013.

Equal to 2011, the study group provided an updated summary of the current sampling programmes in European waters. Compared to 2011, the study group was able to include additional countries such as Germany and Poland.

PGCCDBS 2013 comment

The three-step-approach in implementing a statistical sound discard sampling program identified by SGPIDS, is endorsed within the 'best practice' tabulated by WKPICS2. The steps of 'Defining the frame and creating vessel draw lists'; 'Selecting a random vessel'; 'Monitoring and recording the selection process' should be fundamental to these schemes. PGCCDBS agrees with this approach but how this might be documented and monitored and how practical issues around implementation of such schemes are resolved, still needs further evaluation.

Based on three case studies, SGPIDS concluded that differences in sampling methods are caused by a mixture of restraints i.e. logistic, financial, cultural, historical or practical. Dissimilar research objectives can also significantly stanch the synchronising of sampling methods between countries. A lack of communication and coordination between countries has been a key reason for the current differences between discards monitoring programmes, although SGPIDS has improved on this.

Because of the time needed to implement and/or change current at-sea monitoring programmes, and the need to improve coordination between countries, PGCCDBS emphasises again the need for a single ICES expert group to provide advice and support in documenting, developing, implementing and using the data collected from statistically-sound catch sampling schemes (see Section 4.1.1). This annual expert group would provide a platform where scientists, experts and at-sea monitoring coordinators could communicate and eventually have a better chance to coordinate and synchronise monitoring at-sea.

4.2 Work plan 2013

4.2.1 Review of ToRs and workplan for WKPICS3

PGCCDBS 2013 reviewed and revised the ToRs for WKPICS3. The basis for the revisions is given below, followed by the proposed new ToRs.

- *ToR a.* This ToR has been added specifically to review the trial application of Quality Assurance Reports. These reports were designed at WKPICS2 with reference to the WKACCU bias score cards. PGCCDBS has endorsed these reports and proposed a controlled trial in 2013, covering a few stocks and ICES assessment expert groups (see section 6.1). This ToR is for WKPICS3 to evaluate how easy they are to compile, the efficacy of these reports and what further development is needed based on feedback from each of the trial groups.
- *Tor b.* In light of discussions covering the ongoing concern raised by SGPIDS2 on estimating discard age compositions, PGCCDBS 2013 proposes development of a questionnaire to be completed by national stock coordinators linked to ICES assessment EGs, summarising the sampling design used in assembling age-length keys (ALKs) and weight-length (W-L) relationships (Section 4.4.3). *ToR b* tasks WKPICS3 to review these summaries and potential biases and consider incorporating Quality Indicators relating to these in the QA reports covered in *ToR a*.
- *Tor c.* WKPICS2 provided detailed guidelines on estimation procedures for two of the four principal classes of catch sampling schemes and *ToR c* is to conclude with guidelines for the other two. In light of recent differences in values of the same catch estimate being calculated from the same sources of data to meet data calls for ICES and STECF (see Section 8) PGCCDBS 2013 has requested that further guidance is provided on post-stratification procedures compared with design-based procedures.
- *Tors d and e.* These have been added to summarise and conclude these series of Workshops. The aim of the Regional Databases is to facilitate data compilation, aggregation and estimation of precision at the stock and regional level as well as provide the means to evaluate the contributions from component national sampling schemes. The work carried out by WKPICS will need to conclude with clear further recommendations for the Regional Databases.

The plan that the WKPICS series would provide the basis for a text book on design and analysis of catch sampling programmes is very much alive and it is important that steps are put in place to meet this objective beyond the conclusion of this series of workshops.

The third **Workshop on practical implementation of statistical sound catch sampling programmes (WKPICS3)**, chaired by Jon Helge Vølstad, Norway, and Mike Armstrong, UK, will meet in ICES HQ, Copenhagen, in 19 - 22 November 2013, to:

- a) Evaluate the trial application of Quality Assurance reports developed by WKPICS2.
- b) Review sampling design and estimation procedures currently adopted within Europe for estimating age compositions and weight-length (W-L) relationships for retained and discarded fish, evaluate potential for bias, and develop Quality Indicators related to this in QA reports.
- c) Finalise guidelines on estimation procedures for all four principal classes of catch sampling schemes including using auxiliary data for re-weighting. Using case studies, provide guidance on best practice on the estimation of discards to satisfy data calls, comparing design-based procedures and post stratification procedures.
- d) Finalise recommendations for the Regional Databases concerning procedures for combining national fishery sampling data or estimates to give regional or supra-regional estimates for fisheries or stocks.
- e) Summarise conclusions from the WKPICS series of workshops and consider the next steps to providing a reference book on the design and analysis of statistical catch sampling programmes. Consider the setup of a live document (web based) to link documents and further developments in procedures etc.

WKPICS3 will report by 20 December 2013 for the attention of PGCCDBS, RCMs, STECF-EWG on DCF, and ACOM.

4.2.2 Review of ToRs and work plan for SGPIDS 2013

PGCCDBS 2013 reviewed the proposed Terms of Reference for SGPIDS 2013 and made a number of changes. Edwin van Helmond has stepped down from chairing the last in the series of these Study Groups to attend to a welcome new arrival to his family. Alastair Pout and Marie Storr-Paulsen have stepped into the breach to co-chair this study group.

- ToR a has been changed from a review to a “review and refine” to scope for extra development work if needed.
- The old ToR b and c which were both related to quality indicators have been combined, so that evaluation and development are covered by the same ToR.
- A new ToR c has been added as an opportunity to look at the potentially diverse nature of the data collected on-board to see if it fits with the sampling designs for at-sea sampling set out in WKPICS2 and that the data collected can be accommodated in the (revised) data exchange format of the RDB. This TOR should feed into the quality indicator discussions under the new ToR b

- ToR d wording was revised to make it clear that it is the reporting of estimates and quality indicators.

Terms of Reference for 2013

The **Study Group on Practical Implementation of Discard Sampling Plans (SGPIDS)**, chaired by Alastair Pout & Marie Storr-Paulsen, will meet in SLU DAR IMR, Lysekil, Sweden, 24–28 June 2013 to:

- a) Review and refine the use of sampling frames and vessel selection procedures for at-sea sampling programmes;
- b) Evaluate, and where necessary develop, the quality indicators for discard sampling programmes, as defined at SGPIDS 2012, and WKPICS2 2012.
- c) Assess on-board data collection protocols in respect of estimation procedures appropriate for design based at-sea sampling schemes (as set out in WKPICS 2) and RDB data formats.
- d) Review the reporting of discard estimates and quality indicators of national sampling designs for end users and as metadata to regional databases;
- e) Continue to collaborate with ICES WGBYC on integrating the reporting of protected, endangered and/or threatened species.

4.3 Proposals for 2014 and Beyond

4.3.1 Proposals for workshops

PGCCDBS has no proposals for new workshops

4.3.2 Proposal for a new Expert Group (WGCATCH)

PGCCDBS strongly **recommends** that ICES creates an expert group (Working Group on Commercial Catches – WGCATCH) which will continue with the work started by both SGPIDS and WKPICS on the practical implementation of statistically sound catch sampling programmes and take over responsibilities of PGCCDBS in this area.

The reasons behind the need for such an expert group are as follows:

-
- The series of both SGPIDS and WKPICS are coming to an end in 2013. They have defined and drafted guidelines on “best practice”, achieved international consensus and built the foundations for a more standard approach to probability-based catch sampling. SGPIDS provided the forum for coordinators to contrast and compare and learn from each other contributing to a more synchronous approach, and was able to concentrate in detail on all practical aspects for designing and carrying out sampling of commercial vessels at-sea. WKPICS was able to draw on that work in reviewing the statistical design of at-sea sampling schemes, but was unable to consider the practical details of sample collection on shore to the same level of detail as done for at-sea sampling by SGPIDS. An ICES Expert Group that continues with the work carried out by both these groups will

negate the need for separate groups dealing with at-sea and on-shore sampling.

- The issues around fishery catch sampling and provision of estimates to end users are complex and changing, for example the effect of discard bans and other management measures that may affect the need for and quality of data collection. Furthermore, the intention is to have greater flexibility in the new EU multi-annual data collection programme (DC-MAP) to accommodate end-user-driven changes to data collection requirements. National programmes will have to adapt to changing data needs, whilst demonstrating the good practice in sampling recommended by SGPIDS and WKPICS. There will remain concerns about continuity of data series, changing estimation procedures and extent of communication between data collectors and end users that will require ongoing attention. These drivers all imply the need for an annual process for providing expert advice on fishery data collection. This is more efficiently carried out through the continuity of a dedicated expert group than by workshops or study groups of limited life span, or during the restricted time available each year in a subgroup of PGCCDBS.
- The number of experts in this field is limited, and issues are further complicated by pressure on resources. Consolidating the responsibilities of WKPICS, SGPIDS and the PGCCDBS fisheries sampling subgroup into a single expert group will reduce costs where the same staff attend more than one of these meetings, avoid any duplication of work, and develop synergy.
- An expert group devoted to all stages of catch sampling (design, planning, implementation, data archiving, quality assurance, 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 regular expert advice to the Commission, STECF, Liaison Meeting, PGCCDBS/PGMED, ICES assessment, mixed-fishery or other related Expert Groups, and Regional Coordination Groups (RCGs). It is anticipated that providing expert technical and statistical advice that can help RCGs to develop regional coordinated sampling plans in the new DC-MAP, and ensuring that regional databases (RDB - FISHFRAME) are designed to work with probability-based sampling, will be important roles for WGCATCH.
- A Working Group on Commercial Catches would operate in parallel with, and in liaison with, the equivalent ICES Working Group on Recreational Fishery Surveys (WGRFS). Both Working Groups deal with statistical and practical aspects of estimating the quantity and composition of fishery removals and the quality of estimates.

PGCCDBS recognises that the work of WGCATCH will be strongly driven by the needs of end users of fishery sampling data and will potentially have a very broad remit, and therefore the composition, skills-base and *modus operandi* of the WG will have to be very carefully designed to ensure it can deliver what is required.

PGCCDBS proposes that generic ToRs (recurrent WG tasks over a period of years), additional specific ToRs and duration of the first WGCATCH meeting are developed

in consultation with end users and agreed at the ICES-Commission DCF meeting at the 2013 ASC.

To assist this process, PGCCDBS has drafted a proposal for the supporting information for establishment of WGCATCH :

The **Working Group on Commercial Catches** (WGCATCH), chaired by XX, XX, will be established and will meet in XX, ICES, XX June 2014 to:

- (a) Address generic ToRs given in the table below <to be drafted>
- (b) Address specific ToRs..... < to be drafted>
< ToRs to be agreed before 2013 ICES Annual Science Conference >

WGCATCH will report by XX for the attention of ACOM.

Supporting information

Priority	PGCCDBS recommends that a new expert group WGCATCH be established in 2014, based on the merging and extension of WKPICS and SGPIDS, and the equivalent work conducted within PGCCDBS. A main objective of WGCATCH will be to support the development and quality assurance of regional and national catch sampling schemes that can provide reliable input data to stock assessment and advice, while making the most efficient use of sampling resources. As catch data are the main input data for most stock assessment and mixed fishery modelling, these activities are considered to have a very high priority.
Scientific justification	<p>The data collected from the commercial fisheries have a primary function of supporting stock assessments and informing fleet-based management decisions. The WGCATCH will work to help European countries achieve sufficient accuracy (increase precision and minimize bias) of catch and catch composition estimates (for a given level of sampling effort) that are used as input to the ICES stock assessment, mixed-fishery, and ecosystem-based analysis and associated advisory process. The WG will operate within the ICES Quality Assurance Framework and respond to the requirements of the EU Data Collection Framework (DCF) and future DC-MAP, and recommendations from end-users.</p> <p>Currently all EU Member States collect commercial catch data (e.g., estimates of discards and size/age composition of catches) according to practices under the DCF. The EU commission spends large budget on DCF-related data-collections from fisheries. However, to make the most efficient use of EMFF funds for sampling resources in the DC-MAP, a statistically sound sampling programme should be implemented in all member states. Such programmes are also needed for non-EU countries supplying data for the assessments. If statistically-based designs are implemented, these have the advantage of being flexible and will allow changes in stratification and allocation of sampling efforts over time without jeopardizing the continuity of the data series.</p> <p>WGCATCH will act as a link to the RCMs (RCGs) by developing data quality Indicators and reports for national and regionally aggregated data sets, and by advising on analysis modules for regional databases (RDB). WGCATCH will provide RCMs/RCGs with the tools to review efficiencies and adapt and improve on their programmes, and will provide end users such as ICES assessment EGs and STECF with</p>

procedures for auditing the quality of data used in analyses underpinning stock-based, fleet-based and ecosystem-based fishery management advice.

The combination of statistical expertise in survey design and analyses methods and practical implementation skills makes this working group unique, and ensures it effectively bridges the gap between data collection and data end-users which is essential to collecting effective scientific evidence for fishery management.

WGCATCH will have the following overall remit

Continue the development of methods and guidelines for best practice in quantifying commercial catches and catch compositions where sampling programmes are needed at sea or on shore, covering design of sampling schemes, practical aspects of data collection, data archiving, and analysis of data to provide estimates meeting end-user needs.

Develop and update quality assurance procedures and quality indicators for data and estimates derived from catch sampling programmes, for example to support the ICES benchmark assessment process.

Review the progress in implementing statistically-sound catch sampling programmes within Europe and in developing collaborative regional approaches including sampling of national vessels landing in foreign countries.

Evaluate how changes in fishery management measures are affecting fishery sampling schemes and the quality of the data, and recommend solutions.

Develop approaches for evaluating impacts of changes in sampling design to continuity of data series.

Respond to requests for technical and statistical advice related to fishery sampling from Regional Coordination Groups and the main data end-users.

Provide advice on development of regional databases (RDB - FISFRAME) to include estimation modules that are in accordance with statistically-sound survey design, and modules for data quality reporting.

Identify and promote technological developments for improving the efficiency of catch sampling and improvement in data quality.

Develop and maintain a reference list of key publications or other available resources dealing with design and implementation of fishery sampling schemes and associated data analysis, and annually review new publications of relevance to WGCATCH.

Identify future research needs.

Resource requirements	The WG builds extensively on experiences gained within PGCCDBS, WKACCU, WKPRECISE, WKMERGE, WKPICS, SGPIDS and WGRFS. European countries are encouraged to provide the WG with documentation of their sampling programmes, updated manuals and protocols for review and feedback by the WG, and to ensure that their national members of WGCATCH have sufficient resources to conduct the necessary intersessional work to address the ToRs.
Participants	It is expected that WGCATCH will normally be attended by some 20–25 members.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to advisory committees	WGCATCH supports ACOM by promoting improvements in quality of fishery data underpinning stock-based and mixed fishery assessments, and ecosystem indicators related to fishery impacts, and in developing

	data quality indicators and quality reports for use by assessment EGs and benchmark assessments.
Linkages to other committees or groups	WGCATCH links with PGCCDBS in relation to collection of stock-based biological variables from sampling of fishery catches. It links to stock assessment EGs and benchmark assessment groups by providing input on the data quality of commercial catches. WGCATCH also links closely with Regional Coordination Groups, the Regional Database Steering Group, STECF EWGs dealing with DC-MAP and the Liaison Meeting.
Linkages to other organizations	The outputs of WGCATCH will be of interest to FAO and RFMOs, and productive linkages may be established over time.

The first meeting of WGCATCH would be expected to spend some time on developing and agreeing on its own method of working in future, for example, further developing the initial proposals for generic ToRs for the next period of years, identifying how the balance of skills in the WG should be developed, considering the need for external experts with specific skills, and developing how the WG will operate both during the meetings and intersessionally to address generic ToRs and specific ToRs.

In line with other current ICES expert groups, there will be a need for WG members to carry out work and to draft report text on ToRs prior to the annual meeting, so that WGCATCH can spend more time in plenary discussing and agreeing its outputs. The generic ToRs for the WG should include development of intersessional work plans. During each meeting, WGCATCH should develop a draft intersessional work plan for WG members for the forthcoming year to address generic ToRs and any specific additional ToRs known at that time, identifying the tasks, responsibilities, milestones and approximate staff time needed. This is needed so that WG members can secure the resources for the work in their home laboratory and to maximise the efficiency of the WG.

PGCCDBS notes that WGCATCH will address topics that have been covered by the PGCCDBS subgroup on fleet-based sampling, particularly in the last few years. These topics have become increasingly demanding on PGCCDBS meeting time, due to the increased focus on statistically-sound fishery sampling designs, RDB development, regionalisation and other related issues that are coming to the fore. Consequently, PGCCDBS is finding it more difficult to address all its ToRs and agree outputs in plenary. The transfer of work on fishery sampling to WGCATCH will leave PGCCDBS more time to focus on biological parameters such as age and maturity, from the individual fish level (collection and interpretation of material; accuracy; precision) to the population level (e.g. estimation of growth parameters, maturity ogives etc.) and to have these more fully explored in plenary. PGCCDBS and WGCATCH will retain a strong linkage where stock-based biological parameters such as growth or maturity are estimated from sampling of commercial catches rather than RV surveys. The amalgamation of WKPICS, SGPIDS and the PGCCDBS fleet sampling subgroup, which have many members in common, will achieve considerable savings in staff time and travel compared with the present arrangements were they to continue.

PGCCDBS Action: submit proposal for new WGCATCH to ICES

4.3.3 Training course proposals

In the absence of any progress made with the recommendation in 2012, PGCCDBS reviewed the need for, and structure of a training courses covering the design of statistically sound catch sampling for fisheries monitoring programmes.

The need for such courses still stands. PGCCDBS 2012 indicated that a statistically-robust sampling scheme should be a prerequisite for collecting any data for any form of assessment. The practical problems in sampling fisheries and implementing these schemes are being documented by WKPICS. Expertise in designing sampling schemes is growing within the individual countries through ICES expert group participation, but there is little formal training available that concentrates on sampling design, particularly taking logistical constraints into account. Such courses will not only help those setting up schemes and implementing them but will also help inform end users on how this data can and should be used. Documenting schemes is forming part of the current process but it is important for the end user to understand this documentation, how that data was derived and why, and how it can be used.

In 2012 PGCCDBS proposed that there should be three levels: an introductory level, an intermediate, and an advanced level. The idea was that at the introductory level, the candidates would already have grounding in basic statistics and experience of biological sampling in the field and/or experience of using catch estimates from sampling programmes, in stock or fisheries assessments. The higher level courses may extend to the analysis of complex sampling programmes using design-based and model-based estimators for raising the sample estimates of catch characteristics (e.g. numbers-at-age) to the total catch estimates, with associated precision estimates.

This year PGCCDBS, following discussion with the ICES training committee, is recommending one course at a more intermediate level - aimed at providing a complete overview of the considerations and best practice when setting up or evaluating and possibly improving on current catch sampling programmes and also how to raise the data in reference to sampling design. Data collectors with an understanding of basic statistics working with fishery data would benefit from this course. The results from this one course will inform ICES on the need for further courses at different levels. Details of the proposal, in the format of ICES training course template, are given below.

Course title

Design and analysis of statistically-sound catch sampling programmes

Context, objective and level

- A measure of data quality is 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.

This course introduces the participants to a set of principles of survey design that are the basis of standard practices in the field. It is intended as a detailed introduction to the field for people working with data collection.

It is an applied statistical methods course. It is 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.

Dates and venue

ICES HQ, Copenhagen

Organisation

TBA

Admission and registration

TBA

Fee

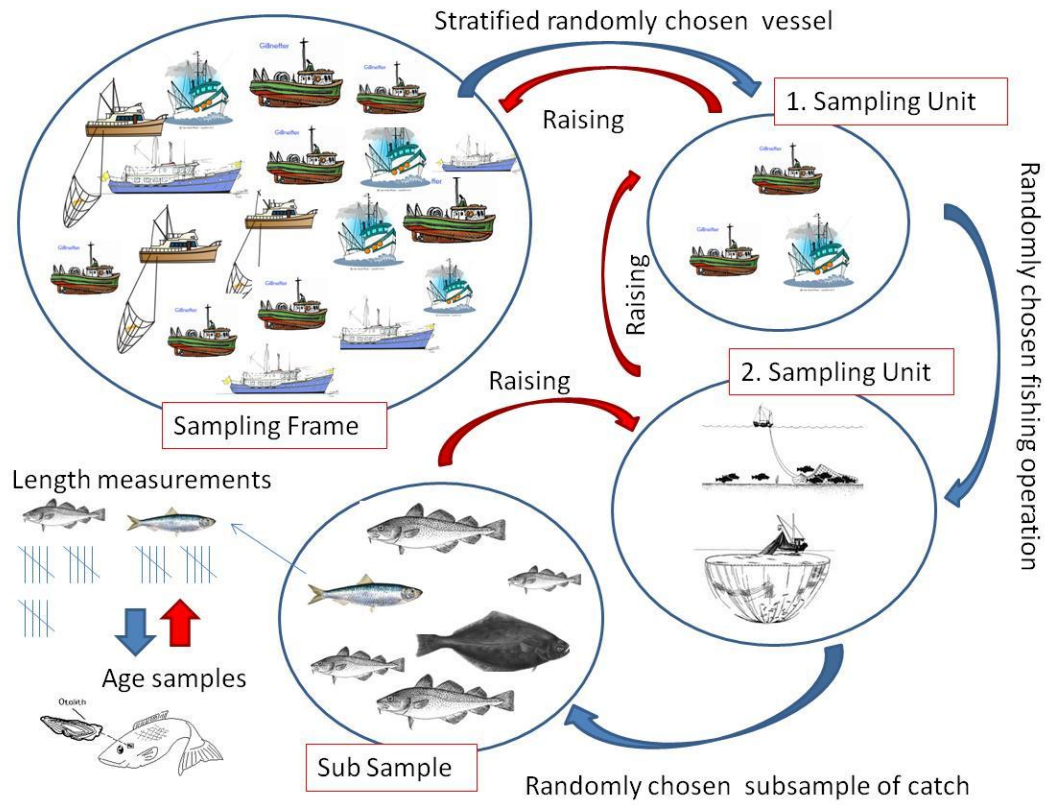
TBA but enough to pay for an external expert to come and hold the course.

Programme

The elements of the course will cover the main techniques used in sampling practice: simple random sampling, stratification, systematic selection, cluster sampling, multi-stage sampling, and sampling with probability proportional to size.

The course will also cover sampling frames, cost models, sampling error estimation techniques, non-sampling errors, and compensating for missing data.

These methods will be elaborated in different types of sampling designs using the R – survey package.



Lecturers

TBA

PGCCDBS Action: To submit proposal for an ICES training course covering the design of statistically sound catch sampling for fisheries monitoring programmes

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

Sections 5.1 – 5.3 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.

5.1 Data problems reported by the AWG contact persons

Annex 7 tabulates the data issues reported to PGCCDBS in 2011 by the AWG data contact persons, and gives a PGCCDBS response. The majority of recommendations relate to concerns around sampling intensity, data quality, age, growth and maturity parameters, discards and surveys. There are also some proposals for tagging studies and studies on survival rates of certain discarded species.

A data issue from SGPIDS to PGCCDBS concerning age length keys required extensive discussion by the sub-group. The response is too lengthy for inclusion in Annex 7 and is given in Section 5.3 below.

5.2 Updated list of AWG data contact persons.

An updated list of the assessment working group data contact persons 2013 was compiled by Cristina Morgado and can be found in Annex 9 of this report.

5.3 PGCCDBS response SGPIDS2012 recommendation related to use of age-length-keys and weight-length relationships.

SGPIDS 2012 directed the following issue and recommendation to PGCCDBS:

“The construction and use of age-length keys (ALKs) and length-weight keys (LWKs) is a critical stage in estimating numbers-at-age for stock assessment working groups. However, bias and error in the application of ALK and LWKs, is poorly understood and a rather neglected topic in the raising of discard data. Many questions were raised during the SGPIDS meetings: what is the bias introduced by the use of survey-based and landings-based ALKs as a proxy to discard ALKs, what is the spatial and temporal resolution of the ALKs used by Member States, how should ages be combined (i.e. as a weighted or unweighted sample), what are the consequences of relying on LWKs, which in some cases, date back up to 30 years? Additionally, many of these issues apply to the raising of landings data as well. Therefore, SGPIDS strongly recommend PGCCDBS to address the problems at some wider forum in the near future. A new platform (workshop/study group) may be created for the exchange of expertise on ALKs and LWKs in order to improve the quality of data used in stock assessments. The corrected methodology for using ALKs and LWKs must be applicable by 2014 with the implementation of the reformed DCF (2014–2020).”

The PGCCDBS response, and associated actions developed by the PG, are given below.

ICES age-based stock assessments require estimates of numbers of fish per age class as input. Such estimates are typically derived from age samples collected in stratified multi-stage sampling where primary sampling units are trips, hauls or sets. Sub-sampling for age from individual are typically collected in two possible ways: either random sampling for age composition or, more often, by length-stratified sampling. In the latter case numbers at age must be derived by using stratified estimators of age composition for the PSU, or from the application of age-length keys (ALKs). Age-length keys give the age distribution (probability of age given length) of fish within the defined length strata, and are used to convert length distribution (e.g., of landings or discards) to a final numbers-at-age distribution.

In principle, ALKs provide a practical and less-costly means to attain age composition of catches since they may avoid having to collect large numbers of individual fish to age. However, a critical assumption is that the fish sampled in a length class stratum represent a random, independent selection of the fish in that length class in the raised length composition to which the ALK is applied. Any departure from this assumption will lead to a bias in age compositions which are usually disregarded at the stock assessment level. Consequently, biases in ALKs have long remained a concern for the overall accuracy of stock assessments.

Most fish species exhibit substantial overlap in length-at-age distributions, particularly in older fish, and often exhibit shifts in spatial distribution as they grow and mature. Spatio-temporal patterns of probability of age at length should therefore be evaluated and accounted for in ALK applications. The sampling and estimation issues surrounding the use of ALKs were discussed in WKPRECISE (2009), which set out the principles for the most appropriate use in design-based surveys and made a number of clear statements about the potential bias caused by their inappropriate use (WKPRECISE section 3.8). Recommendations included:

- *“For probability-based catch sampling programs, the estimation of age distributions of fish, and the associated uncertainty, directly from the multi-stage age samples should be considered rather than using an ALK”.*
- *“ age-length data are coupled to the primary sampling units from which the age and length data were collected”.*
- *“Using an ALK formed from samples in one stratum to estimate age distributions in another will cause bias and should be discouraged”.*

SGPIDS 2011 collated data on the origin and construction of ALKs for discard estimates across participating countries (SGPIDS 2011 section 5.1.7) and noticed high variability in ALK construction. They recommended PGCCDBS to consider the issue:

“The issue of bias associated to the use of fully discard age-length key, mixed discard/retained age-length key or survey age-length key when estimating the age composition of discards was unresolved by SGPIDS. We suggest this subject should be discussed by experts at the next PGCCDBS meeting.”

PGCCDBS 2012 analysed SGPIDS concerns and recommended that a full account of procedures used for generating age and length data should be assembled and provided a template for the compilation of such data (PGCCDBS 2012 section 4.4.1).

“As a first step towards characterizing this situation, PGCCDBS recommends that a full account of all procedures used to generate age and weight data from discards at

national level is carried out by the national stock coordinators for stocks where age-based assessments are conducted. These reports should be made available to EWGs of STECF, data compilation workshops, benchmark and stock assessment working groups so that the full extent of the differences in the sampling and compilation procedures amongst MS is left clear.

Templates for such reports are available in Table 4.4.1.1. and include aspects known to determine the accuracy and precision of ALKs such as the number of samples used to derive each ALK/weight-length relationship, the origin of the samples (survey, landings, discards), the sampling design used to select the samples, the temporal, spatial and fleet resolution of the samples as well as details on the level at which the ALKs are applied (trip, stratum, etc) and their frequency of update."

This recommendation was in the body of the report but did not become a formal recommendation from PGCCDBS 2012. As a consequence the situation did not progress.

PGCCDBS 2013 considers that actions set out in 2012 should be pursued. The biases involved in the application of ALKs and weight-length (W-L) relationships may be significant for stock assessment and are likely stock specific. However, to date there has been no compilation of the sampling design used in assembling the ALKs and W-L relationships that allows a full evaluation of the extent of variability and pooling of information involved in conversions of length distributions to age or weight. This information is available at national level where the sampling for the different species is conducted and should be compiled.

Based on the previous PGCCDBS 2012 template, **PGCCDBS 2013 has developed the following plan of action:**

1. – Intersessional work will be conducted in 2013 by a group comprising the chairs of PGCCDBS/WKPICS/SGPIDS and other designated participants of these groups to identify what the elements of "best practice" guidelines could look like for the collection and application of age data to estimate fishery age compositions for retained and discarded fish, and for collection and use of length-weight data for use in fishery data analysis, and to use these to develop a questionnaire to be circulated by the ICES secretariat to national stock coordinators via national DCF correspondents in June 2013 to find out what practices are currently being applied.
2. – When completed, the questionnaires will be sent to the chairs of WKPICS3. The WKPICS3 will then compile the results, discuss the extent to which sampling practices may be varying from what would be considered as best practice (where "best practice" can be considered as that in which biases are minimised or, if unavoidable, can be evaluated in an informative way, and where precision can be estimated reliably), including between countries sampling the same fish stocks. WKPICS3 will also evaluate within its revised ToRb (see Section 4.2.1) what types of information on national sampling for age composition or length-weight data, and subsequent data processing, could be integrated within the data Quality Assurance Report that it is currently being developed and which can be evaluated against best practice guidelines to be developed (Section 6.1).
3. -PGCCDBS 2014 and WGCATCH (if established in 2014) will then consider how the QARs should be integrated into forthcoming benchmark assessments.

PGCCDBS Action: Develop questionnaire on national schemes for collection and use of length-weight data for use in fishery data analysis, to be circulated by the

ICES secretariat to national stock coordinators via national DCF correspondents in June 2013 to find out what practices are currently being applied

5.4 Regional Coordination Meeting / Liaison meeting recommendations to PGCCDBS

There were no specific recommendations to PGCCDBS from the RCMs or LM in relation to fleet-based variables. However, in the body of the RCM reports, concerns were raised by both the Baltic RCM and the North Sea and Eastern Arctic RCM in relation to sampling of foreign landings. The concerns were around how to incorporate these sampling opportunities in a member state's sampling strategy and how the data can be used either by the member state or the flag state.

BALTIC RCM stated: "The RCM Baltic found that the use of biological samples collected in foreign countries is problematic to include in the raising. As the harbour sampling is conducted with different sampling strategies (and these are not always well known for other MS) it is not possible to include the samples that have been collected by foreign MS in the flag countries raising procedures. Furthermore, it is not possible for the landing country to include the samples from the flag country in their own sampling program as they would have to raise with the landings amount from the flag countries.

The RCM suggest that those MS that are having vessels flying their flag and these vessels are having substantial landings in other MS, that the flag MS is increasing the sampling in the flag MS to compensate for the landing made in other MS's ports."

NS+EA RCM stated: "Data as loaded on the RDB were used to identify the overall landings by MS that occurred outside the vessel flag country. The current DCF states that these landings, if for first sale, become the sampling responsibility of the MS where the landings take place. In order to co-ordinate sampling at a regional level the RCM needs to identify which MS, country of first sale, has sampling responsibility. The data as held at present does not enable the RCM to differentiate between landings for first sale and those that are in transit for first sale in another country. This can apply to both landings in the flag state as well as any landings abroad"

PGCCDBS notes that a particular issue for harmonisation is when vessels from one country land into the ports of another country. This is currently handled within the DCF by establishing bilateral agreements for sampling. The bilateral agreement requires the country of landing to carry out sampling and transmit the data to the country the vessels originate from. In practice, this has not always happened, or the data are collected in a way that is not compatible with the sampling schemes or data analysis methods in the native country and are therefore not used.

However, WKPICS2 notes that national sampling frames can then be defined as "super-strata" in a regional (international) sampling programme, the implication being that the national frame includes separate strata of fishing trips landing into other countries. This approach is only sensible if the frequency and volume of landings into foreign countries is a sufficiently large component of the area landings of the country of origin of the vessels to warrant separate foreign-vessel strata that can be sampled with sufficient frequency. As shown in Section 3 of WKPICS2, the national sampling frames can be established and stratified in ways that are appropriate for that country. There does not have to be harmonisation of frames and strata definitions between

countries provided the sampling follows best practice (WGPICS2 Annex 3), compatible data are being provided, and the estimates and variances can be weighted and combined across countries to give regional estimates. **PGCCDBS has included this complex issue in the remit for the proposed WGCATCH (Section 4.3.2).**

PGCCDBS noted that RCMs are continuing to report biological sampling achievements only as numbers of fish measured or aged. These figures are only valid as a measure of data quantity, a poor measure of effective sample sizes, and, on their own, provide little information on the quality of the data collected. Initial proposals for Quality Assurance reports developed by WKPICS2 and to be tested in 2013 (see Section 6.1) advise the use of more appropriate reporting of sampling achievements in terms of sampling events and number of samples. For example, WKPICS2 noted that national scientists should record the number of trips from which length or age data were collected in each sampling stratum for the stock (a measure of the number of sampling units), as well as the total number of fish measured or aged per stratum. Effective sample sizes, which are typically driven by the number of PSUs sampled, should ideally be calculated although WKPICS2 noted this may be difficult, especially with graded catches and these figures may not be readily available from the Regional Databases.

There is a danger that the reporting only of total numbers of fish measured or aged may, as in the past, be used for setting targets and this could lead to poor sampling designs and reduce cost-effectiveness just to satisfy the auditors. In future, the regional databases should supply RCMs/RCGs with the required statistics on sampling achievement, and consideration should be given to developing routines to compute effective sample sizes where this is possible. In the meantime, **PGCCDBS recommends that RCMs/RCGs provide measures of achievement both as numbers of sampling events and as numbers of fish measured or aged.**

5.5 Review of the ICES – RCM recommendations process

PGCCDBS is presented with four sets of recommendations or issues to deal with: i) from PGCCDBS to itself; ii) from other ICES Expert Groups; iii) from AWG data contact persons; iv) from RCMs (via Liaison Meeting). The development of an ICES Expert Group recommendations database by the secretariat has been a major improvement, and PGCCDBS has added its responses to the database from where the relevant EGs can easily pick them up without paging through the PGCCDBS report.

During WGCHAIRS 2012, PGCCDBS proposed that all expert groups adhere to a maximum of 5 key recommendations, in order to streamline the system. During the 2013 PGCCDBS meeting it was evident that groups have been trying to follow this recommendation and this is very much appreciated.

During the 2012 meeting, PGCCDBS suggested that expert groups should classify and describe their recommendations as follows:

- Make a distinction between recommendations (R) and Strategic Comments and Suggestions (SCS)

- Clearly describe the recommendation and indicate precisely who it is aimed at
- If basic changes should be made for the stock, the EG should decide and agree these
- The EG should step back and look at the stock and data requirements and re-assess what the problem is. Consider methodologies employed, link them to the DCF and 'look outside the box' for solutions.
- Common sense should be used at all times.

PGCCDBS Requests that all Expert Groups follow the proposals above for deciding on recommendations to place in the ICES recommendations database, and also attempt as much as possible to limit themselves to five key recommendations.

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

6.1 Developments in procedures for reporting of data quality to ICES Expert Groups & RCMs

PGCCBS 2013 agrees with WKPICS2 that the WKACCU (ICES 2008) score card is a useful comprehensive list for national institutes to screen their sampling schemes for a wide range of potential biases. However it is qualitative and, without some complex weighting of each of the measures, is not useful for coming up with an overall higher-level score.

The ICES WKPICS, SGPIDS and WGRFS meetings have examined the scope for improving the way data quality can be optimised and reported with clarity to end-users. WKPICS2 reviewed proposals for quality indicators and score-card systems from SGPIDS and WGRFS and, using aspects from each, produced a template for a simple QA report for each stock with reference to key indicators of bias at the national and regional level which, if significant, can be highlighted and explained in an overview at the stock level.

PGCCDBS emphasizes that an efficient collaboration between expert groups and other bodies such as RCGs in relation to data collection will require QA systems that summarise comprehensive and easily-sourced information (e.g. from RDBs) into easily-produced and understood QA reports. Reporting systems that are complex and expensive to produce, or do not provide the type of information that end-users need, will inevitably fail. For example, assessment expert groups can use informative indicators of bias (direction, potential magnitude, unknown) to exclude or down-weight periods of fishery data or include alternative scenarios in sensitivity tests, or can use indicators of precision (CVs, effective sample sizes or proxies such as numbers of sampling events) to develop weighting factors in statistical models or examine how data quality affects management advice. At the same time, the QA reports must provide information to support decisions by RCGs or national coordinators on how to improve and optimise the quality and cost-effectiveness of data collections. PGCCDBS therefore strongly supports WKPICS2 recommendation to test the usefulness of the proposed QA reports on a range of stocks and areas, and receive feedback from end-users (ICES EGs) and coordinators (RCM/RCG, scientists in charge of national data collection programmes).

The QA reports are designed primarily for stock assessment and focus on a given stock. WKPICS2 proposed a report structure giving simple metrics of the sampling design, implementation and sampling successes for each national sampling stratum, indicating also the contribution of catches in each stratum to the overall catches of the stock and information related to bias, such as refusal rates. Sampling success within strata will be based on numbers of primary sampling units selected and achieved (sites and days for on-shore sampling, and vessels or trips for at-sea sampling), but the specifics of each national implementation may differ. Also, the sampling strata will mostly be quite distinct from potential domains of interest such as ICES areas, time periods, métier groups or STECF effort groupings. Estimates for these domains may require post-stratification, and the sampling coverage at these finer scales will not be apparent from the QA reports and would require more detailed evaluation.

Therefore end-users (e.g. stock assessment or mixed fishery analysis groups) have to clearly understand that QA reports will give an overview of the general sampling situation but information per stratum must be understood with respect to national sampling programmes, the described contributions of each country to the total catches, and the domain of interest the QA reports address.

WKPICS suggests that these reports could be automated to some degree if the RDB was enhanced to include metadata and information on national sampling strategies. However PGCCDBS is of the opinion that, while automated QA reports are positive step forward in data quality reporting for assessment groups and other end users, there may be some concern that if these reports were being used for auditing, factors affecting the sampling design and implementation may be missed. It is suggested therefore that national sampling coordinators and the working groups working on sampling and quality data may still be allowed to add a final comment to the QA reports at a national level. This may be carried out in preparation for the submissions to RCGs or at the RCGs. The proposed future working group WGCATCH could also help clarify the role of RCGs in relation to evaluating the QA reports each year.

PGCCDBS proposes that WKPICS-3 under its ToRs (a) and (b) (Section 4.2.1) consider how to include quality indicators to the QA reports relating to biological sampling (age, maturity and length-weight, etc) where they are lacking in the current format. For example, an evaluation of adherence to best practice in sampling for age compositions would require information on the linkage between length and age sampling, the number of age samples and effective sample size taken by strata, if those otoliths are being using by strata or directly by stock, etc. The outcomes of the questionnaire that PGCCDBS has developed to review how age data are being collected and aggregated (Section 5.3) should be considered in this process. These QIs will relate to sampling design and procedures for estimating biological parameters at the population level, and not to quality issues around interpretation of individual otoliths or maturity stages etc as these are dealt with by PGCCDBS through workshops and exchanges.

PGCCDBS considers that work is still needed in order to have a final draft of a Quality Assurance Report and gives **proposals for development and trial of the Quality Assurance Report template drafted at WKPICS-2**. This task will require contributions from PGCCDBS, ICES, national sampling and stock file coordinators, RCMs and WKPICS3. Six stages are listed below; the months give the temporal deadlines:

- 1) April-May 2013
- 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 2013
- 4) The ICES Secretariat will circulate these templates to the National Correspondents of the countries involved, to be completed for consideration at the RCMs in September. This process will be carried out in parallel with circulation of the ALK and W-L questionnaire (See section 5.3), also for completion in time for RCMs.

- 5) September 2013
- 6) PGCCDBS proposes that RCMS consider these completed reports, in relation to their role as coordinators and potential evaluators, and provide feedback to WKPICS3.
- 7) October 2013
- 8) ICES Secretariat will compile the answers received from the National Correspondents and send them back to the chairs of the PGCCDBS and WKPICS3.
- 9) November 2013
- 10) WKPICS3 will then compile and review the results and develop these reports for PGCCDBS 2014. WKPICS3 will also evaluate the possibility of integrating indicators developed following evaluation of responses to the ALK and W-L questionnaire to the data quality assurance reports.
- 11) February 2014
- 12) PGCCDBS 2014 will consider the possibility of forwarding these reports to subsequent benchmark data compilation and assessment meetings scheduled for 2014 for their feedback.

To ease the potential workload, PGCCDBS will limit the first trial of these QA reports to three stocks:

- ✓ Hake in Division IIIa, Subareas IV, VI and VII and Divisions VIIa,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)

ICES will issue a request to DCF National Correspondents 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. The QA reports will also be sent to countries that do not have sampling obligations for these three stocks, and they will be asked to look at it in relation to other stocks they do sample and to complete only the feedback form so that ICES receives a broad end-user feedback for further development of the QA approach. Countries completing the detailed reports for the designated species will also be asked for more general feedback on utility for other species.

PGCCDBS Action: Refine and compile Quality Assurance Report templates for circulation to National Correspondents in June 2013.

6.2 Review developments in setting up regional data bases

Developments in setting up regional data bases (RDB)

Following a data call in 2012, national data sets for landings, effort and sampling data were uploaded to the RDB. However, due to confidentiality concerns and technical limitations, not all Member States uploaded the data. Available data in the RDB were used by the RCMs in 2012, and facilitated the analysis of fishing activity and sampling levels achieved at the regional level. Such analysis included relative occurrence

of landings by metier, the extent of landings by vessels abroad, and comparisons of sampling data between countries.

Three workshops were held during 2012 to help the uploading of national data to the RDB by users not familiar with FishFrame, and to allow demonstration of the estimation procedures available at present. A workshop to facilitate uploading of data for countries not yet involved with the RDB is planned for 2013. The ToRs for two further workshops planned for 2013 are yet to be finalised. It is envisaged that the steering group of the regional data base (RDB-SG) will meet twice in 2013.

The outcome of the first two workshops held in 2012 was that the majority of countries contributing data to the RCM data call completed the task successfully and that Baltic states gained additional experience in processing data. The third workshop demonstrated the processing within FishFrame to those less familiar with its use and facilitated a discussion which concluded that in its present form, RDB (FishFrame) can be utilised for two purposes:

1. To facilitate the work of the RCMs/RCGs
2. Estimation (“processing”) for the Baltic nations and stocks.

It was recognised, however, that further development of the RDB is required before it would be able to accommodate the more diverse data collection practices of countries beyond the Baltic region and to accommodate the data and estimation procedures needed for the probability-based, statistically-sound sampling designs envisaged by the series of ICES Wks PRECISE, MERGE, PICS1 and PICS2.

Development of the RDB is conditional on future funding, and RDB-SG has prioritised the development required, based on differing funding scenarios, for the short term, and that required over the longer term.

Short term development includes:

- fixing bugs in the existing estimation procedures
- minor changes to the exchange format that would allow data from countries not familiar with use of FishFrame to successfully upload their data to the RDB.
- the maintenance and development of reports for use by the RCMs

Longer-term development is aimed at accommodating statistically robust design-based sampling and would, in the first instance, involve:

- changes to the exchange structure for sampling data, landings data and effort data.
- provision of improved housekeeping procedures such as version control, overwriting procedures, auditing of data uploads, etc
- new estimation procedures to accommodate raising/estimation in accordance with sampling design and the advice from the WKPICS workshops

The latter point on estimation procedures involves decisions as to whether the estimation process needed can be housed within the RDB, or remain external to the database and the responsibility of the national institutes. A decision is also needed on whether a single suite of software (such as the “R survey” package) can accommodate the diverse estimation procedures required by differences in design of national sampling schemes; or whether bespoke national software for national estimation is needed.

In the event that the full international raising and aggregation procedure is housed within the RDB, all countries need to be operating with a common data format and

raising according to probability based designs where for example sampling probabilities can be calculated. The R statistical language and the R SURVEY package offer the most likely means to enable this to be achieved in the near future.

The existing data structures within RDB FISHFRAME (csData format for sampling data, the clData for landing data and the ceData format for effort data) all need to be adapted to incorporate additional fields to enable the recording of sampling data in its rawest form and landings and effort data at a resolution that enables aggregation needed to accommodate the diverse sampling designs operated by different countries.

Estimation outside the RDB and incorporation of raised national estimates into the RDB has also to be an option. Currently within ICES, national estimates are aggregated at the regional/stock level to generate the estimates of catch at length or age for the stock. This currently occurs in INTERCATCH but, for design based estimation, the metier based definitions included in INTERCATCH to address needs of WGMIXFISH, and the resultant extensive interpolation of missing cells, need to be modified to be more closely reflect the fleet based sampling strata used by different countries.

There is also an ongoing discussion about the structure of a revised RDB and the opportunity the RDB presents as a data management tool. Such an approach would both facilitate the transmission of data from national institutes, enable far better control over data quality (as outline above) and go a long way to harmonising the collection and reporting of fisheries data within the EU and participating countries. However there are very pertinent issues for discussion around: the extent to which the RDB is a closed environment; the access rights for different types of end users; the form of exports from the RDB as data aggregations or standard reports; the level of data confidentiality required; the resolution of data stored within the database; and, above all, the level of trust among contributing countries.

RDB data and quality indicators for design-based sampling

The data quality indicators needed for design-based sampling can be considered to be of three basic types:

1. Indicators of sampling coverage
2. Descriptions of sampling protocols
3. Indicators of derived sampling

These will be considered in turn.

1. Indicators of sampling coverage

These can broadly be considered as measures that relate the “population” being sampled to comparable indicators of the realised samples.

Indicators of this type proposed by SGPIDS and WKPICS2 include, among other things, the number of vessels in a national stratum and the total number of their trips compared with the number of unique vessels sampled and the total number of trips sampled. More general examples could include spatio-temporal maps of total fleet activity compared with trips with observer coverage, or any number of “goodness of fit” plots. In each case the basic data requirements are landings and effort data at an aggregation that enables the metric (i.e. number of trips, ports) to be quantified, and a comparable metric to have been recorded for the sample data.

Such data are, in general, likely to be readily available from uploads to the RDB. The issues will be consistency of recording the relevant metrics, and the aggregation level of population data.

2. Descriptions of sampling protocols

In general the descriptions of sampling protocols are not likely to be quantifiable in a standard form that would facilitate their upload into the RDB.

That said, depending on how the RDB develops, there may be instances where information on structures such as sampling frames could be uploaded into the RDB. If sampling protocols are sufficiently standardised across countries, and standard templates could be adopted that quantify these protocols, then these have the potential to form the metadata that can be stored in the RDB. An example is the non-response template developed by SGPIDS to ensure that vessel selection procedures for at-sea sampling schemes operating in different national fleets generate a directly comparable non-response rate. Such a template could be incorporated in the RDB as a metadata structure that linked the sampling frame with the realised sample.

3. Indicators of derived sampling

Comparisons of realised samples could include, for example, comparing simple plots of length frequencies, age-length and weight-length relationships between countries sampling the same fisheries. These are useful in highlighting inconsistencies between data derived from different national sampling schemes. Such quality indicators can be readily derived from the existing sampling data within the RDB at present.

Time series of quality indicators

There is no reason why any of the quality indicators outlined above can not form the basis of a time series of data quality, the issue is simply establishing a consistent way of calculating the indicator and repeating the procedure over the available years. In general though, it is unlikely that such quality indicators can be generated retrospectively on historical data in a consistent way. Therefore the widespread population of the RDB with consistently recorded landings, effort and sampling data will mark the start of any data quality time series. It is also to be anticipated that during the initial stages of adoption of design-based sampling there will be a period of refining quality indicators, and the exact form may not emerge for a number of years. This does not preclude the need for expert groups conducting benchmark assessments to find ways of evaluating the quality of historical data, as this is a key issue for many stocks, but this will require information external to the RDB.

6.3 Evaluation on the impact of any recent or future changes in data collection on the continuity of data series.

Changes to sampling design or control regulations constitute interventions that change the statistical properties of time series. Statistical time-series literature is abundant with such examples [e.g. Box et al., 2008]. One recent example of this, directly related to fisheries, was presented in Fogarty and Miller (2004) who analysed and quantified the impact of an intervention in the reporting system of blue crab landings in Maryland.

Based on the former experience, the implementation of the new DC-MAP may bring about some disruptions to some of the time series collected under the previous DCF that are likely to be reflected in future stock assessments. PGCCDBS analysed two

main sources of change: a) changes related to the improvement of statistical design of the sampling programmes following the advice generated by ICES groups including WKPRECISE, SGPIDS, WKPICS and PGCCDBS (Section 6.3.1 below), and b) changes motivated by the impacts of the proposed landings obligation / discard ban regulations on quality and quantity of data collected onboard commercial vessels (see Section 6.3.2 below). Approaches to evaluating the extent of disruption to time series are briefly reviewed in section 6.3.3.

6.3.1 Changes related to the improvement of statistical design of the sampling programmes

In general, it should be expected that an evolution from ad-hoc designs of catch sampling schemes to statistically-based design and analysis (e.g., according to best scientific practice as recommended in WKPICS and SGPIDS) will reduce bias in key estimates (such as catches-at-age or quantities discarded) that form the basis for stock assessments and advice. Since ad-hoc sampling can lead to biases of unknown magnitude and direction, it follows that the implementation of probability-based design and analysis methods that minimize such bias will likely cause, to some extent, a persistent change in some estimates. For example, an ad-hoc scheme for at-sea sampling may bias sample selection towards vessels with discard rates that are not representative of all vessels in the sampling stratum, and a change to a probability-based scheme could see a step-change in average discard rates from biased to unbiased values. However it is important to emphasize that by their very nature, ad-hoc schemes can also mean poorly-controlled and poorly-documented changes to sampling schemes that can lead to biases varying in a poorly understood way over the course of a time series. A statistically-sound sampling scheme will help stabilise the estimates around the correct values. For these reasons, PGCCDBS advises that **to avoid such change to statistically-sound sampling and opt to continue an ad-hoc sampling programme just to avoid disrupting the time series is not advisable**. If statistically-based designs are implemented, these have the advantage of being flexible and allowing changes in stratification and allocation of sampling efforts over time without further jeopardizing the continuity of the data series. Consequently, any further changes in data collection schemes will mainly affect precision in time series, and will not introduce variable bias that is difficult to correct for. Hence, **such designs will ultimately improve the continuity in time series** and make it more robust to adaptations of the sampling programmes. As far as is possible, any disruption to time series should be evaluated using objective methods (see Section 6.3.3).

6.3.2 Operating Observer Programmes in the context of a Discard Ban

The European Council of Ministers for Fisheries and the European Parliament has agreed to implement a landing obligation of all catches for a number of species. This landing obligation and discard ban will be implemented gradually, with the intention (currently) to start in 2014 with pelagic species and have full implementation in 2019. This legislation would be expected to force changes in fishers' behavior and fishing methods to reduce catches of fish below the minimum reference sizes (MRS) that will be applied. A key question for monitoring of fishery impacts on stocks and ecosystems is how the changes will affect the quality of data on quantities and composition of catches. The Council has suggested in their general approach from June 2012 that

“EU Member States shall ensure adequate capacity and means for the purpose of monitoring compliance with the obligation to land all catches of species under the remit of this discard ban, inter alia such means as observers, CCTV and other”. Final agreement on how a discard ban should be controlled has not yet been made. Therefore, detailed implications on the quality of catch statistics and connections to the DC-MAP requirements are not clear now. PGCCDBS however has the following observations regarding potential impacts on data quality:

For species covered by the ban

Fish that previously were discarded due to fish size or quota restrictions, will now be landed. These catches were previously estimated by observer schemes with typically low coverage, often poor precision, and subject to biases including refusals or inability to take observers on board for safety reasons. Although it is currently not clear how accurately the quantities of fish landed below MRS will be quantified in logbooks, in principle there is the possibility for exhaustive coverage (at least in large-scale fisheries) leading to substantial increase in precision of catch estimates for the species covered by the ban. If the ban leads to illegal discarding, the key question for data quality is magnitude of bias – i.e. if the resultant under-estimate of catches is of greater concern for stock assessment than the poor precision and biases inherent in previous observer estimates. In any case, changes to fishing patterns may be expected to reduce the quantities of fish (and hence fishing mortality) below MRS, and errors in catch estimates for these fish should become of less importance over time for assessments.

The detection and reduction of illegal discarding would be a responsibility for control authorities, but PGCCDBS has a concern about the Council’s statement on possible use of observers to monitor compliance. The role of observers for sampling discard-ban species at sea for DC-MAP purposes should be to collect biological data (lengths, otoliths, maturity) on a haul-by-haul basis, not to provide data for estimating catches of these species at the fleet level (which will be derived from the logbooks which are subject to on-shore inspection by control authorities). There will nonetheless be a need to record catches by haul/trip to develop weighting factors for combining samples over sampled hauls and trips to give total length and age compositions for the fleet. If there is any chance that observer data will be used by fisheries control authorities for identifying illegal discarding, it is likely to cause problems of refused access to observers, or changes to fishing behavior, both of which may lead to bias. It may also jeopardise the cooperation between the industry and scientific institutes running the at-sea observer programmes. This might already be an issue in some countries in some fisheries. Finally, as discarding would be illegal (for all discard ban species), at-sea observer recordings may document potential illegal activity placing observers in a difficult situation.

For the species not covered by the discard ban

The situation for these species will not change and there will be a need for observer sampling or other methods to estimate the quantities discarded as well as the species and size composition. Depending on the type of fishery involved, fishermen might save catch-sorting time by landing some or all of the species that can be discarded, including non-TAC species or species of no commercial value, along with the discard-ban species below MRS. A sampling scheme would be required to estimate these landed quantities as well as the discard component. Any biases caused by observers being refused access to vessels, or skippers changing their behavior when observers

are on board, will impact discards estimates for species not subject to the ban. As recommended by WKPICS and SGPIDS, it will remain important to document all refusals and reasons, so that potential for bias can be evaluated.

Some concern has been expressed by STECF (Plenary April 2011) about the existence of parallel sets of estimates of discards from DCF-related observer schemes or other sampling methods, and from data that skippers are required to record in logbooks. According to the Control Regulation (Commission Regulation No 404/2011), "*Discards of quantities of each species above 50 kg live weight equivalent shall be recorded. Discards of species taken for live bait purposes and which are recorded in the fishing logbook at section 15, shall also be recorded*". The experience of PGCCDBS members who have compared the discard information in the logbooks and the discards estimates obtained from DCF is that the discard information in logbooks is not reliable and the level of compliance is low. STECF stated that "logbook information on discards is almost impossible to control without a very comprehensive observer or camera documentation system. There is therefore a high risk that CR discard data may be biased and not representative for the fishery in question. To ensure reliable discard data for scientific advice purposes it may therefore be necessary to set up a parallel discard sampling system under the DCF". STECF also noted that "A parallel discard sampling system under the DCF may, however, result in two official national discard data series with conflicting information on discard levels and it may be necessary to develop clear rules for scientific and management use of the data."

PGCCDBS 2013 discussed the issue of parallel data sets, but it is not clear how the situation for species exempt from the discard ban (including non-TAC species or those of no commercial value) would change compared to previous years where estimates of discards from at-sea observer schemes have never been treated as "official statistics", and the Control Regulation discards data have never been used as official statistics either. The existence of the 50kg threshold in any case introduces a bias in the CR data, alongside many other issues related to completeness and accuracy of records. The definition of national "official statistics" is likely to involve codes of practice to avoid inclusion of data of dubious quality that may cause reputational damage to the public and professional perception of quality-assured "National Statistics" series. For example, the UK Statistics and Registration Service Act 2007 (SRSA) came into operation in 2008 to promote the quality and integrity of official statistics which serve the public good, and an independent UK Statistics Authority (UKSA) was created as a non ministerial department reporting to Parliament. Its main functions include monitoring and publicly reporting on all official statistics, and independent assessment of key statistics which are designated as National Statistics against a Code of Practice which can be found through links at <http://www.defra.gov.uk/statistics/national-statistics/srsa07>. The code of practice includes the application of sound statistical principles, consistent with international statistical practice, and quality assured by professional statisticians.

It follows that the adoption of EU logbook figures on discarding as "official statistics" (at least in the UK) is extremely unlikely given what is known about the quality of the data. This means that the adoption and use of discards data from any source (observers, self-sampling, CCTV, logbooks) is more of a scientific issue that should be addressed through a proper evaluation of the characteristics and quality of the data. It is possible that logbook data could under some circumstances contain information useful for interpretation and analysis of observer or other estimates, and the scientific community should remain open to methodological possibilities to make best use of all available information.

PGCCDBS however concludes that for stock assessment, mixed-fishery analysis and advisory purposes, including related to ecosystem impacts of fishing, it is important to continue an at-sea observer programme for the collection of scientific data for the DC-MAP. These programmes provide important and necessary information that are difficult to collect at the required detail and accuracy from other methods, provided they follow ICES guidelines for statistically-sound sampling and analysis.

PGCCDBS considers that rules should be set up to specify how species retained at or below the 'minimum reference size' should be stored on board. While aware of physical limitations on board, PGCCDBS stresses that the retained 'minimum reference size' fish should be available for data collection for scientific advice purposes. Therefore, measures should be taken to separate the retained part on a haul by haul basis as this information is crucial to quantify and estimate the amount of retained under-sized fish. Also, fish should be stored as whole fish, enabling the collection of biological parameters. Hence, fish should not be shredded or processed otherwise prior to landing the retained part.

A number of publications on at sea observer programmes, observer effect and other issues related to fisheries data collection is listed below. These documents can be used as background information during the preparation of the DC-MAP as well as setting up the national and regional data collection programmes.

Publications on at sea observer programmes, observer effect and other issues related to fisheries data collection

BENOÎT, H.P, AND ALLARD, J. 2009. Can the data from at-sea observer surveys be used to make general inferences about catch composition and discards? *Can. J. Fish. Aquat. Sci.* **66**(12): 2025-2039

BELLIDO, J. M.; SANTOS, M. B.; PENNINO, M.G.; VALEIRAS, X.; PIERCE, G. J. 2011. Fishery discards and bycatch: solutions for an ecosystem approach to fisheries management? *Hydrobiologia* **670**:317–333

BURNS, R. J. AND KERR, G. N. 2008. Observer effect on fisher bycatch reports in the New Zealand ling (*Genypterus blacodes*) bottom longlining fishery. *New Zealand Journal of Marine and Freshwater Research*, **42**:1, 23-32

FAUNCE, C. H., AND BARBEAUX, S. J. 2011. The frequency and quantity of Alaskan groundfish catcher-vessel landings made with and without an observer. – *ICES Journal of Marine Science*, **68**: 1757–1763

FAUNCE, C. H., AND BARBEAUX, S. J. Deployment and Observer Effects as Evidenced from Alaskan Groundfish Landing Reports. ftp://ftp.afsc.noaa.gov/posters/pFaunce02_deployment-observer.pdf

FURLONG; W. J. AND MARTIN, P. M. 2000. Observer Deployment In The Fishery and Regulatory Self-Enforcement. IIFET 2000 Proceedings

GRAHAM, N., FERRO, R. S. T., KARP, W. A., AND MACMULLEN, P. 2007. Fishing practice, gear design, and the ecosystem approach—three case studies demonstrating the effect of management strategy on gear selectivity and discards. – *ICES Journal of Marine Science*, **64**: 744–750.

PASCOE, S.; INNES, J.; HOLLAND, D.; FINA, M.; TH'ÉBAUD, O.; TOWNSEND, R.; SANCHIRICO, J.; ARNASON, R.; WILCOX, C., AND HUTTON, T. 2010. Use of Incentive-Based Management Systems to Limit Bycatch and Discarding. *International Review*

of Environmental and Resource Economics, 4: 123–161

6.3.3 Methods for evaluating disruptions to time-series data

Several methods exist to estimate disruptions in time series, the magnitude and direction of changes and account for these in future analyses. These go from time-series methods (e.g., Box et al, 2008, Fogarty and Miller, 2004) to calibration studies similar to the ones carried out upon implementing new research surveys where two different sampling designs or two different series are compared side by side during a brief period, or the analysis of temporal evolution of proxy variables (e.g., analyzing changes in discard estimates of by-catch species that are not included in the discard ban).

PGCCDBS 2013 strongly advises that national laboratories maintain clear documentation of their sampling schemes, using the categories of “best practice” identified by WKPCS2 and the QA report structures being tested in 2013, so that changes to the bias/precision characteristics of the data and estimates can be evaluated. The PG also suggests that if the proposal for a WGCATCH is agreed, that the WG should consider in its longer term work plan a process a review of methods for evaluating and quantifying disruption in time series.

6.4 Development of a suitable format for reporting information from age workshops and exchanges on likely errors in age composition data to the Assessment Working Groups and propose to WKSABCAL.

Since 2010 PGCCDBS has recognized the possibility of providing stock assessment working groups with an age precision matrix which could be incorporated into an assessment as known uncertainties in the catch-at-age matrix. This is presently only possible in a statistical assessment model, as many of the conventional assessment models assume catches at age are known without errors. However, in recent years more stocks have changed to statistical assessment models giving the opportunity to incorporate known bias in age readings. If an age reading workshop or otolith exchange programme has occurred it could be a possible to provide stock assessment working groups and data compilation/benchmark workshops with an age precision matrix.

In 2011, a case study was presented to PGCCDBS where the age bias matrix was incorporated in the SAM model; however the process could be more widely adopted.

To obtain a true age, you need access to known-age fish or be able to use bomb carbon or Pb/Ra radiometric validation methods. Alternatively it is possible to use fish from mark – recapture experiments (provided the age at release was known accurately) or have applied other methods, such as counts of daily rings etc provided these are known to be accurate measures of absolute age. However, such information is not readily available for most stocks. Therefore most age-bias matrices will be compiled from an age reader workshop where true age is approximated by the modal age, based on the ages estimated as a combination of the most experienced readers and the number of readers that agree on a given age.

Given the development of image analysis tools to accompany exchanges and workshops (like WebGR) the age calibrations are at times supported by multiple marked readings of the otoliths in an exchange set. These pictures/readings then form the ba-

sis for an agreed-age otolith set, which can be applied as a 'true age' approximation. It should be noted, however, that 'agreed age' will only support estimations of the precision of the age estimations and not the accuracy, as the latter can only be evaluated against known-age material. The PGCCDBS subgroup reviewing work on stock specific age related variables (ToR b) notes that the highest level of details in terms of bias in the outcome of an age calibration workshop is preferable (thus more than a report on overall agreement and CV). The PGCCDBS encourages the development of age-bias matrices such as the example in Figure 6.4.1 and obviously the collation of known-age material where possible. This should be considered at the Workshop on the Statistical Analysis of Biological Calibration Studies (WKSABCAL) in 2014.

To set up an age-bias matrix there is a need for regular systems of age reading comparisons that might be presented before a benchmark stock assessment meeting. This would enable the stock assessment groups to incorporate current age-based uncertainties into age-based assessment models. The interactive table of planned workshops and exchanges has been synchronized with the planned benchmarks to facilitate the availability of such information in due time for a benchmark (see Section 3).

		true age →													
observed age ↓	1	0.04	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0.92	0.05	0	0	0	0	0	0	0	0	0	0	0	0
	0	0.04	0.90	0.07	0	0	0	0	0	0	0	0	0	0	0
	0	0	0.05	0.86	0.09	0.04	0	0	0	0	0	0	0	0	0
	0	0	0	0.07	0.82	0.07	0.04	0	0	0	0	0	0	0	0
	0	0	0	0	0.09	0.78	0.08	0.05	0	0	0	0	0	0	0
	0	0	0	0	0	0.07	0.76	0.10	0.05	0	0	0	0	0	0
	0	0	0	0	0	0.04	0.08	0.70	0.11	0.06	0.03	0	0	0	0
	0	0	0	0	0	0	0.04	0.10	0.68	0.12	0.07	0.04	0	0	0
	0	0	0	0	0	0	0	0.05	0.11	0.64	0.10	0.07	0.04	0.03	0
	0	0	0	0	0	0	0	0	0.05	0.12	0.60	0.11	0.08	0.05	0
	0	0	0	0	0	0	0	0	0	0.06	0.10	0.56	0.12	0.08	0
	0	0	0	0	0	0	0	0	0	0	0.07	0.11	0.53	0.10	0
	0	0	0	0	0	0	0	0	0	0	0	0.03	0.11	0.23	0.74

Figure 6.4.1 example of an age-reading bias matrix, which can be incorporated in a statistical assessment model.

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

7.1 Review any developments in the area of data collection technologies since the PGCCDBS 2012.

7.1.1 Needs for further development and collaboration

Although electronic measuring boards are used more and more over the last years, measuring fish and shellfish is, in general, still done by using a traditional measuring board and the length is recorded by using a pen and paper. Therefore, there is an urgent need to further develop integrated systems, by combining dedicated hardware and software, which would make data collection easier and more automated. Doing so, will lead to improvements in data quality and will reduce the cost of sampling. Furthermore, this should ease the workload while sampling on board vessels.

Even though all fisheries research institutes would benefit from a coordinated initiative for developing a common solution in order to reduce the development and production costs only few initiatives have been made since over the last years and these initiatives were not coordinated internationally.

The national experiences however often point into the same direction when it comes to problems encountered during the development of the national tool.

- Tools are considered to be expensive, thus hampering the implementation at a large scale.
- Development funds are limited, leaving no opportunity for further development for both existing tools as well as development of new tools.
- Software problems often hamper the connection between the tool and data storage. Often, unique software has to be written to facilitate data transfers.

In an attempt to join forces, PGCCDBS would like to encourage and stimulate any initiative to develop electronic facilities for collecting data e.g. length and weight measurements, as well as on board monitoring like CCTV systems. With the expected changes in fisheries management, like the discard ban and the establishment of more closed areas in some regions, the need for adequate and cost efficient measuring and monitoring tools increases.

To speed up the process, there is a need to get more people aware of the existing technologies as well as getting a broader involvement of other expertise especially from companies having useful experience in other fields, where similar problems occur.

PGCCDBS suggests having a dedicated theme-session on new technologies, preferably at the 2014 FAO 'Making the Most of Fisheries Dependent Data: Science, Management, and Policy-making with the Active Participation of Stakeholders' Symposium. This session should focus on the basic new tools needed and should draw attention from both data collectors, as well as the well-known companies in the business and opportunistic companies willing to enter the field. The companies should be challenged to come up with innovative solutions for measuring tools. The session should focus on general tools, like measuring boards, first. PGCCDBS 2012 compiled a list of technological requirements for these tools. This list encompasses requirements like: portable, robust, water proof, inexpensive and open source software.

As a first step in disseminating information on new technologies and to draw attention to the theme-session the following action was agreed:

- An Article on Enabling Technologies will be written for ICES InsideOut (Jørgen Dalskov, Els Torreale)

In order to get an up-to-date status of methodologies and electronic facilities used for collecting information on length and weight in the different countries an overview was produced in PGCCDBS 2010 (ICES 2010a). This overview has been updated in 2011 & 2012 and again at the PGCCBDS 2013. The overview of methods is presented in Annex 10. There were no major changes as compared to the 2012 status, with only a few updates and/or amendments. As in other years, PGCCDBS regards it to be worthwhile continuing to update this table each year as a reference for those labs that may be planning to carry out some developments in this area.

Semi-automatic/automatic methods are used in some countries, mainly on research vessels, but the technology spreads to auction sampling as well. These methods include electronic measuring boards, electronic calliper for crustaceans, digital image analyser for length measurement of shrimps and electronic data capture system.

7.1.2 National developments

The last known national initiatives for developing portable semi-automatic methods for registering some of the fisheries data are summarised below.

Cefas (UK) Electronic measuring board

The Cefas measuring board is 103.5cm x 20.5cm (+ 15.5cm headstock) (see photos below). It is made from light and durable foam, painted white and enclosed in a protective stainless steel frame. The board template is designed to suit individual customer requirements and uses RFID technology to capture measurement data which is stored on the Cefas Electronic Data Capture Unit using a Cefas software application. An optional Wrist Unit is available to display/enter measuring board data or any other user information. It is completely sealed against water ingress and it floats in water.

The tool has been developed in modular fashion to allow easier maintenance and the ability to exchange and swap out components.

They are independent of all the power, transmitting and receiving hardware. The boards are interchangeable but allocated to individuals who can customise them – ie allocate repetitive codes such as port, species, sub-species codes etc - to a range of editable keys. The screen can be worn on the wrist or put in a convenient place and the 5 buttons attached to this unit provide further functionality. Mitotoyo data transmitting callipers are connected to the base unit for sampling shellfish. Sex is transmitted by using the buttons on the wrist /screen unit and meta data are transmitted using the 'keys' on the measuring board or, for convenience, a more simple and smaller companion board

Cefas has also developed software to allow users to easily manage their own system, otolith targets and data uploads. For example samples from the same vessel and same species collected by different staff on different systems can be later merged allowing staff to speed up a sampling event.

Data are transmitted over the internet and uploaded directly into the national biological sampling database. Once quality assured by the sampler using the data review screens the sample is then available for use.

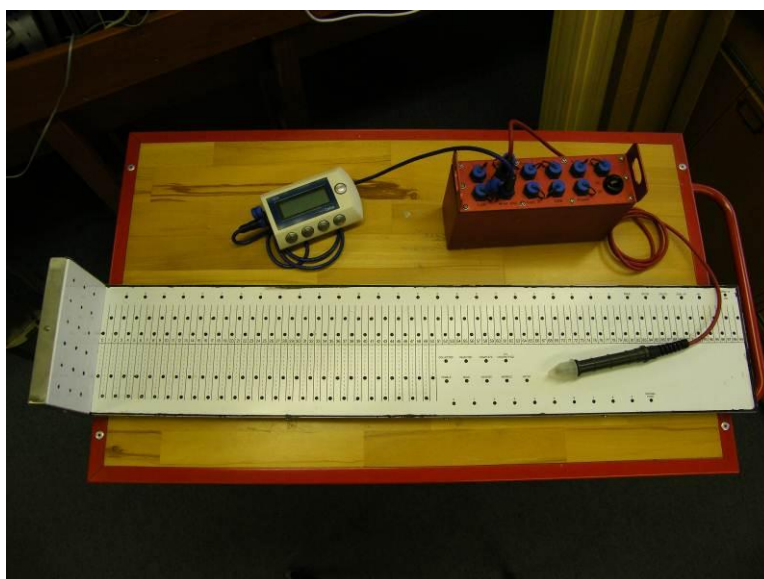


Figure 7.1.2 Belgium (Electronic measuring board for commercial at sea sampling)

As the progress of development of new electronic hard/software has been limited the PGCCDBS 2012 encouraged and promoted any good ideas for development of new technology. Therefore, in order to take the development of automatic electronic equipment for recording fisheries data at ports and on board vessels to a higher level, the PGCCDBS2012 defined a need to involve new expertise from other businesses, and also to establish a forum, participated by field sampling staff and IT-developers, engineers, in which new ideas and new techniques can be discussed and suggested. A list of general requirements was set up in order to be able to approach companies, universities to start the process of involving other expertise:

- The equipment must be capable of recording a variety of parameters such as catch data and biological data (species, length, weight, maturity, etc.);
- Lightweight, portable, robust and waterproof;
- Be capable of working in unstable conditions;

- Must work on both AC and DC power;
- Easily mountable;
- Must have a touch screen;*
- Must be capable of solo or multi person use;
- Capability to download data directly to PC;
- Be able to be used by right or left-handed staff.

Based on these requirements, Belgium started in 2012 a pilot project in developing a new electronic measuring board for sampling at sea on **commercial** trips (fisheries dependant data). In the development of the electronic measuring board, the developers are including:

- On commercial at sea sampling, one observer is on a vessel and he/she will be able to record requested data under the DCF (DCMAP) in a reliable and efficient way.
- The electronic measurement board is usable on surveys and for market sampling as well.
- Software is developed in house to have the flexibility for problem solving and changes
- Length, sex, maturity and weight of gonads is registered with the same device.
- The set of used parameters are developed and usable in a flexible way.
- Registration of individual weights (surveys and lab)
- Total weight and sampled weight to be registered
- Total volume and sampled volume to be registered
- Determination guide of fish species
- Benthos: to be registered
- Marine litter: to be registered
- Graphic representation of the length measurements immediately available to the observer.
- A "length class parameter" is developed to signalize when the requested number of length measurements is reached.

In co-operation with a private company with expertise in the marine military research, ILVO Fisheries (Belgium) is developing an electronic measuring board to be used for commercial at sea sampling. The circumstances in which the data collection at sea is taking place, is not optimal. Therefore, the usability of the application must be optimal and logical. The registration of the data must be efficient and the user must be supported.

The electronic measuring board will replace the present used Scantrol measuring board and will be developed in different phases. The Scantrol electronic measuring board is used at present but is not robust enough for sampling at sea on commercial trips:

- when the CPU unit fails, the whole system fails and it is not possible anymore to register length data,
- The board itself has a significant “wear&tear” during at sea trips.

The electronic measurement board will have an interface with a Panasonic Toughbook, with touchscreen. The application is controlled by a customized numeric keyboard as well.

During the first phase, a specific application for the processing of the length measurements during “sampling at sea”, commercial and surveys is developed.

After each length measurement, the registered length will be sent to the device. On the Panasonic Toughbook, the received length measurements will be processed and be saved on the hard disk.

Subsequently, the data will be uploaded electronically into the Belgian DCF database.

Technology used:

- The electronic measuring board has an interface with the Panasonic Toughbook CF-H2 (touchscreen).
- Measuring sensor 100cm.
- Plexi board with measurement indication.
- Keypad 16 key design.
- Keypad + encoder + RS232+ Bluetooth interface.
- Compatible with OS Window 7 and upcoming OS Windows 8.

In the subsequent phases, the functionalities will be extended to accommodate the other data registration required during at sea sampling (commercial and surveys).

7.2 Review options for collecting transversal data from small-scale fisheries at appropriate spatio-temporal scales and disaggregation levels.

Small-scale fisheries pose a number of problems for data collection due to the distribution and accessibility of boats, and the frequent inability to take observers. Development of technological solutions to data collection may therefore be of particular usefulness for such fisheries.

The definition of a small-scale fishery is unclear (see e.g. Berthou P, Daurès F, Demaneche S 2005. Workshop on Small-Scale Fisheries, Kavala, Sep. 12-16, 2005; Ifremer (coord.) 2007. Small-Scale Coastal Fisheries in Europe, Final report of the contract No FISH/2005/10, 447 p.). The importance of the small scale fleet differs from region to region. Therefore the type of variables required for collection will obviously vary between regions, especially where small scale fisheries constitute the largest part of the MS fishing fleet. These requirements of data type are essentially different, for example, due to gear types, boat sizes, soaking time used etc. Therefore, the group emphasizes the importance of developing a regional approach (e.g. Mediterranean Sea, Irish Sea, Baltic Sea, Skagerrak etc).

The STECF EWG-12-01 reviewed the proposed DCF 2014-2020 (Barza, Italy, 12-16 March 2012) and suggested that Annual Work Plans should only include provisions for collecting data on the small-scale fleets that are not available through other

sources. There should be a list of possible parameters with the mechanism to decide on the final items to be collected regionally. To account for the regional diversity of small scale fisheries gears and methods, a definition of parameters (e.g. gear type/métier, soaking time) should be stated regionally so that the collection of a specific set of parameters is justified. PG strongly recommends that the regional approach is adopted in the new DC-MAP.

There is a forthcoming workshop which will deal with "Common understanding and statistical methodologies to estimate/re-evaluate transversal data, with a special focus on the small-scale fisheries" in Nantes, France from 21-23 May 2013, which will specifically deal with the issue of transversal variables.

- PG suggests that the terms of reference should be updated in accordance with PGCCDBS to encourage participants from all regions.
- PG suggests that the title should be changed to reflect the focus of the meeting [rename as "Common understanding and statistical methodologies to estimate/re-evaluate transversal data in small scale fisheries].

During the meeting in Nantes participants may consider e.g. determining the relative importance of small-scale fisheries by stock on the national level, discussing how information will be collected, and how the requested parameters can be incorporated into the data collection. Special focus should be given to the future DC-MAP and the use of modern technologies such as CCTV or mobile phone apps for reporting fishing activities.

8 Identify reasons for differences between raised discards estimates provided by ICES and STECF, and make recommendations on how to resolve this problem in the short and longer term. (TOR g)

8.1 Request to PGCCDBS from Commission

ICES was asked by the European Commission to include a Term of Reference to PGCCDBS to address the discrepancies between discards estimates documented by ICES stock assessment working groups (AWGs) and the equivalent values published annually by STECF, and to make recommendations on how to resolve the problem in the short and medium term. The EU Commission has recently started to publish European data on discards, obtained through the STECF data call, available through a webpage:

(<https://fishreg.jrc.ec.europa.eu/web/datadissemination/tables>).

Discard estimates are also published in different STECF EWG reports. These discard estimates are not always consistent with the estimates published in the ICES AWG reports and/or advisory sheets.

PGCCDBS 2013 compared discard estimates in the EU database and in the assessment group reports for a selected number of stocks. Participants from different countries at the PG meeting were asked if the estimates from their country are consistent and, if not, the reasons why. This analysis is not complete but did highlight at least some key issues. Comparisons could only be made for a few stocks (primarily cod stocks in the Baltic and cod recovery areas). There are however substantial differences (up to fourfold in some cases) between the two sources (Fig 8.1.1).

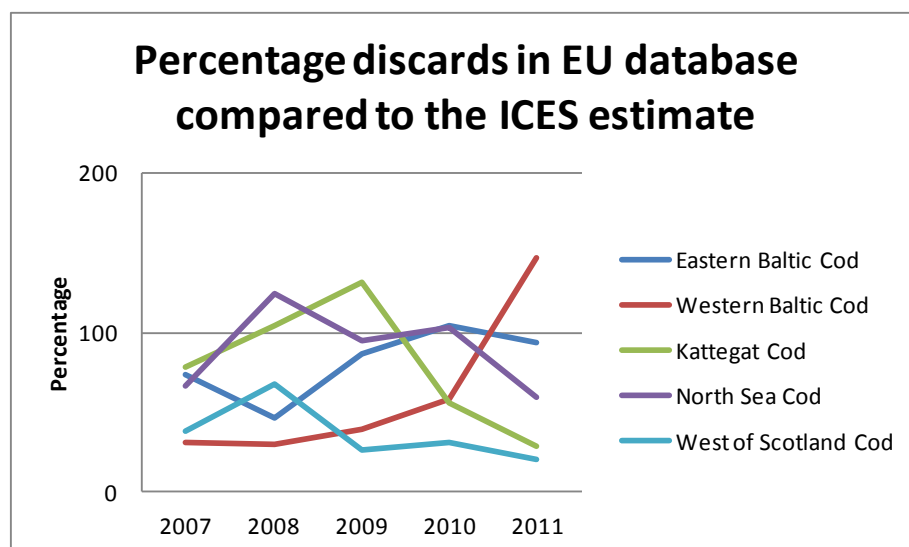


Fig 8.1.1 - A comparison between the discard estimates by stock. The STECF estimate is expressed as the percentage of the ICES estimate. In the case of West of Scotland cod the STECF estimate is compared to an adjusted ICES estimate.

8.2 Differences in end-user needs

Discard estimates are usually obtained from the fishery sampling programmes in the DCF. Presently there are two main types of end-users. The first type of end user is ICES assessment working groups (AWG) conducting single-species or multi-species stock assessments. They need discard estimates by stock to estimate fishing mortality

and population numbers at size or age. For some statistical models the catch data are disaggregated into broad fleet groupings to allow separate modeling of selectivity patterns. The second type of end users includes the ICES Working Group on Mixed Fisheries Advice for the North Sea (WGMIXFISH) developing mixed-fishery models, and the STECF expert working group (EWG) evaluating the effectiveness of the fishing effort regulation schemes. The second type of end users ask for data aggregated at very fine scales (e.g. métiers defined by target species, gear type, mesh size and in some cases vessel length class) in order consider how management measures applied to vessels using different regulated and unregulated gears would affect overall fishing mortality at age.

8.3 How data are aggregated and supplied to end users

National data for STECF EWGs and ICES AWGs are now obtained through formal data calls. Member States are obliged to submit data collected through the DCF in accordance with the call. If they do not they risk a cut in DCF funding.

For stock assessment AWGs, the national discards and catch-at-length or age data have in the past been requested from countries in a way that permitted them to use raising and aggregation procedures appropriate to their sampling schemes. The national strata may have included fleet or gear groupings corresponding to a variable extent to those required by STECF. Countries uploaded raised discard data into the ICES InterCatch database and/or submitted the data to the stock-coordinators. The data were then further aggregated to the stock level as required for stock assessment models. In 2012, ICES called for North Sea fishery data to be entered on InterCatch at the métier level following a request by ICES WGMIXFISH. In 2013, the combined data call for the AWGs and WGMIXFISH has been extended to the Celtic Seas ecoregion. For InterCatch to raise data by métier, raising factors are needed by métier. As national sampling schemes are frequently adequate only for the main métiers, procedures are needed to impute missing national estimates for any national métiers with no sampling. Currently there are few guidelines for dealing with this. The continuity of assessment data series following a shift from the previous national stratification schemes for raising their data, to an enforced métier-based post-stratification, remains an important issue.

STECF EWG requirements are met by national scientists working with the same discards data supplied to ICES. Data are raised to the métier level by the national scientists. This may require complex manipulations of data and imputations where métier data are missing for areas or quarters. This problem often arises because the national discards sampling schemes have historically been designed to supply stock-based estimates and cannot supply adequate numbers of trips for all métiers at a quarterly level. The raised data are supplied to the STECF data base, and the Commission's scientists at JRC in Ispra apply algorithms that have been developed to make any imputations needed to fill gaps in data. (In the event that no countries sampled a métier, no estimates of discards would be provided).

8.4 Sources of discrepancies

Raising and aggregation procedures in relation to sampling design

One of the main reasons for discrepancies seems to be the high level of detail and disaggregation required for the STECF data call. Although the DCF has required Member States to achieve a minimum sampling rate for the Level-6 métiers listed through the regional ranking system, national discard sampling schemes are in many cases

unable to meet this requirement even if able to supply acceptable estimates at the fleet-aggregated stock level using the strata included in their sampling design. Whilst the largest métiers for a country may have sufficient observations, many of the smaller métiers may have few or no samples for specified areas and time periods. Post-stratification at the métier level is particularly complex where the métier cuts across national sampling strata such as areas and vessel length classes where these are used, and imputation methods for dealing with gaps in sampling coverage at a national level become equally complex. Some countries adopt vessel length-class strata that they consider best suits their estimation accuracy (sometimes at higher resolution than STECF demands) but that do not necessarily conform to STECF stratification standards. A range of imputation and other data manipulation techniques are therefore used at national laboratories and at JRC to fill gaps for STECF data or deal with incompatibilities between STECF needs and national sampling design. These procedures are not well documented. For example, some laboratories impute métier estimates for missing strata by “borrowing” data for sampled trips in surrounding strata, whilst other MS raise the data for sampled trips in accordance with their sampling scheme, then distribute data to the different métier cells proportionally to the raising factor.

It is not always the same scientist that compiles data for the ICES AWG and the STECF EWG. Different scientists may use different raising techniques and auxiliary variables, resulting in different discard estimates (ICES WKDRP, 2007). This can lead to widely differing values particularly when numbers of sampled trips are low. Also, many sampling programmes are, for logistical reasons, carried out in an ad hoc way when it comes to selection of primary sampling units (eg vessels). This makes the estimates sensitive to different raising procedures and it also makes it difficult to assess the representativeness of the samples. This is slowly changing through the recent work in ICES WKPICS and SGPIDS.

The recent requests by ICES for national scientists to upload assessment data on InterCatch at the métier resolution requested by WGMIXFISH may start to bring ICES and STECF estimates closer, but is still problematic where sampling designs and sampling effort are incompatible with post-stratifying at the required métier level, resulting in a need for complex imputations for missing data. These can lead to bias, and it is particularly problematic where there are no clear and specific methodological guidelines from ICES.

Units in the STECF database

Discard estimates (as well as landing estimates) from some countries in some areas seem to be expressed in kg and not in tonnes as indicated in the database. If this is not accounted for when estimates are combined over countries, the combined estimates will be wrong and will contribute to differences with ICES figures.

Stock boundaries

In several cases the stock/report boundaries are different between ICES and STECF, which makes direct comparisons difficult. One example is for plaice. The STECF database provides a combined estimate for North Sea (IV), Skagerrak (IIIaN), Eastern Channel (VIId) and the EU part of area II. Within the ICES, North Sea and VIId plaice are assessed individually and Skagerrak is assessed together with Kattegat. Discard estimates of plaice are not included in all assessments and are therefore not always present in the AWG reports. Comparisons need to take this into account.

Discard estimates in ICES assessment working group reports and advisory sheets

It is not always easy to identify the discard figures that originate from the national discard sampling programmes in the ICES reports. Sometimes there are no figures at all, sometimes there are only figures on numbers of discarded fish, sometimes figures are adjusted to account for misreporting, and sometimes there are several different sets of estimates of discards. The latter situation can occur where statistical models are used, and the input data are tabulated along with the model estimates of catches at age including discard components. Discard figures presented in an AWG report may also only apply to the age ranges used in the assessment. Comparisons between ICES EWG and STECF figures need to be on a like-for-like basis.

Incomplete data

Data from all countries are not always present in the STECF database. Comparisons are inadequate if major contributors to the discard estimates are missing. Without knowledge of the specific fishery it is difficult to assess if the main contributors are included.

Mistakes

There may be typing errors.

8.5 Advice from PGCCDBS for short-term and longer term solutions to the problem

PGCCDBS identifies three short-term priorities, to start to address the problem of inconsistent discards estimates:

- i) Production of **documentation** to describe the procedures adopted (a) by national scientists for raising and imputing data to give estimates for national fleets and (b) by end-users (ICES, STECF-JRC) for aggregating national estimates to regional/stock estimates including any imputation involved. [Action: *ICES AWGs* to ensure Stock annexes clearly describe the methods; *STECF EWG* to request **National laboratories** supplying STECF data to document how their discard data are processed for this purpose and explain any differences between estimates submitted to ICES and estimates submitted to STECF; *JRC* to document procedures adopted within STECF database to aggregate over national estimates and impute missing data].
- ii) **Improved reporting** of estimates in ICES and STECF reports to clearly demonstrate what the data represent, so that it is easier to compare the different data sources and understand why there may be discrepancies [Action: **ICES AWG** and **WGMIXFISH**; **STECF EWG**]
- iii) **Quality assurance** of discards estimates for example to identify mistakes or wrong units. [Action: **national scientists** supplying data to ICES and STECF; **JRC** for STECF database.]

PGCCDBS also identifies three additional longer-term solutions:

- i) **Development of best-practice guidelines** on how to process data if the end-user requires data at a different scale than the sampling programmes are designed for. [Action: **WKPICS3** or proposed **WGCATCH** to develop such best practice]
- ii) **Documented estimation procedures within a regional database** to make the raising/extrapolation transparent and give the end-user knowledge about the quality of the estimates. [Action: **RDB Steering Group**].
- iii) **Implementation of statistically sound sampling schemes** to facilitate the processing of data to meet fishery and stock-based domains of interest without having to resort to complex data manipulation and imputation. [Action: **individual countries** in response to WKPICS/SGPIDS/PGCCDBS recommendations.]

Additional notes on the above:

Improved documentation:

Such documentation should include both historical data as well as new data entering the database. Is there any imputation of data and in such case what are the methods used? Are there a minimum number of samples behind a raised estimate (e.g. do countries raise data for a fleet based on only one sample?) Are there additional sources of data being used (e.g. input from the industry/ collaboration projects with the industry)? What are the main reasons for divergence between estimates provided to ICES? It should also be documented how the JRC and STECF EWGs deal with missing data from individual countries, identifying particularly where estimates based on poor sampling in one country are extrapolated to countries with no sampling but which have a large fraction of the annual international catches, and if this is reflected in the database/reports.

Improved reporting of discards data in ICES and STECF reports

The reports should contain easily recognisable and interpretable tables of discards estimates. The reports should describe where documentation can be found on the methods and procedures for deriving the discards estimates. Tables of discard estimates used in an assessment should clearly identify if they represent all discards components, or exclude any countries, fleets or size/age groups. If data components are available but not used, they should be listed. Aggregate discard estimates should be expressed in tonnes in ICES reports to allow comparisons with STECF or other sources of documented estimates.

Quality assurance procedures for submitted data

There is a DCF requirement for all national data to be validated before submission to end users. Member States should be in a position to describe how such validation is done. An additional validation is needed for estimates input to data bases such as the STECF data base, to help identify typographic errors or use of incorrect units (e.g. kg rather than tonnes).

Best-practice guidelines on how to deal with data calls (e.g the STECF data call) that request data on a different level than the sampling schemes

Best practice needs to be developed on how to derive discard estimates and identify quality issues in cases where the end-user requirements are for domains of interest at a much different level than the design of the sampling schemes. This is a particular issue where the request is for data at a much finer scale than can be supported by existing sampling schemes without extensive and complex imputation or other data manipulation needed because the domains of interest are badly matched to the stratification schemes of sampling programmes. Such guidelines would ideally be available prior to national documentation of data processing methods being employed, so that the format for documentation can allow easy evaluation against best-practice guidelines.

Further development of estimation modules for discard data in the regional database

The regional database (RDB) FishFrame has been used to raise discard data on cod for the AWG in a transparent way. However, the RDB (exchange format and raising modules) need to be developed further to meet the requirements from sampling programmes in other regions as well as to cater for estimation processes when data are collected through statistically sound sampling schemes. Such sampling schemes have been promoted by ICES PGCCDBS, WKPICS and SGPIDS and will allow a better possibility to assess representativeness and quality of discard data.

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Annex 1a: PGMed List of participants and ToR's 2013.

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Annex 1b. PGMed ToR's

Terms of Reference PGMed 2013

Belfast (Northern Ireland), 18th February – 22nd February

- ToR 1) Ranking system for the whole Mediterranean and for the Black Sea
- ToR 2) Reviewing and update of the landing template for the Mediterranean and for the Black Sea
- ToR 3) For the metier which are exploring a shared stock and selected by the ranking system, the number of sampling trips by metier at the GSA level can be determined.
- ToR 4) Assess the CV for shared stocks both for the Mediterranean (GSA 7, GAS 15-16, GSA 17) and Black Sea.
- ToR 5) To analyse the extension of the problem concerning the fishing performed in a different GSA than their original one
- ToR 6) Update the work conducted in the PGMed 2012 for large pelagic species on sampling of length and stock related variables by using 2011 data
- ToR 7) Assess the CV of large pelagic for length
- ToR 8) Progress in the Mediterranean & Black Sea Regional Data Base
- ToR 9) Discards. Comparison at regional level
- ToR 10) Proposal of workshops and studies
- ToR 11) AOB

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Annex 3: PGCCDBS 2012 Recommendations with Follow – Up Actions by PGCCDBS 2013

The following table summarises the status of PGCCDBS 2012 actions and recommendations as at the time of the PGCCDBS 2013 meeting.

Actions

REPORT SECTION	RECOMMENDATION	FOR FOLLOW UP BY	TIMEFRAME	STATUS AT PGCCDBS 2013
1.4	<p>Integration of PGCCDBS and PGMed</p> <p>For the meetings: (i) when possible, join all presentations of potential interests for the Mediterranean together, so that PGMed can have more time to work on their specific ToRs; (ii) presentation of PGMed main results and discussions in plenary on the last day.</p> <p>For the report: (i) include a summary of relevant issues discussed in plenary in the PGMed report; (ii) include the list of ToRs of each group in the other's report; (iii) include the list of participants of each group in the other's report; (iv) add a link to the online report; (v) include the list of workshops of potential interest of each PG. To be actioned by the chairs of PGCCDBS and PGMed.</p>	PGCCDBS		Done at 2013 meeting
3.5	<p>Interactive table: The Interactive table of age calibration reports by ICES species-stocks will be uploaded to the PGCCDBS European Age Readers Forum and all age calibration reports will be moved to the PGCCDBS docs repository, with links back to the original ICES database locations (e.g. the European Age Readers Forum SharePoint site (Cristina Morgado). Missing age calibration reports located by PGCCDBS scientists and colleagues will be sent to Jane</p>	PGCCDBS		Table has been updated by subgroup. However the links in the table are still not live and there is no link to the EARF. This will be addressed in 2013.

	<p>Godiksen who will coordinate with the ICES Secretariat to keep the table updated.</p> <p>Francesca Vitale will coordinate with the ICES Secretariat to keep the Interactive table of maturity calibration reports by ICES species-stocks updated, and this will be uploaded onto the PGCCDBS docs repository.</p>		
3.6	<p>European Age Readers Forum</p> <p>All members of the European Age Readers Forum SharePoint should be informed that they can be alerted to updates on the site by activating the e-mail notification system. To be Actioned by the ICES Secretariat.</p> <p>Details of the location and ownership of Reference collections of both annotated agreed age images and calcified structures should be housed on the forum. To be actioned by Workshop coordinators.</p>	PGCCDBS	<p>Members advised by ICES secretariat in 2012 on how to set up the alerts. Is an ongoing action for age workshop coordinators to put details of reference collections on the site.</p>
3.6	<p>WebGR</p> <p>From recommendations of WebGR users some short-term needed developments have been identified.</p> <p>Develop installation packages in order to allow an easy set-up of the tool in servers different from the one provided by the WebGR consortium and in Windows and Linux environments.</p> <p>System need to provide better information about errors encountered during the batch upload of images, since it has been identified as the major problem by coordinators when setting up a new workshop.</p> <p>Since the average user is not an IT professional a better user manual need to be written and an FAQ system would be desirable in WebGR's wiki page.</p> <p>A tool allowing calibrating a set of images from the pixel to real distance ratio for having a calibration bar in the annotation</p>	PGCCDBS	<p>Addressed by PGCCDBS meeting 2013 age subgroup, please refer to section: 3.5 of the PGCCDBS 2013 Report.</p>

	<p>screen is expected to be a great help for readers.</p> <p>An R package (RWebGR) on statistical methodologies that will be developed during WKSABCAL 2014 for analysis of results of maturity and ageing workshops needs to be developed and its direct link to WebGR.</p> <p>Develop a tool that allows performing daily rings study.</p> <p>In the medium term and considering that WebGR has an Adobe Flash based interface that is likely to be discontinued by Adobe, start migrating the interface to other standards like HTML5 would be advisable to.</p>		
4.1	<p>Changes to the ToRs of WKPICS2 and SGPIDS2. In relation to fleet based biological sampling were recommended during the PGCCDBS 2012 meeting. To be actioned by the chairs of WKPICS2 and SGPIDS2 and ICES Secretariat.</p>	PGCCDBS	ToR's updated at the 2012 PGCCDBS meeting.
6.4	<p>Follow up to WKPICS/SGPIDS recommendations</p> <p>PGCCDBS recommends that the PGCCDBS 2013 meeting reviews progress by SGPIDS and WKPICS in identifying quality indicators and how they may be best used to, inform national sampling coordinators that may need to revisit their sampling designs and or improve on their sampling frequency and inform end users whether or how the data can be used for the assessment they are attempting. To be actioned by the PGCCDBS chairs for the PGCCDBS meeting 2013.</p>	PGCCDBS	<p>Addressed by PGCCDBS 2013..</p> <p>WKPICS2 has a proposal for a quality indicator scheme in the form of Stock Quality Assurance Reports, based on previous proposals from WGRFS, SGPIDS, WKACCU etc. PGCCDBS 2013 has recommended a trial of these reports to review both their efficacy and ease of use (see Section 6.1). This trial is intended to involve national sampling coordinators, RCGs, and EGs.</p>
7.1	<p>Enabling technologies</p> <p>PGCCDBS would like to encourage and stimulate any initiative to develop electronic</p>	PGCCDBS	Article was not written

facilities for collecting data e.g. length and weight measurements. To speed up the process, there is a need to make more people aware of the existing technologies as well as getting a broader involvement of other expertise. In order to start this process the following action is proposed:

An article will be written in the ICES InsideOut and other fisheries magazines where possible on current technology in use and on emerging enabling technologies which simplify biological data collection. This will be done jointly by Els Torreele, Belgium and Jørgen Dalskov, Denmark.

(a) Recommendations to other groups

REPORT SECTION	RECOMMENDATION	FOR FOLLOW UP BY	TIMEFRAME	STATUS AT PGCCDBS 2012
5.4	PGCCDBS Recommends that a Recommendations Database set up by the ICES secretariat on the RCM Share Point for all areas. It will be accessible by all RCM members in read-only format and the RCM chairs will have read/write access. All recommendations, as well all strategic comments and suggestions, should be available in the recommendations database.	ICES secretariat		Completed
6.1	PGCCDBS recommends the RDB Steering Group should consider how to produce reports on quality indicators for time-series data; taking into account aspects of sampling design and data analysis recommended by Wks PRECISE, ACCU, MERGE, PICS, and in a format useful to the end users (AWGs/EGs, etc.).	RDB Steering Gp		Ongoing

REPORT SECTION	RECOMMENDATION	FOR FOLLOW UP BY	TIMEFRAME	STATUS AT PGCCDBS 2012
6.3	PGCCDBS recommends that WKNARC2 should review what experience there may be, worldwide, of incorporating age based uncertainties into age based assessments.	WKNARC2		Will be addressed by WKNARC2 in May 2013
6.4	PGCCDBS recommends that SGPIDS forward the outcome of their latest meeting to WKPCS2 who will coordinate responses relating to both onshore and offshore sampling schemes and make recommendations on the development of the WKACCU score cards. This may lead to a more focussed workshop on the development of these score cards in 2013–2014.	SGPIDS		Done
7.2	PGCCDBS recommends that the Commission and ICES jointly consider how to address the following concern and ensure that Member States receive access to VMS data: As real time access to logbook and VMS data is crucial for carrying out cost efficient data collection and ensuring quality of the sampling process the PGCCDBS would like to stress the importance for the national authorities holding this data to find solutions for the national institutes to get on line access to the data.	Commission and ICES		Ongoing discussion as part of new DC-MAP

Annex 4 Revised ToRs for WKPICS3

The third **Workshop on practical implementation of statistical sound catch sampling programmes (WKPICS3)**, chaired by Jon Helge Vølstad, Norway, and Mike Armstrong, UK, will meet in ICES HQ, Copenhagen, in 19 – 22 November 2013, to:

- a) Evaluate the trial application of Quality Assurance reports developed by WKPICS2.
- b) Review sampling design and estimation procedures currently adopted within Europe for estimating age compositions and weight-length (W-L) relationships for retained and discarded fish, evaluate potential for bias, and develop Quality Indicators related to this in QA reports.
- c) Finalise guidelines on estimation procedures for all four principal classes of catch sampling schemes including using auxiliary data for re-weighting. Using case studies, provide guidance on best practice on the estimation of discards to satisfy data calls, comparing design-based procedures and post stratification procedures.
- d) Finalise recommendations for the Regional Databases concerning procedures for combining national fishery sampling data or estimates to give regional or supra-regional estimates for fisheries or stocks.
- e) Summarise conclusions from the WKPICS series of workshops and consider the next steps to providing a reference book on the design and analysis of statistical catch sampling programmes. Consider the setup of a live document (web based) to link documents and further developments in procedures etc.

WKPICS3 will report by 20 December 2013 for the attention of PGCCDBS, RCMs, STECF-EWG on DCF, and ACOM.

Annex 5 Revised ToRs for SGPIDS3

The **Study Group on Practical Implementation of Discard Sampling Plans (SGPIDS)**, chaired by Alastair Pout & Marie Storr-Paulsen, will meet in SLU DAR IMR, Lysekil, Sweden, 24–28 June 2013 to:

- a) Review and refine the use of sampling frames and vessel selection procedures for at-sea sampling programmes;
- b) Evaluate, and where necessary develop, the quality indicators for discard sampling programmes, as defined at SGPIDS 2012, and WKPICS2 2012.
- c) Assess on-board data collection protocols in respect of estimation procedures appropriate for design based at-sea sampling schemes (as set out in WKPICS 2) and RDB data formats.
- d) Review the reporting of discard estimates and quality indicators of national sampling designs for end users and as metadata to regional databases;
- e) Continue to collaborate with ICES WGBYC on integrating the reporting of protected, endangered and/or threatened species.

Annex 6 ToRs and Supporting information for proposed Working Group on Commercial Catches (WGCATCH)

The **Working Group on Commercial Catches (WGCATCH)**, chaired by XX, XX, will be established and will meet in XX, ICES, XX June 2014 to:

- (c) Address generic ToRs given in the table below *<to be drafted>*
- (d) Address specific ToRs..... *< to be drafted>*
< ToRs to be agreed before 2013 ICES Annual Science Conference >

WGCATCH will report by XX for the attention of ACOM.

Supporting information

Priority	PGCCDBS recommends that a new expert group WGCATCH be established in 2014, based on the merging and extension of WKPICS and SGPIDS, and the equivalent work conducted within PGCCDBS. A main objective of WGCATCH will be to support the development and quality assurance of regional and national catch sampling schemes that can provide reliable input data to stock assessment and advice, while making the most efficient use of sampling resources. As catch data are the main input data for most stock assessment and mixed fishery modelling, these activities are considered to have a very high priority.
Scientific justification	<p>The data collected from the commercial fisheries have a primary function of supporting stock assessments and informing fleet-based management decisions. The WGCATCH will work to help European countries achieve sufficient accuracy (increase precision and minimize bias) of catch and catch composition estimates (for a given level of sampling effort) that are used as input to the ICES stock assessment, mixed-fishery, and ecosystem-based analysis and associated advisory process. The WG will operate within the ICES Quality Assurance Framework and respond to the requirements of the EU Data Collection Framework (DCF) and future DC-MAP, and recommendations from end-users.</p> <p>Currently all EU Member States collect commercial catch data (e.g., estimates of discards and size/age composition of catches) according to practices under the DCF. The EU commission spends large budget on DCF-related data-collections from fisheries. However, to make the most efficient use of EMFF funds for sampling resources in the DC-MAP, a statistically sound sampling programme should be implemented in all member states. Such programmes are also needed for non-EU countries supplying data for the assessments. If statistically-based designs are implemented, these have the advantage of being flexible and will allow changes in stratification and allocation of sampling efforts over time without jeopardizing the continuity of the data series.</p> <p>WGCATCH will act as a link to the RCMs (RCGs) by developing data quality Indicators and reports for national and regionally aggregated data sets, and by advising on analysis modules for regional databases (RDB). WGCATCH will provide RCMs/RCGs with the tools to review efficiencies and adapt and improve on their programmes, and will provide end users such as ICES assessment EGs and STECF with procedures for auditing the quality of data used in analyses</p>

underpinning stock-based, fleet-based and ecosystem-based fishery management advice.

The combination of statistical expertise in survey design and analyses methods and practical implementation skills makes this working group unique, and ensures it effectively bridges the gap between data collection and data end-users which is essential to collecting effective scientific evidence for fishery management.

WGCATCH will have the following overall remit

Continue the development of methods and guidelines for best practice in quantifying commercial catches and catch compositions where sampling programmes are needed at sea or on shore, covering design of sampling schemes, practical aspects of data collection, data archiving, and analysis of data to provide estimates meeting end-user needs.

Develop and update quality assurance procedures and quality indicators for data and estimates derived from catch sampling programmes, for example to support the ICES benchmark assessment process.

Review the progress in implementing statistically-sound catch sampling programmes within Europe and in developing collaborative regional approaches including sampling of national vessels landing in foreign countries.

Evaluate how changes in fishery management measures are affecting fishery sampling schemes and the quality of the data, and recommend solutions.

Develop approaches for evaluating impacts of changes in sampling design to continuity of data series.

Respond to requests for technical and statistical advice related to fishery sampling from Regional Coordination Groups and the main data end-users.

Provide advice on development of regional databases (RDB - FISFRAME) to include estimation modules that are in accordance with statistically-sound survey design, and modules for data quality reporting.

Identify and promote technological developments for improving the efficiency of catch sampling and improvement in data quality.

Develop and maintain a reference list of key publications or other available resources dealing with design and implementation of fishery sampling schemes and associated data analysis, and annually review new publications of relevance to WGCATCH.

Identify future research needs.

Resource requirements	The WG builds extensively on experiences gained within PGCCDBS, WKACCU, WKPRECISE, WKMERGE, WKPICS, SGPIDS and WGRFS. European countries are encouraged to provide the WG with documentation of their sampling programmes, updated manuals and protocols for review and feedback by the WG, and to ensure that their national members of WGCATCH have sufficient resources to conduct the necessary intersessional work to address the ToRs.
Participants	It is expected that WGCATCH will normally be attended by some 20–25 members.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to advisory committees	WGCATCH supports ACOM by promoting improvements in quality of fishery data underpinning stock-based and mixed fishery assessments, and ecosystem indicators related to fishery impacts, and in developing data quality indicators and quality reports for use by assessment EGs and

	benchmark assessments.
Linkages to other committees or groups	WGCATCH links with PGCCDBS in relation to collection of stock-based biological variables from sampling of fishery catches. It links to stock assessment EGs and benchmark assessment groups by providing input on the data quality of commercial catches. WGCATCH also links closely with Regional Coordination Groups, the Regional Database Steering Group, STECF EWGs dealing with DC-MAP and the Liaison Meeting.
Linkages to other organizations	The outputs of WGCATCH will be of interest to FAO and RFMOs, and productive linkages may be established over time.

Annex 7 PGCCDBS response to issues raised by ICES EG data contact persons.

Issues related to stock-based biological parameters

ICES RECOMMENDATION DATABASE ID	EXPERT GROUP	EXPERT GROUP RECOMMENDATION	PGCCDBS 2013 RESPONSE
8	HAWG	Collation of age-length keys of sprat in the Celtic Sea and West of Scotland should be done. A first step should be to validate the ageing of sprat from this area. HAWG recommends including available material on this part of the sprat stock complex in the upcoming large-scale exchange on Sprat in the North Sea.	<p><i>For the collation of ALKS: HAWG should do this.</i></p> <p>The large-scale North Sea sprat exchange otolith exchange has been extended to include Celtic sea and Western Scotland.</p> <p><i>Validation of sprat age reading:</i></p> <p>Micro-increment (aka daily ring / microstructure) validation exists for NS and Baltic stocks (WKSPRAT 2013). PG advises to wait on the results from this upcoming exchange before evaluating the need for a validation study.</p>
55, 230	WKMSPDF2 , WKMSTB	The group recommends that a maturity-stagers forum is installed, following the lines of the age-readers forum facilitated by ICES	<p>Question to be put to ICES-secretariat?</p> <p>The preferred choice is a separate maturity forum (EFMF?)</p>
56, 234	WKMSPDF2, WKMSTB	WKMSPDF2 recommends that the meeting frequency should be once each 3-5 years. WKMSTB recommends that there is no need for another workshop in due time. WKMSTB does recommend that before a next maturity staging workshop a calibration exercise using WebGR is conducted. Based on the results of this calibration exercise it should be decided if a new workshop is	<p>PGCCDBS supports the recommendation on the calibration exercise. However, updated guidelines will be drafted when WebGR is fully functional. The guidelines need to be updated and should be in line with the PGCCDBS recommendations for age calibration. I.e. The frequency of exchanges and workshops mainly depends on the quality of the maturity data and will be revised by expert groups. Even if no</p>

		<p>needed.</p> <p>WKMSSPDF2 recommends that the group should not be expanded with more species (and so, more people).</p> <p>WKMSTB recommends that it might be worth to consider a joint workshop for turbot and brill with other flatfish species.</p> <p>WKMSTB recommends that it should be checked beforehand if there is any country interested in a maturity staging workshop for these two species.</p> <p>The national institutes should be strongly encouraged to put effort into making pictures, and should find time and money to do so. Successful maturity staging workshops cannot be carried out without these pictures.</p>	<p>quality issues were revealed in workshops or exchanges, quality assurance requires the organisation of an exchange at least once every 3-5 years. The possibility for a workshop should be offered every 5 years.</p> <p>The chairs of both workshops should resolve this .</p> <p>PGCCDBS will nominate coordinators for exchanges and workshops when the PGCCDBS finds it necessary to hold an exchange or workshop.</p> <p>The proposed maturity staged forum should maintain an up to date list of the institutes and the species for which they contribute maturity data. It should also maintain a maturity reader contacts page.</p> <p>We encourage institutes to make pictures of macroscopic staging. In case regular photographing is not feasible, the institutes that contribute maturity data to assessments should provide images of their sampled maturity stages for use in exchanges and workshop.</p>
53	WKMSSPDF2	<p>Macroscopic maturity staging is a reliable method when used from two months before the spawning season until the end of spawning to assess maturity. It is recommended that macroscopic maturity staging of fish only takes place in this period, unless it can be supported with histological sections.</p>	<p>PGCCDBS supports this recommendation.</p>
101	WGBEAM	<p>WGBEAM recommends that the maturity</p>	<p>This was originally from WGNSSK to WGBEAM</p>

		<p>subgroup of PGCCDBS, investigate other sources of data for the calculation of mean size at first maturity.</p>	<p>in 2011 to ask if they have maturity data for various species. WGBEAM indicated that surveys were wrong time of year and no data collected.</p> <p>The PGCCDBS can on request provide an overview of available data for the required species, and the optimum time for collecting such data based on existing knowledge of spawning seasons.</p> <p>(Details of the link to the Interactive Maturity Long Term Planning Table can be sent to the WGNSSK and WGBEAM chairs, for information on future quality assurance exercises for maturity identification, when this is online on the ICES website.)</p>
232, 58	WKMSTB, WKMSSPDF2	<p>WKMSTB/WKMSSPDF2 recommend that in future workshops it should be decided if all stagings should be checked against the microscopic stage or the modal stage. If it is decided to continue using the modal stage it should than be decided to base the modal stage on all participants or only the modal of the expert stagings. (see WKMSSPDF report section 7)</p>	<p>The use of modal maturity data does not appear to be reliable, thus histological preparations should be used. WKMATCH should update the guidelines for maturity workshops accordingly.</p>
233	WKMSTB	<p>It is recommended that for future development the comments of this groups are taken into account (see section 10 and ICES (2012) for the full list)</p>	<p>WebGR will be developed in a 2 stage process.</p> <p>Development of WebGR tools will be considered by WKNARC2.</p> <p>Statistical outputs will be considered by WKSABCAL.</p>
217	WKACM2	<p>WKACM3 workshop in 2015</p>	<p>ACOM should be reinstated on the recipient list.</p>
218	WKACM2	<p>Age validation study to solve the growth rings interpretation</p>	<p>PGCCDBS and PGMED decide on the planning</p>

219	WKACM2	Otoliths Exchange of <i>M. surmuletus</i> and <i>barbatus</i> in 2014	of an exchange, validation study, Workshop.
220	WKACM2	Clarify guideline of ageing criteria (e.g. date of birth) in the Mediterranean sea	WKNARC should clarify guideline of ageing criteria (e.g. date of birth) in the Mediterranean sea. PGCCDBS 2014 to decide on a WK and place, tors, chairs
313	WGPDMO	The FDI approach for externally visible diseases of dab (<i>Limanda limanda</i>) is applied on the full set of disease data submitted by Member Countries and maintained in the ICES fish disease database.	This is not currently within the remit of PGCCDBS.
418	WKFATHOM	2. The group reiterates the need to continue with the egg identification/staging and fecundity workshop prior to the egg surveys as they are essential to quality assurance of the the mackerel and horse mackerel egg surveys. It is almost impossible to organize and run workshops such as this without some financial assistance. Without access to central financial resources, each participant is wholly reliant on funding from their own institute for travel and subsistence. Therefore, WKFATHOM recommends PGCCDBS and STECF continue including the workshop into the list of eligible meetings within the Data Collection Framework.	To be followed up by WGMEGS, not PGCCDBS.

1. Issues related to fishery sampling and other topics

ICES RECOMMENDATION DATABASE ID	EXPERT GROUP	EXPERT GROUP RECOMMENDATION	PGCCDBS 2013: FISHERY SAMPLING
235	SGPIDS	<p>The construction and use of age-length keys (ALKs) and length-weight keys (LWKs) is a critical stage in estimating numbers-at-age for stock assessment working groups. However, bias and error in the application of ALK and LWKs, is poorly understood and a rather neglected topic in the raising of discard data. Many questions were raised during the SGPIDS meetings: what is the bias introduced by the use of survey-based and landings-based ALKs as a proxy to discard ALKs, what is the spatial and temporal resolution of the ALKs used by Member States, how should ages be combined (i.e. as a weighted or unweighted sample), what are the consequences of relying on LWKs, which in some cases, date back up to 30 years? Additionally, many of these issues apply to the raising of landings data as well. Therefore, SGPIDS strongly recommend PGCCDBS to address the problems at some wider forum in the near future. A new platform (workshop/study group) may be created for the exchange of expertise on ALKs and LWKs in order to improve the quality of data used in stock assessments. The corrected methodology for using ALKs and LWKs must be applicable by 2014 with the implementation of the reformed DCF (2014–2020).</p>	<p>This recommendation is addressed in detail by PGCCDBS 2013 Section 5.3</p>
250	WGCEPH	<p>WGCEPH would launch another Data Call reviewing templates and with enough time previous to the group meeting. The aim is to have</p>	<p>WGCEPH to liaise with the ICES Secretariat for issuing of EG data calls.</p>

		access to up-to-date data on cephalopod landings, directed effort, discards, and survey catch data, in order to complete its ToRs.	
374	WGWIDE	Discard information for the stocks considered by WGWIDE is still considered to be inadequate. WGWIDE recommends that each country should have adequate scientific observer programs to better estimate the quantities of these unknown removals (e.g. discards, slippage etc.). WGWIDE further suggests that a list of existing discard programmes by stock is available, along with details of what data from these programmes is/isn't provided to the working group. The Working Group again recommends that observers should be placed on board vessels in those areas in which discarding occurs, and existing observer programmes should be continued. Furthermore agreement should be made on sampling methods and raising procedures to allow comparisons and merging of dataset for assessment purposes.	<p>PGCCDBS suggests that WGWIDE members consult the reports of WKPICS2 and SGPIDS for advice on design and implementation at-sea sampling for estimating discards, and on sampling methods and raising procedures that would allow comparisons and merging of data sets for assessment purposes. They should then consider how the particular issues for WGWIDE stocks fit in with these frameworks. PGCCDBS suggests that WGWIDE asks stock coordinators to work with their national contacts to compile a list of the sampling that is currently being carried out by countries in relation to their contribution to the international landings. This could provide a basis for identifying critical gaps in discard sampling programmes. PGCCDBS and WKPICS are developing a data Quality Assurance report to be tested on a limited number of stocks during summer 2013, including a WGWIDE stock (western Horse mackerel) (see Section 6 of PGCCDBS 2013).</p> <p>PGCCDBS also notes that the complete ban of discarding on pelagic vessels from Jan 1st 2014 may affect the efficacy of observer programmes for some of these single-species fisheries. Dumping/slippage at sea and misreporting is an</p>

			<p>enforcement issue, and quality indicators for reported landings should be considered. CCTV and other monitoring devices might provide indices for some of these metrics but again this technology is likely to form part of a Member State's monitoring for enforcement.</p>
375	WGWIDE	<p>There are significant concerns within the group over the quality of historic catch data for the NEA mackerel stock (see Section 2). At present the group proceeds with the use of official catch estimates in the absence of any alternative. There is a big need for an exploration of potential sources to inform on the past (and present) levels of misreporting. In the absence of this, national data laboratories should re-evaluate their time series of catch data and indicate whether these are appropriately representative of the true catches over time.</p>	<p>PGCCDBS in its 2011 meeting provided clear guidance on the types of data quality evaluation needed for benchmark stock assessments, and this includes the accuracy of historical fishery landings data which for many stocks suffer from often poorly understood bias due to reporting issues. Whilst PGCCDBS and its workshops WKPICS/SGPIDS can advise on how to evaluate potential biases in sampling programmes required for example for discard estimation, it is not in a position to help Expert Groups resolve the magnitude of historical misreporting affecting official landings figures of EU or non-EU countries. This is an issue for national fishery departments and scientists to resolve in consultation with their fishing industries, in order to develop alternative plausible catch histories that could be tested within assessments.</p>
390	WGEEL	<p>An international program of recruitment monitoring would help replacing lost series in the glass eel fishing area.</p>	<p>WGEEL to propose sources of data.</p>
391	WGEEL	<p>The working group welcomes the revival of the Tiber series</p>	<p>Not relevant to PGCCDBS.</p>

		in the Mediterranean and advocates the development of other series in that area.	
392	WGEEL	The proposed new DC-MAP (ICES 2012) supports the need for surveys at sea of eel in the spawning area in the Sargasso Sea. These should be internationally co-ordinated.	Not a PGCCDBS remit to coordinate international surveys at sea.
393	WGEEL	Establish a Planning Group to set the minimum standard for Sargasso Sea Eel Larval Surveys.	Not a PGCCDBS remit to coordinate international surveys at sea.
398	WGEEL	Deliver national stock indicators to ICES in support of the stock-wide assessment, by March 2013 for countries outside EU or those not having reported their assessment.	Outside the competence of PGCCDBS to deliver national indicators.
50	WGHANSA	The WGHANSA recommends that, unless proven inadequate, the data needed for calculation by the WG of horse mackerel landings continues to be submitted, including those missing this year regarding the year 2011. In case the calculation methods used in the past are considered to be not correct, a new time series of landings, from 1985 to present, calculated with a improved method, should be submitted to the WG.	Whilst PGCCDBS and its workshops WKPICS/SGPIDS can advise on how to evaluate potential biases in sampling programmes required for example for discard estimation, it is not in a position to help Expert Groups resolve the accuracy of historical official landings figures of EU or non-EU countries. This is an issue for national fishery departments and scientists to resolve in consultation with their fishing industries.
409	WKESDCF	For clarity, eel and salmon should be dealt with in separate subsections to marine species in the new DC-MAP (Section 2.3), the data elements for Baltic and Atlantic salmon should also be separately specified under the new DC-MAP, and these requirements for eel and salmon should be integrated with those relating to the WFD, MSFD and HD (Section 4.1.3);	PGCCDBS acknowledges the distinct nature of salmon and eel biology and fisheries and suggests this is considered by STECF EWGs helping to develop the DC-MAP.

410	WKESDCF	Sampling of diadromous species within national programmes should endeavour to meet the standards of precision required for marine species, and where this is impractical it should be addressed within the usual derogation procedures or pilot studies	PGCCDBS notes that there are no standards for precision – this must be agreed by end-users according to their needs. Sampling schemes for diadromous species should meet standards of statistically-sound design (see WKPICS2 report), and precision/bias characteristics of estimates should be provided to end users to evaluate the cost-effectiveness of the data collections and need for any revisions, using pilot studies where data are currently lacking.
411	WKESDCF	An international pilot study (appropriate under 93/2010, Ch. II Section B, Para. 1) would be a fruitful way forward: to establish minimum standards for data collection on the basis of current expert judgement; to analyse achieved precision levels where adequate databases exist; and to stimulate further analysis when and where more data become available within the framework of the DC-MAP. Separate pilot studies might be required for eels and salmon, but a joint study should be considered.	PGCCDBS also notes the primary importance of ensuring that the design of sampling schemes meets “best practice” guidelines (see WKPICS2). Precision estimation is only relevant if sampling design can support such estimation.
412	WKESDCF	Habitat data collection should be included under the new DC-MAP, and this should be harmonized with the requirements to collect data on habitat under Article 17 of the Habitats Directive.	PGCCDBS does not deal with habitat data collection.
413	WKESDCF	Member States should seek opportunities to harmonize data collection programmes for eels and salmon, particularly in relation to electrofishing surveys, trapping facilities, automatic counters and habitat surveys	The ICES EGs dealing with eels and salmon should be the main driving force to encourage harmonisation of methods, in liaison with RCMs/RCGs where appropriate. PGCCDBS encourages harmonisation insofar that data and estimates from each country can be directly

compared or included together in analyses. However the type of data mentioned are not within PGCCDBS remit other than sampling for biological parameters.

Annex 8. RCM 2012 Recommendations & PGCCDBS Follow – Up.

RCM 2012 recommendations directed at PGCCDBS and reviewed by the Liaison Meeting 2012, included some recommendations from 2011 still considered ongoing.

RCM BALTIC 6 – STOCK RELATED VARIABLES: TASK SHARING OF AGE READING OF FLATFISH SPECIES CAUGHT IN BITS SURVEY, EEL, AND SALMON.	
RCM Baltic 2011 Recommendation	<p>For institutes collecting small volumes of age samples for certain species and when new species are to be sampled, task sharing of age reading is necessary in order to optimise the use of age reading expertise. The RCM Baltic recommends the following MS to investigate their capability to read relevant age samples of interested MS:</p> <ol style="list-style-type: none"> (1) Germany: plaice (2) Denmark: plaice, dab and sole (3) Poland: flounder and turbot (4) Sweden: eel and salmon (5) Finland: salmon <p>The suggested coordination should be discussed, agreed and decided by the National Correspondents so the first agreements could be established before December 2011.</p>
Follow-up actions needed	Discussion and agreements to be taken place among National Correspondents
Responsible persons for follow-up actions	Participants of RCM Baltic2011 from the MS listed above to report back the Chair of RCM Baltic. EFARO
Time frame (Deadline)	October 1st 2011
LM 2011 and RCM Baltic 2012 comments	<p>LM strongly supports this approach and recommends that ICES PGCCDBS provides guidance on harmonisation and documentation of the sampling, WEBGR storage and age reading methods used. LM encourages other RCMs to use a similar approach. RCM Baltic recommends that bilateral –trilateral agreements could be made.</p>
PGCCDBS Response	<p>It is up to the RCMs and the national correspondents to discuss, produce and sign a bilateral agreement (see the template) that deals with sampling methods, sampling task sharing, otoliths sampling and age-reading. PGCCDBS can only support this recommendation. As for harmonization of age reading, it should first be decided which institutes will do the age-readings and then an exchange (maybe followed by a workshop) can be put forward and organized. Harmonization, documentation and storage regarding WebGR will be addressed in the WebGR study (proposed at the 2013 PGCCDBS, see Error! Reference source not found.). Further development of WebGR will be a 2 stage process. Development of WebGR tools will be considered by WKNARC2. .</p>

RCMNS&EA_SV_01: STOCK VARIABLES: INVESTIGATE OPPORTUNITIES FOR TASK SHARING AGE READING	
RCM NS&EA 2011 Recommendations	The RCM NS&EA recommends that the task sharing species are investigating by MS participating in current age reading programs and decide whether task sharing is desirable or possible for the future.
Follow-up actions needed	MS to investigate each task sharing opportunity with specific MS taking responsibility for each species and report for the chair of RCM NS&EA
Responsible persons for follow-up actions	Each MS noted in column labeled "Leading countries" to liaise with MS without expertise for that species.
Time frame (Deadline)	1 December 2011
Follow up 2012	Ongoing. Topic goes broader than this RCM. PGCCDBS needs to look further into setting up guidelines how to make this work. Task sharing is one of the priorities of the RCMs
PGCCDBS Response	<p>A template for a bilateral agreement was set up in the 2009 RCM NS & EA. The bilateral agreement template was also discussed in the 6th LM (2009) and in its report: "With regard to the template for bilateral agreements, LM endorses the RCM proposals to use this template (Annex 9, RCM NS&EA) and recommends that all bilateral agreements should be attached to NPs." The report from the 2011 RCM Baltic also has this bilateral agreement template as an annex (Annex 10).</p> <p>Rules on when to setup a bilateral for sampling biological variables are in place: regional agreement (EWG 11-19) (made in RCM NS & EA 2011, discussed in STECFEW-11-19 but not made official).</p> <p>If the MS is only required to collect small volumes of age data and it is not practical to provide in-house age reading for some species, a bilateral agreement should be set up with another MS institute.</p> <p>The relevant MS national age coordinators can decide whether or not a bilateral agreement is feasible two MS institutes. The contract of agreement will be made between the MS institutes concerned.</p>

LM 19 - DCF Requirements	
RCM NA 2011 Recommendation	RCM NA recommends that the collection of otoliths of John Dory is continued but not proceed with age readings until an agreed standardized method is developed.
Follow-up actions needed	All MS having catches of John Dory to collect otoliths
Responsible persons for follow-up actions	All MS
Time frame (Deadline)	None
LM 2011 comments	<p>LM supports this recommendation and regards it relevant for the NS&EA region as well.</p> <p>LM recommends that PGCCDBS provides guidance on future work</p>
PGCCDBS Response	PGCCDBS supports this. The study proposal for age determination and maturity staging for new spp refers. See PGCCDBS 2011 section 7.4.3.

Annex 9 Updated List of AWG Data Contact Persons 2013.

EXPERT GROUP	NAME	E-MAIL
AFWG	Gjert Dingsør	gjert.endre.dingsoer@imr.no
HAWG	Lotte Worsøe Clausen	law@aqua.dtu.dk
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WGHMM	Iñaki Quincoces	iquincoces@azti.es
WGCSE	Colm Lordan	clordan@marine.ie
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NIPAG	Peter Shelton	Peter.Shelton@dfo-mpo.gc.ca
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WGMIXFISH	Paul Dolder	paul.dolder@cefas.co.uk
WGEF	Graham Johnston	graham.johnston@marine.ie
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WGNEW	Kelle Moreau	Kelle.Moreau@ilvo.vlaanderen.be

Annex 10. National methods for recording length and weight

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

Country	Traditional length measurement using pen and paper (Y/N)			Semi automatic /automatic method (Y/N)			Short explanation of the semi / automatic method (i.e electronic measuring board)			Data transported directly to the database		
	RV	SS	M / H	RV	SS	M / H	RV	SS	M / H	RV	SS	M / H
Belgium	Y	Y	N	Y	y	Y	Electronic measuring board (Scanrol) Digital analyse image for shrimps - Length measuring	Electronic measuring board (Scanrol) for the catch and partially for discards	Electronic measuring board	Y	N	Y
Bulgaria	Y	Y	Y	N	N	N	NA	NA	NA	N	N	N
Cyprus	Y	Y	Y	N	N	N	NA	NA	NA	N	N	N
Denmark	Y	Y	Y	N	Y	N	NA	Electronic caliper stored in portable media and exported to the National Database	NA	N	Y	N
Estonia	Y	Y	Y	N	N	N	NA	NA	NA	N	N	N
Finland	Y	NA	N	N	NA	Y	NA	NA	Length and weight data recording electronic measuring boards connected to scale	N	NA	Y
France	Y	Y	Y	Y	Y	Y	Electronic measuring board (NKE) and electronic caliper for crustaceans	Electronic measuring board (NKE) and electronic caliper for crustaceans	Electronic measuring board (NKE) and electronic caliper for crustaceans	Y	Y	Y
Germany	Y	Y	N	Y	N	N	Electronic measuring boards on some surveys			N	N	N
Greece	Y	Y	Y	Y	Y	Y	Electronic caliper for crustaceans	Electronic caliper for crustaceans	Electronic caliper for crustaceans	N	N	N
Ireland	N	Y	Y	Y	Y	Y	Electronic Data Capture (EDC) System Electronic measuring boards uploading L/W, sex, maturity data	Digital calipers for Nephrops. Electronic measuring boards.	Digital calipers for Nephrops. Electronic measuring boards.	Y	Y	Y
Italy	Y	Y	Y	N	Y	Y	NA	Tape recorder	Tape recorder	N	N	N
Latvia	Y	Y	Y	N	N	N	NA	NA	NA	N	N	N
Lithuania	Y	Y	Y	N	N	N	NA	NA	NA	N	N	N
Malta	Y	Y	Y	Y	Y	N	Electronic caliper for crustaceans	Electronic caliper for crustaceans	NA	N	N	N
Norway	N	Y	Y	Y	Y	N	Electronic measuring board (Scanrol and Marei scales) in a network	Electronic measuring board (Scanrol Fishmeter) for reference fleet and inspectors	NA	N	N	N
Poland	Y	Y	Y	N	N	N	NA	NA	NA	Y	N	N
Portugal	Y	Y	Y	Y	Y	Y	Electronic caliper for crustaceans Electronic measuring board (only DOP/Uac)	Digital/Tape Recorder Electronic caliper for crustaceans	Digital/Tape Recorder Electronic caliper for crustaceans FishMetrics(experimental)	N	N	N
Romania	Y	Y	Y	N	N	N	NA	NA	NA	N	N	N
Spain	Y	Y	Y	N	Y	Y	NA	MP3 Recorders	MP3 Recorders	N	N	N
Sweden	Y/N ¹⁾	Y	Y	Y 1)	N	Y 2)	1) Coastal surveys, electronic registration form is used	NA	2) Some samples worked up using electronic measured board. Nephrops and shrimp measurement using electronic caliper	Y	N	N
The Netherlands	Y	Y	Y	N	Y	Y		Digital voice recorder	Electronic Registration Form	N#	N#	N#
UK England	Y	Y	Y	Y	N	Y	Cefas Electronic Measuring Board (CEMB)	CEMB (under development)	CEMB Elec. data recording for Nephrops catch - Elec. Data capture for scallop	Y	Y	Y
UK Scotland	Y	Y	Y	Y	N	Y	Cefas Electronic Measuring Board (CEMB); Electronic calipers only for sampling Nephrops	Electronic calipers only for sampling Nephrops	For sampling of Nephrops, length measurements, and sex are also recorded on	y	N	Y
UK N Ireland	Y	Y	Y	NA	N	NA	Electronic Measuring Board (Scanrol) - not yet commissioned		Electronic Measuring Board (Scanrol) - not yet commissioned			

after quality control

Annex 11 PGCCDBS 2014 ToR's

2013/x/ACOMxx. The **Planning Group on Commercial Catches, Discards and Biological Sampling** [PGCCDBS] chaired by Mike Armstrong, UK, and Gráinne Ní Chonchúir, Ireland, will meet in Constanta, Romania from the 10th –14th of February 2014.

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

- a) 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).
- b) 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).
- c) 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.
- d) Report on the implementation of the Quality Assurance Framework (QAF) by ICES Expert Groups, and make recommendations for further development of the QAF and procedures for ensuring its full implementation in stock assessments and associated advice.
- e) Review and present practical examples of progress in developing enabling technologies and equipment for data collection from fisheries.

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

Supporting Information

PRIORITY:	ESSENTIAL
Scientific justification:	<p>The Planning Group and workshops are proposed in response to the EC-ICES MoU that requests ICES to provide support for the Data Collection Framework (DCF; EC Reg. 199/2008 and 665/2008, Decisions 2008/949/EC and 2010/93/EU).</p> <p>PGCCDBS is the ICES forum for planning and co-ordination of collection of data for stock assessment purposes; it coordinates and initiates the development of methods and adopts sampling standards and guidelines. Many activities in this group are closely linked to the activities of the EU DCF and DG MARE is a member of PGCCDBS to ensure proper coordination with the DCF activities. Stock assessment requires data covering the total removal from the fish stocks and the PG serves as a forum for coordination with non-EU member countries where appropriate.</p> <p>The PG shall develop and approve standards for best sampling practices within its remit and for fisheries in the ICES area. The implementation of these practices is discussed regionally and implemented nationally.</p> <p>The PG coordinates initiatives for workshops and other activities to address specific problems. The success of the workshops requires a substantial amount of preparatory work in the laboratories. This preparatory work is the responsibility of the national laboratories. ICES have been informed that this work is included in the national annual DCF work plans.</p> <p>Under ToR a) and b), recommendations for further work should be compiled and a workplan for 2014 and 2015 should be agreed.</p> <p>ToR c) includes the following tasks:</p> <ul style="list-style-type: none"> - Review any developments between Advisory Councils and ICES in developing regional taskforces to address data deficiencies and problems impeding assessments, and recommend how these could link most effectively with PGCCDBS. - Develop a summary overview of the types of data problems reported to PGCCDBS, and provide advice to the Liaison Meeting and relevant RCMs on where recurring problems could be addressed through improvements in sampling design, coverage, intensity and international collaboration within the EU Data Collection Framework. <p>ToR d) includes:</p> <ul style="list-style-type: none"> - Review latest developments in setting up regional data bases, and advise on the information needed from the data bases to produce reports on quality indicators for time-series data; taking into account aspects of sampling design and data analysis recommended by WKSs PRECISE, ACCU, MERGE, PICS etc. - Evaluate the impact of any recent changes in data collection on the continuity of data series. - Consider how to develop a suitable format for reporting information from age workshops and exchanges on likely errors in age composition data to the Assessment Working Groups and propose to WKSABCAL. - Evaluate progress in development of data Quality Assurance reports for fishery sampling. <p>The meeting will take place in Constanta, Romania, and will be held in parallel with the corresponding planning group for the Mediterranean EU fisheries (PGMED).</p>
Resource requirements:	Participation for a maximum of two people from each MS should be considered for funding within the DCF.

Participants:	Scientists involved in the EU Data Collection Framework and other data collection schemes, usually 30-40 participants.
Secretariat facilities:	
Financial:	
Linkages to advisory committees:	ACOM
Linkages to other committees or groups:	SciCom, fish stock assessment working groups, RCM's, Expert Groups, The Commission
Linkages to other organizations:	DG MARE (DCF)

Annex 12 PGCCDBS workplan for 2013

(1): Workshops taking place in 2013.

ACRONYM	DATES	CHAIRS	VENUE
WKA VSG Workshop on age validation studies of Gadoids	6-10 May 2013	Karin Hussi , Denmark and Beatriz Morales-Nin, Spain	Mallorca, Spain
WKNARC2 Workshop of National Age Readings Coordinators	13-17 May 2013	Ângela Canha, Portugal and Lotte Worsøe Clausen, Denmark	Horta, Portugal
WKA RBLUE Workshop on the Age Reading of Blue whiting	10-14 June 2013	Manolo Meixide, Spain and Jane Amtoft Godiksen, Norway	Bergen, Norway
WKMIAS; Workshop on Micro increment daily growth in European Anchovy and Sardine	21–25 October 2013	G. Basilone, Italy, B. Villamor, Spain and M. La Mesa, Italy	Mazara del Vallo, Italy
WKAMDEEP Workshop on Age Estimation Methods of Deep Water Species	21-25 October 2013	Ole Thomas Albert, Norway, and Beatriz Morales Nin, Spain	Esporles, Spain
WKMSGAD Workshop on sexual maturity staging of cod, whiting, haddock, saithe and hake	14-18 October 2013	Francesca Vitale, Sweden, and Maria Korta, Spain	San Sebastian, Spain
WKPICS3 Third workshop on practical implementation of statistical sound catch sampling programmes	19–22 November 2013	Mike Armstrong, UK and Jon Helge Vølstad, Norway	ICES, Copenhagen
SGPIDS Study Group on Practical Implementation of Discard Sampling Plans	24-28 June 2013	Alastair Pout, UK, and Marie Storr-Paulsen, Denmark.	SLU DAR IMR, Lysekil, Sweden

(2) Small scale and full scale age exchanges taking place in 2013

SPECIES/STOCK	TYPE OF EXCHANGE	COORDINATOR
Sprat (North Sea and Celtic Sea)	Full-scale	Lotte W. Clausen (DK - DTU aqua)
Mackerel	Small scale	Jens Ulleweit (Germany) jens.ulleweit@vti.bund.de

Herring (Norwegian spring spawning)	Small scale	Jane Amtoft Godiksen (Norway)
Saithe	Full exchange of images	Kélig Mahe (France).
Capelin	Small exchange between Iceland and Norway	Gróa Þóra Pétursdóttir (Iceland).
Dab (postponed from 2012)		Holger Haslob, Hamburg, Germany.
Sea bass	Large scale	Kélig Mahe (France).

Annex 13 PGCCDBS proposals for 2014 and beyond

Proposed workshops for 2014

- WKSABCAL, the Workshop on the Statistical Analysis of Biological Calibration Studies. The ToRs for this WK are available in Annex 4 of the PGCCDBS 2011 report. [Postponed until 2014]
- WKARA, workshop on age reading of anglerfish *Lophius* spp. [Priority 1]

Proposed large-scale age exchanges in 2014:

- Whiting (*Merlangius merlangus*)
- Megrim (*Lepidorhombus* spp)
- Sole (*Solea solea*)
- Sprat (*Sprattus sprattus*, all areas)
- Horse mackerel and Mediterranean horse mackerel (*T. picturatus* and *T. mediterraneus*)

Proposals for age exchanges in 2015 (to be evaluated by assessment working groups)

- (a) Priority 2 exchanges:
- Witch (*Glyptocephalus cynoglossus*)
 - Lemon sole (*Microstomus kitt*)
 - Gurnards (*Aspitrigla cuculus*, *Eutrigla gurnardus*, *Chelidonichthys lucernus*)
 - Pollack (*Pollachius pollachius*)
 - Sandeel (*Ammodytes* spp)
 - Boarfish (*Capros aper*)
 - Ling and blue ling (*Molva molva* and *Mola dypterygia*)
- (b) Priority 3 exchanges
- Conger eel (*Conger conger*)
 - Norway pout (*Trisopterus esmarkii*)
 - Pouting (*Trisopterus luscus*)
 - Wolf fish (*Anarhichas lupus*)

Proposals for maturity exchanges (to be evaluated by assessment working groups)

- (a) Priority 2 exchanges
- Mackerel and Horse mackerel (*Scomber scombrus* and *Trachurus trachurus*)
 - Eel (*Anguilla anguilla*)

Proposal for collaborative studies contracts

PGCCDBS 2013 makes two proposals for study contracts, one of which is a repeat proposal from the PG 2012 meeting (See Section 3.8 for full details)

- 1 A collaborative study on anglerfish (*Lophius piscatorius*) Priority 1.
- 2 Study proposal on age determination and maturity staging of species not previously subjected to biological sampling for analytical assessments.

Proposal for ICES Cooperative Research Report

PGCCDBS has proposed an ICES cooperative research report (CRR) on the Protocols on the ageing of different fish species in the ICES area. More details can be found in Section 3.9 and the full draft resolution for this CRR is available in Annex 7 of PGCCDBS 2012.

Proposal for ICES training course

PGCCDBS recommends that ICES provide a training course covering the design of statistically sound catch sampling for fisheries monitoring programmes. The full proposal is detailed in Section 4.3.3

Annex 14 PGCCDBS actions arising from 2013 meeting

Section 3.2.2: North Sea cod otolith small scale exchange 2011-2012

Action: PGCCDBS will forward all recommendations, suggestions and comments to the Workshop on Age Validation Studies of Gadoids (WKAVSG) which will meet from 6 to 10 May 2013 in Mallorca, Spain, chaired by Karin Hussi, Denmark and Beatriz Morales-Nin, Spain.

Section 3.3.1.1. WKMSTB .- Workshop on the Sexual Maturity Staging of Turbot and Brill.

Action: Concerning the establishment of a maturity-stagers forum, PGCCDBS supports the proposal and together with the ICES Secretariat will work on it intersessionally.

Section 3.3.3 ICES Workshop on Sexual Maturity Staging of Elasmobranchs (WKMSSEL2)

Action: PGCCDBS will contact National Correspondents and make them aware of work carried out by WKMSSEL2

Section 3.9: Proposal for ICES cooperative research report (CRR) on protocols on the ageing of different fish species in the ICES area

Action: Carry out work plan established for 2013 & 2014 to identify editors, content, contributors and species.

Section 4.3.2: Proposal for new WGCATCH to ICES

Action: Submit proposal to ICES for WGCATCH

Section 4.3.3: Proposal for ICES training course on design of statistically-sound catch sampling programmes.

Action: Submit proposal for the training course

Section 5.3: questionnaire on national schemes for collection and use of age-length and length-weight data for use in fishery data analysis.

Action: Develop questionnaire to be circulated by the ICES secretariat to national stock coordinators via national DCF correspondents in June 2013 to find out what practices are currently being applied.

Section 6.1. Quality Assurance report templates

Action: Refine and compile Quality Assurance Report templates for circulation to National Correspondents in June 2013.

Annex 15 PGCCDBS recommendations

RECOMMENDATION	ADDRESSED TO
RCMs/RCGs provide measures of achievement both as numbers of sampling events and as numbers of fish measured or aged.	Regional Coordination Meetings / Groups
