Scientific, Technical and Economic Committee for Fisheries (STECF)

REVISION OF DCF (STECF-14-02)

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This report was reviewed by the STECF by written procedure in February 2014

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SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (STECF)

Revision of DCF (STECF-13-18)

THIS REPORT WAS REVIEWED DURING FEBRUARY 2014 BY WRITTEN PROCEDURE

Background

In the context of the revision of the Data collection Framework (DCF), the STECF was requested to provide advice on the content of a revised DCF and a series of Expert Groups were convened under the auspices of the STECF to address the specific Terms of Reference. The Report of the EWG 13-18 which met in Brussels, Belgium from 25-28 November 2013, is the Report from the third such meeting.

Request to the STECF

The STECF is requested to review the Report of the EWG 13-18 in relation to the Terms of Reference, make any additional comments and recommendations and if appropriate, endorse the findings of the Expert group.

Observations of the STECF

STECF notes that the report of the EWG 13-18 builds on the work presented in previous Expert Groups (EWG 13-02 and EWG 13-05). In addressing the Terms of reference, the Report documents the Expert group's considered opinion on the following topic areas:

- The scope of the future DCF
- Implications regarding the Landing obligation
- Data Quality
- End-user consultation mechanism/cycle
- Regional coordination and task sharing mechanisms (for surveys or commercial sampling)
- Definition of terms
- Simplification of the future DCF

The EWG 13-18 Report primarily focuses on providing input to Block C of the Commissions consultation document "EU Data Collection for Fisheries 2014 – 2020" of 21st November 2013, and the Expert Group's proposals are documented in Annex 1 of its Report.While STECF agrees with the proposals given in Annex 1, it is important to note that the text therein, is not intended to be precise legal text, and is intended to provide guidance to the Commission in response to the Terms of Reference. Comments and justifications for the proposals in Annex 1 are given in the main body of the report under the relevant headings.

STECF notes that the proposals in Annex 1 are largely based on the thoughts and opinions expressed in the Reports from the previous two EWG meetings, Regional Coordination meetings and meetings of the Liaison Group.

Conclusions of the STECF

The report of the EWG 13-18 represents a further step in advising on the specific future requirements of the EU Data collection framework and builds on the work presented in previous Expert Groups (EWG 13-02 and EWG

13-05). STECF concludes that the Expert group has adequately addressed all of the Terms of Reference. The opinions and proposals presented in the reportprovide important and helpful proposals to aid the development of a revised DCF taking into account the likely future demands for fisheries-related data and information under a revised CFP.

STECF endorses the findings and proposals presented in the Report of the EWG 13-18 noting that while further work is required to finalise the scope and content of a future DCF, the Report provides an excellent basis for further development in relevant fora, including a further STECF Expert group (EWG 14-02) scheduled for 24-28 February 2014.

REPORT TO THE STECF

EXPERT WORKING GROUP ON
Revision of DCF
(EWG-13-18)

Brussels, Belgium, 25-28 November 2013

This report does not necessarily reflect the view of the STECF and the European Commission and in no way anticipates the Commission's future policy in this area

1 EXECUTIVE SUMMARY

In addressing the terms of reference, the EWG 13-18 used as key input the document on Proposed changes to the DCF regulation, prepared by Commission services (21st November 2013). The findings of the EWG13-18 are given both in the main body of this report and in annex 1 as comments to Block C of the Commissions consultation document "EU Data Collection for Fisheries 2014 – 2020" of 21st November 2013. The comments to the Consultation Document are given in the form of suggestions for changes inserted directly into the consultation document supported by comments and explanations for the suggested changes. The suggestions from the expert group shall not be considered as firm proposals for legal text but as comments to the Commission as requested in the terms of reference.

Most of the items had been addressed at previous EWG meetings, Regional Coordination Meetings and meetings of the Liaison Group. Many of the suggestions for changes to the consultation document were therefore based on work carried out at previous meetings and not resulting from discussions and evaluations carried out at the meeting of the EWG 13-18.

Monitoring of incidental by-catch of rare, vulnerable, sensitive and endangered species should be integrated in the fisheries monitoring programmes. The EWG 13-18 suggests that all marine mammals, seabirds and reptiles caught as incidental by-catch are recorded by default since the majority of these species are listed in existing instruments. With regards to fish species, it is recommended that groups to be monitored by default (e.g. sharks/rays and sturgeons, lampreys) are designated at a regional level.

The first step in assessing the impact of fishing on vulnerable marine ecosystems will often be analyses of the overlap between the location of fishing grounds (using VMS data) and the location of vulnerable marine habitats. A necessary prerequisite is the availability of habitat maps. Where such maps are not available, specific studies funded as part of direct management measures should be carried out.

As a second step, the impact of different types of fishing gear on different habitat types should be characterized. This could be achieved by carrying out impact assessments as part of targeted surveys.

Regarding data required to assess the impact of aquaculture the EWG 13-18 underlines the differences between marine, inland and freshwater aquaculture and noticed that the sustainability objectives could be measured in different ways.

Furthermore, the EWG 13-18 considers that MS need initially to identify the available data sources to avoid double collection.EWG 13-18 proposes to organize the collection of data by stepwise approach in order to prioritize aims. The collection could start simple to let the MS the possibilities to correct this collection based on end-users' feedback and their cost evaluation.

It is unlikely that the introduction of a landing obligation will require a change in the variables to be collected. However, it may have a large impact on the methods to be used in the collection of the data. There most likely will be a continued need for discard estimates in data for future resource assessments. It is, however, not clear yet how these estimates will be obtained and what kind of data collection will underpin them, as the detailed implementation of the landing obligation will depend on regional discard plans. The EWG therefore suggested that, within the revised/new DCF, there should be an obligation for MS to collect data on discards (volumes, biological variables) but the regulation should not specify the method.

A substantial amount of work related to the quality sampling programmes, data and associated analysis has been conducted in recent years. This has led to increased awareness on the need for more comprehensive views on data quality as well as how data quality should be evaluated.

The review on "Data quality indicators for biological data as input to discussions on revision of the DCF" (annex 2) proposes that the present system for reporting data quality in DCF programmes may be inappropriate.

The quality of a sampling programme should be evaluated in relation to two aspects of sampling: 1) the ability of the programme todeliver data that are unbiased and fit for purpose; and 2) evaluation of the quality of the data and estimates following implementation of the sampling survey, covering bias and precision.

Quality evaluation should ideally be through a well-structured peer-review process supported by clear documentation of the sampling programmes and the sampling outcomes.

The main message for the future DCF is that quality assurance needs to be assured for all components (including design and implementation of data collection schemes, data archiving as well as methodologies to derive final estimates). Member States need to establish documented quality assurance frameworks which can be compared with future agreed international standards.

Another main message is that quality evaluation need encompass all types of data, including transversal data.

The EWG 13-18 focused on two main issues regarding end users consultation. First, the group reconsidered the definition of end-users, setting out more clearly their rights and obligations. Second, the group defined the process whereby end-users are consulted on their needs and how this results in a change in the EU Multiannual Programme or national work plans.

The Regional Coordination Groups and the Planning Group for Economic Issues are suggested to have a key role in the end-users consultation and in the coordination at regional and supra-regional level andthe EWG 13-18 addressed the role of the groups and the issue of task charring between Member States by commends to the consultation document (Annex 1).

The EWG 13-18 provided a comprehensive list of definitions of relevance for the DCF by merged existing definitions from the CFP Basic Regulation (Doc. 12007/13 of 10 Oct 2013) and Reg. 199/2008, added definitions from the EWG 13-05 meeting report (Appendix XV) and added definitions of the terms 'catch', 'by-catch', 'incidental by-catch' and 'slipping' based on existing FAO/GFCM glossaries.

The enterprise level is where all costs and incomes are recorded, because it is the legal unit. Therefore, when the end-user is interested in the economic performance of the aquaculture sector (e.g. their profitability, economic robustness, economic situation of the sector and its dynamics), then the statistical unit should be the enterprise. On the other hand, if the end-user is interested in the economic and social importance from a regional point of view and in a more detailed knowledge of the economic performance and sustainability of particular aquaculture techniques, then there is the need to have the farm (production unit) as the statistical unit. However, EWG 13-18 is currently unable to assess if economic data disaggregated by farm could be obtained in all MS. Therefore, a study should is needed to address the feasibility and cost of this kind of collection of disaggregated data.

Aquaculture data collection is done at the enterprise level, and it is possible that an enterprise has other economic activities than aquaculture (i.e. processing, marketing, oil drilling). EWG 13-18 recommends that revenues and costs from other activities of the enterprise that are not related to the aquaculture sector are separated from the aquaculture data collected when possible. However, the collection of these data could be very difficult and not cost-efficient.

2 INTRODUCTION

2.1 Background

Following the agreement on the Basic Regulation on the Common Fisheries Policy, which includes Article 25[1] laying out the key principles for Member States to collect biological, technical,

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[1]In the Commission proposal this was Article 37.

environmental and socio-economic data, the Commission is preparing a proposal for a revision of the Data Collection Framework (Council regulation (EC) No. 199/2008), to be submitted in 2014. This will be followed by a Commission proposal for a revision of the EU Multiannual Programme for data collection once the revised DCF is adopted.

The current Data Collection Framework Regulation establishes key provisions that are intended to continue, as they are proven to provide a well-functioning structure for data collection as part of the advisory process. However, arising from the reform of the CFP, several technical changes in the legislative framework on Data Collection are nevertheless required:

1. The current data collection system focuses on providing data primarily for the management of various fisheries, while in the new CFP, data will be used to support several new policy objectives: the move to ecosystem-based fishery management and the undertaking to base all management measures on scientific information. Also, a new emphasis is put on the development of aquaculture and on an improved impact assessment of decisions on fisheries management. This requires an adjustment to the scope of data to be collected beyond the current fishery/stock specific scope;

2. The gradual introduction of a landing obligation requires a new approach to recording discards of unwanted catches, and to put in place a monitoring of the impacts of the landing obligation;

3. The transfer of responsibilities to MS and stakeholders, through reinforced sea basin coordination, calls for some adjustment of the role of regional coordination groups in the area of data collection;

4. The need to improve the quality and precision of collected data and to ensure the swift transmission of these data to end users necessitates adjusting the technical rules in place for data storage and data transmission to end users;

5. More transparency and open access to fisheries data for all interested stakeholders is called for in view of a more inclusive CFP, while protecting personal data.

Consistency also has to be ensured with the fisheries control regulation[2], the Eurostat regulations[3] and EU environmental legislation such as Marine Strategy Framework Directive (MSFD)[4], Bird action plan[5], Cetacean by-catch regulation[6], Habitats[7] and Bird Directives[8]. All of these legal acts contain provision on data and information to which the Data Collection Framework Regulation must be aligned. Synergies must be profited from and duplications have to be avoided.

The adjustments should also be in line with the Marine Knowledge initiative[9], which intends to improve the provision and access of scientific information in all marine sciences. This initiative identified improving access to fisheries data and information as a key issue.

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[2]Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006

[3]Regulations (EC) No 762/2008, (EC), (EC) No 1921/2006, (EC) No 218/2009, (EC) No 217/2009 and (EC) No 216/2009.

[4]Directive 2008/56/EC of the European Parliament and the Council of 17 June 2008 establishing a framework for Community action in the field of marine environmental policy (Marine Strategy Framework Directive)

[5]http://ec.europa.eu/environment/nature/conservation/wildbirds/action_plans/index_en.htm

6 Council Regulation (EC) No 812/2004 of 26 April 2004 laying down measures concerning incidental catches of cetaceans in fisheries and amending Regulation (EC) No 88/98.

[7] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora
[8] Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds
[9]http://ec.europa.eu/maritimeaffairs/policy/marine_knowledge_2020/index_en.htm

Discussions on revision of both the DCF and the EU Multiannual Programme have been ongoing for over two years and the key issues that need to be addressed have been identified and discussed to various extents in STECF expert working groups and other fora. EWG13-18 will be the last STECF EWG before the Commission prepares a draft Commission proposal for a revised Regulation 199/2008.

The aim of this meeting should therefore be to focus on cross-cutting topics covered by the current Reg 199/2008 or that may be included in its successor, building on the work done by STECF and other bodies over the past two years.

Concerning the topics related to the EU Multiannual Programme, the aim of the meeting is to address outstanding fundamental issues and emerging needs on general categories of data to be collected and where possible (i.e. socio-economic variables) to consolidate in a single document the recommendations on variables and definitions formulated so far.

Discussions at EWG13-18 will be based on two documents:

The document on Proposed changes to the DCF regulation, prepared by Commission services (21st November 2013)

Block C of the document "EU Data Collection for Fisheries 2014-2020 - Consultation Document" that was prepared by the Commission for the EWG13-08 (June 2013). The EWG13-18 should also review the categories of data to be included in a future EU Multiannual Programme, presented in Block D, to ensure this is up to date and covers all needs.

2.2   Terms of Reference for EWG-13-18

EWG 13-18 is requested to:

1. Review outcomes of the RCMs and Liaison meeting relating to revision of the DCF & the EU multiannual Programme, in particular relating to regional coordination for sampling and for task sharing in data collection.

2. Review the Consultation Document sections relating to the following topics and provide new/amended wording where relevant:

a. The scope of the DCF (new areas of data collection to be covered)

Background documents regarding by-catch of non-target species:

EWG1318 – Doc 1:SGPIDS REPORT 2012 (Section 6 – includes list of proposed taxa to sample).

EWG1318 – Doc 2: ICES WGBYC REPORT 2013

EWG1318 – Doc 3: ICES WKBYC REPORT 2013

EWG1318 – Doc 4: FAO Guidelines for sampling bird bycatch

EWG1318 – Doc 5: ICES advice -Request from EU concerning monitoring of bycatch of cetaceans and other protected species

EWG1318 – Doc 6: ICCAT Manual – Appendix on by-catch species

Background documents regarding ecosystem indicators:

EWG1318 – Doc 7 and 8:2 sets of 2013 ICES advice relating to ecosystem indicators concerning fisheries (ENV),

EWG1318 – Doc 9: 1 set of ICES advice on OSPAR indicators,

EWG1318 – Doc 10: Report of ICES WKIND (October 2013),

EWG1318 – Doc 11: Report of the Workshop on Data Collection - Assessments of non-fishery impacts (WKDCF-NF) 2013

EWG1318 – Doc 12: Proposed list of key MSFD indicators prepared by COM.

b. Landings obligation

Background documents:

EWG1318 – Doc 13: STECF EWG13-16 report on the landings obligation

c. Quality assurance

Background documents:

EWG1318 – Doc 14:Ad hoc expert paper on possible approaches to quality assurance for biological variables (including relevant outcomes of WKPCS3).

d. End-user consultation mechanism/cycle.

e. Regional coordination and task sharing mechanisms (for surveys or commercial sampling).

f. Relation to other EU data collection provisions

g. Definitions for the revised DCF Regulation

The Consultation document (Block C) does not contain any definitions but the revised DCF Regulation – just as the current DCF Regulation should contain key definitions. Experts should review the definitions in the current DCF Regulation and identify which ones need to be modified/removed added, in order to address new scope of DCF and revised CFP regulation. This work should take as a basis the work already done under ad hoc contract on proposed changes to DCF-related definitions, taking into account any updated definitions included in the CFP Basic Regulation.

Background document:

EWG1318 – Doc 15:STECF EWG13-12 (Appendix XV)

3. Simplification of the DCF

Based on all the previous discussions on revision of the DCF/DC-MAP, provide an overview of the mechanisms through which simplification will be achieved under the revised DCF, both through changes in the framework, reducing variables to be collected (or the frequency of collection/aggregation), through simplifying reporting and through the use of tool such as improved IT systems for facilitating and harmonizing data transfer to end users.

Background document:

EWG1318 – Doc 16: JRC analysis of which data were used/not used by STECF following data calls.

4. Revision of the EU Multiannual Programme

Social & economic data on the fisheries, aquaculture and fish processing sectors [Annex X, XI, XII]

The group should elaborate more in detail on the pros and cons of the two alternative definitions of the sampling unit in aquaculture (farm or company) and the discrimination of performance on aquaculture from other activity of the enterprise.

The group should present a detailed proposal for the segmentation of aquaculture data on the basis of findings and recommendations of previous STECF and PG-ECON meetings and harmonisation needs against EUROSTAT.

The group should incorporate suggestions on definition of economic variables in the fisheries, aquaculture and fish processing sectors arising from PG-ECON and STECF meetings in an updated version of the glossary of economic variables produced by JRC. The glossary should incorporate for each variable an indication of overlaps and differences between DCF and EUROSTAT on the basis of the outcome of EWG 13-15 and 13-10.

The group should discuss pros and cons and possible solutions for providing geographically disaggregated socio economic data in support of the regionalisation of CFP.

Background documents:

EWG1318 – Doc 17: STECF Plenary report covering outcomes of the EWG 13-15 on fish processing industry & the EWG 13-10 on Aquaculture economics

EWG1318 – Doc 18: JRC glossary on socio-economic variables

EWG1318 – Doc 19: Recommendation GFCM/35/2011/6on reporting of aquaculture data and information

5. Identifying next steps / develop Roadmap for MS to prepare for implementation of the revised DCF (RCG's work, regional sampling, development of best practice, training courses)

6. A.O.B.

3   METHOD

In addressing the terms of reference, the EWG 13-18 focused on providing input to Block C of the Commissions consultation document "EU Data Collection for Fisheries 2014 – 2020" of 21st November 2013. The inputs were given in the form of suggestions for changes inserted directly into the consultation document supported by comments and explanations for the suggested changes. The consultation document including suggested changes is given in annex 1. The comments and explanations are given in the main body of the report addressing the individual items of the terms of reference.

The EWG 13-18 aimed at drafting the suggested changes to the consultation documents in a style similar to the one used in the consultation document, i.e. in a style used in regulations. The suggestions from the expert group shall, however, not be considered as firm proposals for legal text but as comments to the Commission as requested in the terms of reference.

Most of the items had been addressed at previous EWG meetings, Regional Coordination Meetings and meetings of the Liaison Group. Many of the suggestions for changes to the consultation document were therefore based on work carried out at previous meetings and not resulting from discussions and evaluations carried out at the meeting of the EWG 13-18.

TOR 2f"Relation to other EU data collection provisions" was dealt with by the expert group under each of the other TORs and findings are presented in the report under each TOR when relevant.

4   TOR 2A. THE SCOPE OF THE DCF (*NEW AREAS OF DATA COLLECTION TO BE COVERED*)

4.1   Collection of data on incidental bycatch

Recording of incidental by-catch of rare, vulnerable, sensitive and endangered species listed in legislative instruments, conventions and action plans at national, regional or international level should be integrated in the fisheries monitoring programmes.

STECF EWG 13-18 considers such monitoring of incidental by-catch to be feasible since the great majority of species listed in legislation, conventions and action plans are not common species. The

additional effort involved in monitoring such species on board should not be prohibitive in the case of seabirds, marine mammals, reptiles (marine turtles) and non-target fish/protected fish species (sharks and rays in particular). Moreover, it is suggested that all marine mammals, seabirds and reptiles caught as incidental by-catch are recorded by default since the majority of these species are listed in existing instruments. With regards to fish species, it is recommended that groups to be monitored by default (e.g. sharks/rays and sturgeons, lampreys) are designated at a regional level.

Some smaller listed/protected fish and benthic species may in practice however become parts of the smaller sized bulk discards (see section 4.1.1 and Figure 9.1below). Special attention should be paid to such species on a case-by-case basis, taking into account gear types and whether such species are likely to be found in the surveyed fishing grounds.

Suitable methods of recording incidental by-catch are the use of on-board observers, self-sampling systems or by remote electronic monitoring (REM). The exact method of monitoring should be established at a fishery / national / regional level. It should taking into account the potential impact of direct by-catch mortality rates on species groups in order to prioritise fishing gears to be monitored (e.g. ICES 2013[10]).

In order to facilitate the process of monitoring incidental by-catch, updated lists of species relevant at a regional level should be compiled, including lists of smaller listed/protected fish and benthic species which are likely to become part of the smaller sized bulk discards, and are thus more difficult to monitor. Where on-board observation or self-sampling system are chosen as a suitable method for monitoring incidental by-catch, identification manuals as well as training should be provided to observers and/or crew.

An indicative list of relevant legislation, conventions and action plans is provided below. It was not possible to compile a complete list of all relevant instruments during the STECF EWG 13-18: such work should be carried out as part of an ad hoc expert contract. Moreover, national legislation and national action plans are not included in this list.

European Union Instruments

- Council Regulation (EC) No 812/2004 laying down measures concerning incidental catches of cetaceans in fisheries
- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive)
- Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (Birds Directive)

Regional Instruments

- OSPAR: The Convention for the Protection of the marine Environment of the North-East Atlantic
- HELCOM: Baltic Marine Environment Protection Commission (also known as Helsinki Commission)
- Barcelona Convention: (Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean) - Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA & Biodiversity Protocol)
- Bucharest Convention: Convention on the Protection of the Black Sea against Pollution
- ASCOBANS: Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas
- ACCOBAMS: Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area
- ICCAT: International Commission for the Conservation of Atlantic Tunas (ICCAT) Recommendations
- GFCM (General Fisheries Commission for the Mediterranean): Resolutions / Recommendations

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[10]ICES (2013).Report of the Workshop on Data Collection – assessments of non-fishery impacts (WKDCF-NF), 8-10 October 2013, ICES Headquarters, Copenhagen, Denmark. ICES CM 2013/ACOM: 74. 68pp.

- IATTC (Inter-American Tropical Tuna Commission) Resolutions and Recommendations
- IOTC (Indian Ocean Tuna Commission) Conservation and Management Measures
- WCPFC (Western and Central Pacific Fisheries Commission) Conservation and Management Measures, and Resolutions
- CCAMLR (Commission for the Conservation of Antarctic Marine Living Resources) Schedule of Conservation Measures
- SPRFMO (South Pacific Regional Fisheries Management Organisation) - Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean

International Instruments

- CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora
- Bern Convention: Convention on the Conservation of European Wildlife and Natural Habitats
- Bonn Convention: Convention on the Conservation of Migratory Species of Wild Animals
- CMS / Bonn Convention: Convention on the Conservation of Migratory Species of Wild Animals
- World Heritage Convention: Convention concerning the Protection of the World Cultural and Natural Heritage: IUCN Red List of Threatened Species
- UNCLOS: United Nations Convention on the Law of the Sea
- ICRW: International Convention for the Regulation of Whaling
- United Nations Agreement on Straddling Fish Stocks

Action Plans

- IPOA SHARKS: International Action plan for the Conservation and Management of Sharks
- European Commission's Action plan for the Conservation and Management of Sharks[11]
- European Bird Species Action Plans: LIFE Priority birds and Species Action Plans (Annex I Bird species considered as "Priority for funding under LIFE)
- Action Plan for the Conservation of Cetaceans in the Mediterranean Sea (UNEP / RAC-SPA)

Additional relevant instruments which refer more generally to the need of protecting species and maintaining them at favourable conservation levels include for instance:

- CBD: United Nations Convention on Biological Diversity
- Marine Strategy Framework Directive (56/2008/EC), including Commission Decision (2010/477/EU) on criteria and methodological standards on Good Environmental Status (GES) of marine waters

The monitoring incidental bycatches may be carried out to (1) indicate fisheries, areas and seasons with a high incidental bycatch which may not be sustainable for the species involved (following the so called Bycatch Risk Approach (BRA), (e.g. ICES 2010) or (2) to estimate the number of specimens taken in a certain area. In both cases for a fishing event, it is essential to identify the species and the number of specimens.

The monitoring may also be conducted with the aim of supporting evaluation of mitigation measures. This requires further headers, describing the mitigation device. Further headers in Table 4.1 cover information on the haul, which should be recorded as default. The EWG 13-18 underlines that the data to be collected may vary between regions pending on end-users need. The Table should therefore only be read as a guideline for data to be collected. The table is also included in Annex 1 as appendix nr. 0.

For the purpose of raising bycatch from sample level to fleet level it is important that the unit of fishing effort is the same as provided by the DCF. Fishing effort data like number of hauls, km of nets

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[11]Communication from the Commission to the European Parliament and the Council of 5 February 2009 on a European Community Action Plan for the Conservation and Management of Sharks [COM(2009) 40 final]

and soaking time is in general not available. However, data provided in adequate parameters should always be delivered together with days at sea as this is at least a unit that can be used to combine different types of metiers, despite its flaws.

Table 4.1 Headers for the data required for the monitoring of protected, endangered or threatened species. The data to be included in the work plans may deviate from the data listed in the table according to the needs of end-users.

vessel ID	date	time	haul ID	geographical position (a)	métier level 6	mesh size for set nets	species	no of specimens	indicator of decomposition	mitigation type

(a) In general this should be expressed in latitude/longitude (degrees and minutes).
If the exact location is not known or available, the approximate location should be fit to the geographical area/grit in use by ICES, GCFM, et al (rectangle, subdivision, division, geographical subarea).
(b) a table with identiefied stages will be available

Mitigation - pinger

brand	type	check box battery	distance to nearest pinger

Mitigation - TED

....	....

Mitigation - Circle hooks

brand	type	size

Mitigation - .....

.....	.....	.....

Description of the headers - Practical issues which should be taken in account

Date/time/haul ID

While incidental bycatch and discards of target species may be technically the same, the sampling approach will often be different. Discards of target species, consists often of a lot of specimens with a size below the minimum landing size. This part of the catch can be sampled by taking of small subsample. Incidental bycatch is often not possible to sample with the required quality by taking subsamples and the whole bycatch will in most cases have to be sampled. This means inspection of the opening of the codend; or a scan of the catch during handling. As hauls are concurrently sampled for discards and retained catch, it is important that the sampling protocols contain a checkbox whether the haul was actually checked for incidental bycatches and – in case of a scan during hauling - an indicator of the percentage coverage. This enables the output of hauls or sets with zero bycatches.

Geographical position

In general, this should be expressed in latitude/longitude (degrees and minutes). If the exact location is not known or available, the approximate location should be fit to the geographical area/grid in use by ICES, GCFM, etc. (rectangle, subdivision, division, geographical subarea).

Mesh size for set nets

The mesh size of gill- and trammel nets is of interest as it influences the likeliness of entanglement.

Species

If it is not possible to identify the level of identification to species, it should be recorded on a higher taxonomic level (group of species, genus -, family – or order level). This is in particular important for the recording of seabirds, which includes a large number of possible species for a lot of areas. Protocols should include a list of rare species that should be recorded during trips. These species should have a code in the institutes' database and code lists should be available to the person who enters the data into the database. It has been recognized that most countries do not have codes for a lot of protected, endangered and threatened species, which causes data not to be stored in national

databases (ICES 2012a, ICES 2013). For species lists, and entry codes are provided by the ASFIS List of Species for Fisheries Statistics Purposes http://www.fao.org/fishery/collection/asfis/en.

Number of specimens

Number of specimens by species.

Indicator of decomposition, dead or alive

Rare species are often considered to have been dead already prior to the time they were bycaught. This seems to happen often in sampling on-board beam trawlers where observers assume that it is impossible to catch a large, fast swimming animal, like a harbour porpoise, because of the low vertical opening of the trawl.

Mitigation type

Sampling should contain information on any mitigation measures applied. Currently, so called acoustic deterrent devices are obligatory in some fisheries under EU Reg. 812/2004. Brand, type and indicators of adequate use should be collected as well. Other mitigation measures (i.e. for turtles, birds) may become in use in the future.

4.1.1 *Discards – Small-Sized Bulk By-Catch*

In addition to the incidental by-catch of sensitive/protected species described above, undersized commercial fish and (in the case of some fisheries) considerable volumes of more abundant non-commercial species are frequently discarded.

Sampling of such species could be done by taking sub-samples, in order to collect information on what species are being caught and to estimate discard volumes.

An indicative list of potential end-users of data on by-catch and discards is given below.

- European Commission to demonstrate compliance legal requirements under existing legislation / conventions
- National governments to demonstrate compliance legal requirements under existing legislation / conventions
- Regional Fisheries Management Organisations (RFMOs) and their relevant working groups
- Regional Sea Conventions (RSCs)
- International Council for the Exploration of the Sea (ICES)
- Regional Advisory Councils (RACs)
- Scientific, Technical and Economic Committee for Fisheries (STECF)
- Non Government Organisations (NGOs)
- Additional stakeholders, e.g. individuals with an interest in by-catch and / or discards

4.2 **Vulnerable Marine Ecosystems**

Fishing activities using bottom gears with a potential impact on benthic habitats and the integrity of the seafloor (e.g. beam trawlers, bottom otter trawlers, scallop dredges) may also generate by-catch of macro-benthos.

The first step in assessing the impact of fishing on vulnerable marine ecosystems will often be analyses of the overlap between the location of fishing grounds (using VMS data) and the location of vulnerable marine habitats. A necessary prerequisite is the availability of habitat maps. Where such maps are not available, specific studies funded as part of direct management measures should be carried out.

As a second step, the impact of different types of fishing gear on different habitat types should be characterized. This could be achieved by carrying out impact assessments as part of targeted surveys.

An indicative list of relevant legislation, conventions and action plans of relevance to the protection of vulnerable marine ecosystems (focusing on reefs, seamounts, deep water corals / coralligenous communities, hydrothermal vents, sponge beds, and maerl / seagrass beds in the Mediterranean Sea) is provided below. It was not possible to compile a complete list of all relevant instruments during the STECF EWG 13-18: such work should be carried out as part of an ad hoc expert contract. Moreover, national legislation and national action plans are not included in this list.

European Union Instruments

- Council Regulation (EC) 734/2008 on the protection of vulnerable marine ecosystems in the high seas from the adverse impacts of bottom fishing gears
- Council Regulation 1967/2006 concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea (Mediterranean Regulation)
- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive); Natura 2000 Network

Regional Instruments

- OSPAR: The Convention for the Protection of the marine Environment of the North-East Atlantic
- HELCOM: Baltic Marine Environment Protection Commission (also known as Helsinki Commission)
- Barcelona Convention: (Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean) - Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA & Biodiversity Protocol)[12]
- Bucharest Convention: Convention on the Protection of the Black Sea against Pollution - The Black Sea Biodiversity and Landscape Conservation Protocol.[13]
- North East Atlantic Fisheries Commission (NEAFC) – Closures of VMEs
- Northwest Atlantic Fisheries Organization (NAFO) - Conservation and Enforcement Measures[14]
- CCAMLR (Commission for the Conservation of Antarctic Marine Living Resources) Schedule of Conservation Measures

International Instruments

- Bern Convention: Convention on the Conservation of European Wildlife and Natural Habitats
- World Heritage Convention: Convention concerning the Protection of the World Cultural and Natural Heritage[15]
- CBD: United Nations Convention on Biological Diversity[16]

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[12] The Protocol concerning Special Protected Areas and Biological Diversity in the Mediterranean, Annex I, contains common criteria for the choice of protected marine and coastal areas that could be included in the SPAMI list. However no specific habitat types are listed.

[13] Annex 1 of the Bucharest Convention focuses on protected areas. Specific habitat types are not listed per se, however reference is made to representative types of habitats, habitats/biocenoses/ecosystems in danger of disappearing, critical habitats and sites of particular importance due to scientific, aesthetic, cultural or educational value.

[14] Chapter II – Bottom Fisheries in the NAFO Regulatory Area

[15] No reference to particular types of vulnerable marine habitats is made, however habitat types to be considered as part of world heritage include (i) geological and physiographical formations and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation, and (ii) natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty.

[16] Criteria for Ecologically and Biologically Significant Areas (EBSAs) were adopted in 2008 by the CBD; coverage includes: seamounts, hydrothermal vents, cold-water corals and open ocean waters.

- FAO[17] Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (International Guidelines for the Management of Deep-sea Fisheries in the High Seas)

Additional European Union instruments which refer more generally to the need of protecting habitats and maintaining them at favourable conservation levels include for instance:

- European Union Biodiversity Strategy / Action Plan
- Marine Strategy Framework Directive (56/2008/EC), including Commission Decision (2010/477/EU) on criteria and methodological standards on Good Environmental Status (GES) of marine waters
- Water Framework Directive (Directive 2000/60/EC) of the European Parliament and of the Council on establishing a framework for Community action in the field of water policy[18]

4.3 Sustainable Aquaculture

First, EWG 13-18 noted that not a clear definition of sustainable aquaculture exists. Such a definition should be developed and should be based on the three pillars of sustainability: social, economic and environmental. This implicates that the collection of data will be needed in these three research topics.Member States collect economic data for aquaculture and some variables could be used to assess the sustainability of the sector.

Secondly, EWG13-18 also noticed that MS need initially to identify the available data sources to avoid double collection.

Thirdly, EWG 13-18 underlines the differences between marine, inland and freshwater aquaculture and noticed that the sustainability objectives could be measured in different ways.

4.3.1 Organization of the data collection "sustainable Aquaculture"

According to the variables, the information will be available from different sources (EU level, MS administrations…). Therefore, the major issue will be the availability of these data, to unlock access to data (depends on ministries, administrations…).

EWG 13-18 proposes to organize the collection of data by stepwise approach in order to prioritize aims. The collection could start simple to let the MS the possibilities to correct this collection based on end-users' feedback and their cost evaluation.

This collection could be organized by non-exhaustive sampling scheme. It will depend on the variables collected and the populations targeted. For example, feed companies could respond to individual questionnaires. However, especially for numerous freshwater farms, it will be necessary to fix a threshold in order to limit the costs for MS.

Periodicity of the collection

The periodicity of the collection could vary upon the variables and the companies; annually for medicine, each every three or five years for other variables as the conversation factor, temperature.

Variables needed

Could MFSD indicators be a link for use in monitoring marine aquaculture?

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[17] FAO Guidelines on Vulnerable Marine Ecosystems (VMEs) are based on recommendations formulated by the United Nations General Assembly (UNGA) in 2006; coverage includes seamounts, hydrothermal vents and cold-water corals.

[18] The Water Framework Directive lists macro-algae, angiosperms, and benthic invertebrates as biological quality elements, which need to be included in assessments of water body status in coastal waters.

In general, the variables that follow will show the impact on benthic beds, since impact on *Posidoniaoceanica*meadows, maerl and eelgrass benthic beds, were identified both for fish and for shellfish farms. Furthermore monitoring of such variables will also show the interaction and the impact on wildpopulations, suchas the genetic impacts, the attraction or repulsion of wild fish and also the possible transfer of microbes, viruses, parasites and pathogens to wild populations.

4.3.2 Identification of sectors

The following set of variables could be used to better assess which sectors should be supported as a priority and to identify where environmental impacts are higher or lower.The socio-economic variables are not listed below.

- Nature of the production

The impact on the environment could differ from the nature of the production, freshwater or marine water, intensive or extensive farms, organic farm or not.

- Feed

Information on the source and the quantity of the feed is needed. The food conversion factor could be used as an indicator to measure total fish production. Evolution of alternative sources of proteins and lipids could be useful.

- Medicines

Farm registers mention medicines used, but EWG13-18 does not have information if this is in an exhaustive way or not. Moreover, this consumption could vary along the year and it will be necessary to collect this information regularly to have a general view of medicines used at the farm level.

- Chemicals

Chemicals are used to pest management and control of bio-fouling (used to clean the nets) and may influence the sustainability of the sector.

- Environmental parameters

Temperature is an essential parameter to build the conversion factor. Currents can also influence the use of feed by the fish. Other parameters such as salinity, ph, oxygen saturation are usually collected monthly. However, knowing the multi-annual trend is sufficient to compare and to assess the evolution of the conversion factor.

- Nitrates and phosphates

By experiments, scientists could have the information on the quantity of nitrates and phosphates released by species and by size. Therefore, it could be possible to estimate total quantities of phosphates and nitrates released at the level of the farm.

- Losses and escapes

Depending on the nature of the production, (marine, inland, freshwater aquaculture), losses and escapes would exist or not. Some losses could be known if there is a natural disaster and when subsidies are requested to the administration. Losses from diseases as escapes could be recorded at farm level.

- Production of organic culture

This sector could be supported as a priority, since organic production is an overall system of farm management and food production that combines best environmental practices, a high level of biodiversity, the preservation of natural resources, the application of high animal welfare standards and a production method in line with the preference of certain consumers for products produced using

natural substances and processes. The organic production method thus plays a dual societal role, where it on the one hand provides for a specific market responding to a consumer demand for organic products, and on the other hand delivers public goods contributing to the protection of the environment and animal welfare, as well as to rural development.

Legislation exists but the statistical data are not yet available at unit level.

- Culture of alien species and foreign strains

Some aquaculture farms culture alien species and/or foreign strains and it could create genetic pollution and impact on the wild population/species.

Table 4.2 Set of variables needed to measure sustainability of the sector, source for those set of variables and proposed monitoring periodicity for such variables∗

Variables needed to be collected	Possible Sources	DCF collection (Economic variables)	Periodicity
License system = species and production level, value of the production, cultural species, system of culture, type of culture, type of product, quantity	MS Ministries Farm level GFCM countries	Mostly	Annual basis
Feed	Farm level Feed companies	Partly	Annual basis Annual basis
Medicines	Farm level	No	Annual basis
Chemicals	Farm level	No	Every three years
Environmental parameters	Farm level Directive 2006/11/EC MS	No	Every five years
Nitrates and phosphates	Farm level Scientific advices	No	Annual basis
Losses	Administrations if subsidies requested	Partly	Annual basis
Escapes	Farm level	No	Annual basis
Production of organic culture	Commission Regulation (EC) No 710/2009, of 5 August 2009 Labeling	No	Annual basis ?

administration			
Culture of alien and foreign strains	Ministry	Yes	Annual basis
Genetic impact	Aqua Trace (FP7 project)	No	End of project

* The set of variables depends on the part of the aquaculture sector (marine, inland, freshwater) and the feasibility of monitoring the variables in the different sectors.

4.3.3 List of documents and Regulations for Aquaculture.

- Aquaculture Regulation/ WG

Aquatrace Project, FP7

Recommendation GFCM/35/2011/6on reporting of aquaculture data and information

DG- MARE conference on aquaculture, November 2012

WGAQUA, March 2013

Directive 2006/113/EC of the European Parliament and of the Council of 12 December 2006 on the quality required of shellfish waters

- Organic aquaculture Regulation

Council Reg. (EC) No 834/2007, OJ L 189, 20.7.2007

Commission Reg.(EC) No 889/2008, OJ L 250, 18.9.2008

Entry into force of new EU-wide rules on organic aquaculture

IP/10/861: New EU labeling rules including new EU organic logo come into force on 1 July

- EMFF

http://ec.europa.eu/fisheries/reform/emff/guidance-fiche-3-common-indicators_en.pdf'

4.4   Recreational fishery

The requirements to collect recreational fishery data in the revised DCF should be driven by end-user needs. Flexibility isneeded to include data for additional species or areas and to allow for differencesbetween countries in the types of surveys that are appropriate or possible.

In relation to assessing the impact of recreational fisheries on the biological resources a criteria for including sampling of recreational catches could be that the catch taken by recreational fishery constitute a minimum amount of the total catch of a stock for which assessment is conducted.

However, the relative proportion of the total catch may not be reflect the possible impacts of recreational fisheries on local populations and the EWG 13-08 therefore suggests that the decision to sample a recreational fishery should be done on a case by case basis and that other factors than the relative catch taken by recreational fishery may be taken into account.

5   TOR 2B. LANDING OBLIGATION

As laid out in the EWG 13-02 meeting report, it is unlikely that the introduction of a landing obligation will require a change in the biological variables to be collected. However, it may have a large impact on the methods to be used in the collection of the data. There most likely will be a continued need for discard estimates in data for future resource assessments. It is, however, not clear yet how these

estimates will be obtained and what kind of data collection will underpin them, as the detailed implementation of the landing obligation will depend on regional discard plans (e.g. Scheveningen Group, BALTFISH). The EWG 13-02 therefore suggested that, within the revised/new DCF, there should be an obligation for MS to collect data on discards (volumes, biological variables) but the regulation should not specify the method.

6 TOR 2C. QUALITY

6.1 Quality assurance

A substantial amount of work related to the quality of fisheries sampling programmes, data and associated analysis has, since the late 2000ies, been conducted by the ICES Planning Group on Commercial Catches, Discards and Biological Sampling (PGCCDBS), and by workshops and study groups (e.g. WKPICS, SGPIDS) established by PGCCDBS.

A similar bulk of work has been undertaken to provide guidelines on quality assurance of sampling programs for the collection of economic data of the fleet, the aquaculture and the processing sector. Such work has been conducted mainly by STECF working groups, DCF workshops and meetings of the Planning Group on Economic Issues (PGECON).

This has led to increased awareness on the need for more comprehensive views on data quality as well as how data quality should be evaluated. A prerequisite for transparent evaluation of data quality is that data is collected in accordance with statistically-sound sampling designs.

The review on "Data quality indicators for biological data as input to discussions on revision of the DCF" (annex 2) proposes that the present system for reporting data quality in DCF programmes may be inappropriate. The main reason for this is that the present system only covers part of the data quality aspects. It has a strong focus on precision but few requirements to assure representativeness of collected data and to reduce (the risk of) bias.

The quality of a sampling programme should be evaluated in relation to two aspects of sampling: 1) the ability of the programme to (in principle) deliver data that are unbiased and fit for purpose, by reviewing the design of the programme against guidelines and standards for best practice; and 2) evaluation of the quality of the data and estimates following implementation of the sampling survey, covering each of the two components of accuracy: bias and precision.

Quality evaluation should ideally be through a well-structured peer-review process supported by clear documentation of the sampling programmes and the sampling outcomes. Such process needs to cover all the components, design of the sampling scheme, implementation of the sampling scheme, data archiving and extraction as well as production of final estimates. This requires that best practices, quality evaluation procedures, performance measures and quality indicators are considered for all the different components of a sampling programme. It needs to be noted that quality standards for fishery sampling are still in development and thereby incomplete. Further development of such standards need to be included in a road-map towards a revised DCF.

The main message for the future DCF which is reflected in changes of the Consultation document, suggested by the EWG, is that quality assurance needs to be assured for all components (including design and implementation of data collection schemes, data archiving as well as methodologies to derive final estimates). Member States need to establish documented quality assurance frameworks which can be compared with future agreed international standards and evaluated by STECF. Special attention needs to be given to the design of collection schemes to make sure that data is collected in a statistical robust way that is fit for purpose and allows for further assessment of the quality of the data. This type of pre-evaluation was missing in the presented draft Consultation document.

Another main message is that quality evaluation need encompass all types of data, including transversal data.

6.2 Sampling intensity

Precision for a given survey design is an outcome related to the variability of the sampled population and the sampling effort. The target precision levels for biological sampling in the present DCF has been heavily criticised for a number of reasons. These include i) estimation of precision is only meaningful if sampling according to basic principles of random sampling which the present DCF does not cater for ii) it is inherent that MS never can assure that the sampling scheme meet a certain level of precision as required in the present DCF, quality indicators thereby need to be distinguished from metrics to indicate compliance with DCF legal requirements, iii) the present precision levels in the DCF are unreachable for some variables if sampling effort is not increased considerable and iv) the DCF require MS to meet national levels of precision while the end-users in many cases are interested in precision for the combined international estimate. It is thereby, for a number of reasons, inappropriate to have target precision levels in a legal text.

Ideally should sampling schemes be designed to deliver the desired precision at the scale of aggregation needed by end users – e.g. for catches-at-age for a stock, it is the precision of the combined international estimates. The process of coordination of sampling between countries should identify the sampling needed at a national scale to deliver the desired precision for combined international data. Sampling programmes should then evolve in response to achieved precision relative to the desired precision.

The challenge is how to grasp the sampling obligation at the Member State level to ensure adequate sampling without being too prescriptive. The text in the consultation document also needs to cater for future regional coordination of sampling programmes and even (possible) fully integrated regional sampling designs. The EWG 13-05 concluded that minimum sampling levels shall be set, assuring that sampling effort is remaining at least at the present level. There is, however, a risk involved in this since minimum levels at the operational level often becomes target levels. Different countries may further organise their sampling programmes in different ways depending on logistics in the member state/region. This means that what constitutes a sample (as well as primary sampling units) may differ between programmes, making it difficult to establish straight forward generic direct minimum levels of sampling effort. Required sampling effort is further highly dependent on the objective (e.g. desired precision level), design (e.g. number of strata) of the sampling programme as well as the methods for deriving the final estimates.

The suggestion from EWG 13-18, that is reflected in the suggestions for change in the consultation document, is thereby that sampling intensity should be an integral part of the design following recommended best practices. MS should make sure that sampling intensity is sufficient for statistically sound estimation for derived estimates.

7 TOR 2D.END-USER CONSULTATION MECHANISM/CYCLE

The current DCF has been criticized for not reflecting sufficiently the needs of end-users, and not being flexible enough to address evolving needs of end-users over time. The challenge is to find a good balance between flexibility, continuity and, ultimately, the cost of the data collection framework.

In order to achieve this objective, EWG 13-18 focused on two main issues regarding end users consultation. First, the group reconsidered the definition of end-users, setting out more clearly their rights and obligations. Second, the group defined the process whereby end-users are consulted on their needs and how this results in a change in the EU Multiannual Programme or national workplans.

Former STECF reports were revised to address these issues and the information found there was compiled and summarized. A text about end users consultation was included in Annex 1 which is the expert group's comments/suggestions to revision of Block C of the Commissions consultation

document "EU Data Collection for Fisheries 2014 – 2020" of 21st November 2013. Here we present the ideas that have been included in the text.

7.1 Definition of end-users

The role of end users has been addressed at previous EWG and STECF meetings. EWG 13-02 proposed the following classification in order to differentiate the role end users can play:

- Type 1: Main end users for whom the DCF was designed, including the Commission, any bodies such as ICES and STECF designated by the Commission to provide them with recurrent advice directly supporting CFP decision making, and other fishery management bodies such as RFMOs, GFCM and using DCF data to implement their fishery management policies.

- Type 2: Other bodies such as Advisory Councils or subcontractors from whom the Commission may request advice or analysis based on DCF data

- Type 3: All other bodies such as NGOs, Fishermen's organizations and Universities with an interest in using DCF data for their own purposes.

EWG 13-18 modified end users category 1, removing EU governments. The group considered that EU governments are represented through the scientific and management organisations they are affiliated with.

End-users type 1 will be consulted by the Commission on data requirements. STECF EWG 13-05did not consider it necessary to set up a formal system to address possible requests from type 2 and 3 end users and suggests that such requests are dealt with on an ad-hoc basis by the Commission.

7.2 Consultation process

In order to include type 1 end users in the decision process, the EWG 13-02 proposed the consultation process illustrated in Fig. 7.1.

Figure 7.1
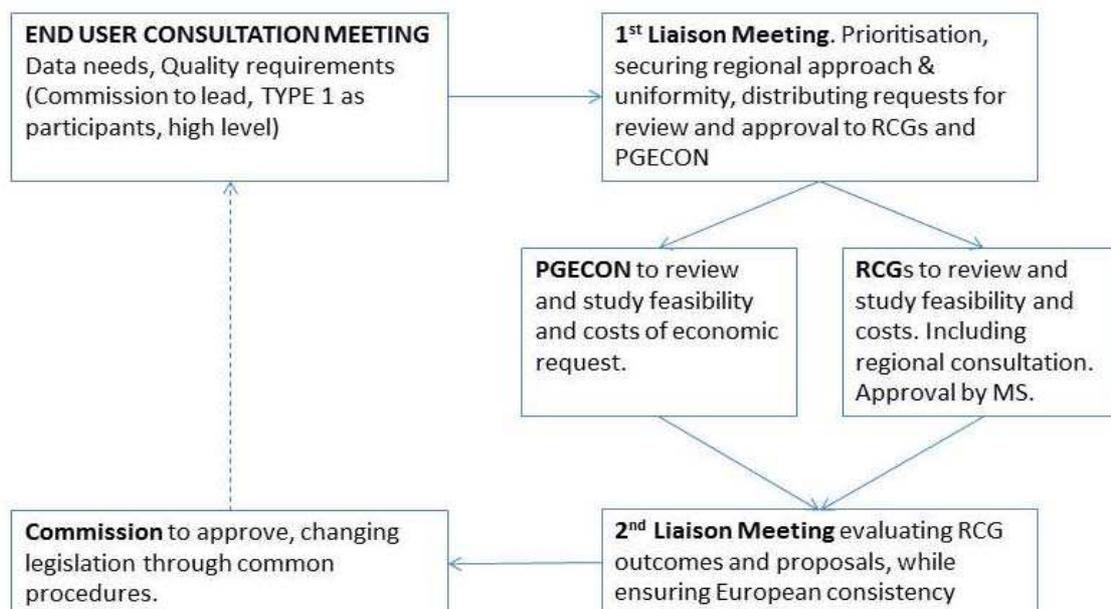
The process starts with the consultation of end-users Type 1 by the Commission. This consultation should include feedback to and from Regional Coordination Groups and PGECON. STECF 13-05 proposed seven criteria to evaluate the proposed changes in data collection in terms of the 1) need and relevance, 2) impacts, 3) feasibility, 4) methods, 5) costs, 6) data quality and 7) data use.

The end-user consultation process should not be fixed on a regularly basis but rather depending on the requests from type 1 end users. However, it could be useful to set up regular check-points (e.g. every 3 years) for an overall evaluation of data included.

8 TOR 2E. REGIONAL COORDINATION AND TASK SHARING MECHANISMS (FOR SURVEYS OR COMMERCIAL SAMPLING).

8.1 Biological and environmental data

As a general point, EWG 13-18 thought it was more appropriate for the Commission to establish Regional Coordination Groups rather than it being the responsibilities of Member States. The bullet point tasks of the RCGs as originally listed in Block C of the Commissions consultation document "EU Data Collection for Fisheries 2014 – 2020" of 21st November 2013 by the Commission were commended on (Annex 1). The intention was to maintain the existing set while making it more complete. For biological and environmental data, the first three follow the logic that they describe: (i) meeting end user needs, (ii) advising on the sampling programmes from data collection through to end user availability and (iii) providing guidance on the development and implementation of regional programmes. The second three are concerned with different aspects of the consultation process and the final one concerns quality assurance of data at the regional level.

It may be necessary for the RCGs to consult directly with each other's and the clause to enable this has been included after the bullet point list of tasks rather than as part of the opening article in this section that establishes the RCGs with the overarching task of coordinating the national work plans of Member States.

EWG13-18 found it easier to follow the text in the consultation document if some of the articles were separated into their component parts, and this was done during the EWG review of this section. In doing so, it highlighted the need to make clear to which Treaty the text is referring when it indicates

that the Commission could propose measures to resolve issues over task allocations if RCGs could not agree a solution within their own memberships. EWG13-18 considers the proposal to allocate responsibilities according to the shares of TACs (where they exist) or the proportion of overall landings where no TAC exists to be reasonable.

EWG13-18 was unconvinced of the need for Member States to submit participant lists to the Commission two weeks before any RCG meeting or for the names of invited experts to be submitted three weeks prior to such meetings. If these obligations are to be included, there should be a clear justification.

8.2   Social and economic data

The original text in the draft consultation document regarding supra-national coordination of economic and social data collection was an almost direct copy of the text on biological and environmental data, with minor amendment to ensure appropriate reference to the Planning Group on Economics Issues (PGECON) rather than to RCGs and to reflect that economic data are referenced supra-regionally rather than within regions. In discussion, EWG13-18 considered that simply repeating this process with reference to PGECON would not be appropriate. Consequently, the tasks of PGECON were redrafted.

9   TOR 2G. DEFINITIONS

The EWG 13-18 merged existing definitions from the CFP Basic Regulation (Doc. 12007/13 of 10 Oct 2013) and Reg. 199/2008, added definitions from the EWG 13-05 meeting report (Appendix XV) and added definitions of the terms 'catch', 'by-catch', 'incidental by-catch' and 'slipping' based on existing FAO/GFCM glossaries.

The updated list is included in Annex 1 which is the expert group's comments/suggestions to revision of Block C of the Commissions consultation document "EU Data Collection for Fisheries 2014 – 2020" of 21st November 2013.Where the EWG 1318 has added new definitions or changed existing definitions the source of the definition is indicated.

In the description of the new DCF it is important to use expressions on discards and bycatch in a consistent way. The meeting noted that in management communities in Europe, there are two different meanings in use for 'by-catch' or 'bycatch'. Bycatch may refer to (1) catch that is being put back in sea. On the other hand it may refer to (2) catch of non-target species that are kept on board or to (3) the incidental catch of rare, endangered species, like marine mammals. In the meeting the 'bycatch' was considered covering all (1, 2, 3). In order to do justice to the other meanings that are in use, the meeting suggests adding qualifiers 'incidental' and 'retained'. 'Discards' is part of 'bycatch' and contains the small sized, bulk species. This is illustrated by figure 9.1.
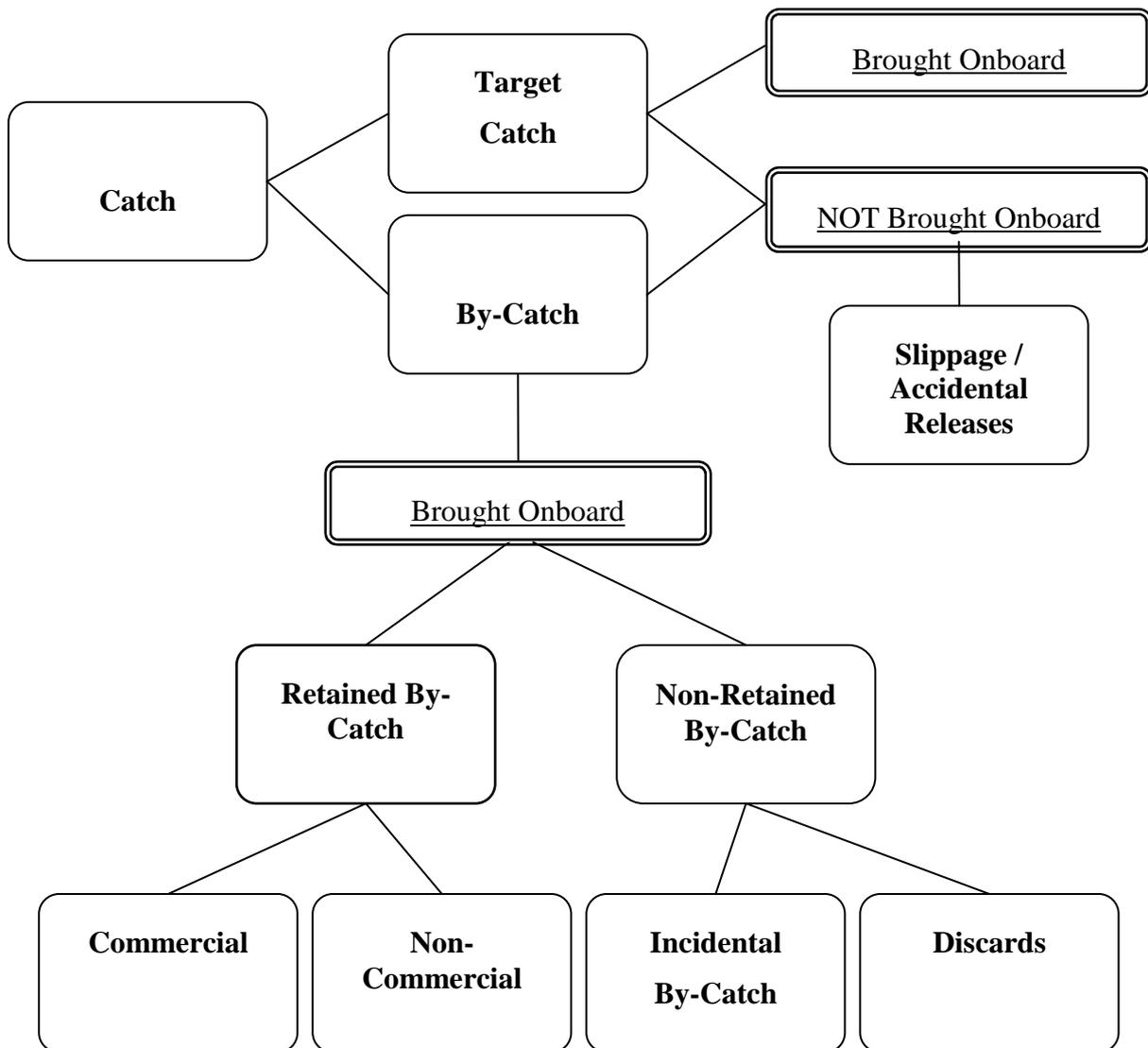
Figure 9.1. Illustration of the definitions related to the catch.

10 TOR 3. SIMPLIFICATION OF THE DCF

The EWG discussed the possibilities for simplification of the DCF and the mechanisms through which simplification might be achieved.

The expert group noted that, although the revised DCF will include commitments for Member States to expand the data collection to areas not covered under the current DCF, there is scope for simplification, mainly related to:

- the shift from an output-driven data collection system, where the data to be collected is defined up front to a more end-user driven system, where the need for the data has to be demonstrated before the collection is made mandatory;

- the implementation of regional databases; and

- the introduction of sampling design based on best practice.

The focus on end user needs will likely result in that some data will be removed from the list of data that Member States must collect. The reduction will be both in terms of variables not to be collected and in terms of number and frequency of sampling the data. A quantitative estimation of the magnitude

of the reduction in data to be collected cannot be given until the national work plans have been drawn up.

Regional databases have already proven to be an efficient tool in the planning and reporting of the data collection, and the EWG 13-18 consider that a systematic use of the databases will reduce the workload for Member States and simplify reporting and transfer of data to end users.

The introduction of best practice is likely to enhance the quality of the sampling programmes and make sure that the sampling effort is used in a statistically sound way and may lead to simplifications in form of reduction in sampling effort.

11 TOR 4. SOCIAL & ECONOMIC DATA ON THE FISHERIES, AQUACULTURE AND FISH PROCESSING SECTORS

11.1 Pros and cons of the two alternative definitions of the sampling unit in aquaculture (farm or company)

It is necessary to clarify that the universe for the sampling of aquaculture data under the DCF refers to enterprises having aquaculture as their main (primary) activity according to the appropriate NACE code from Eurostat. The EWG 13-10 agreed that the enterprise[19] level is where all costs and incomes are recorded, because it is the legal unit. Therefore, when the end-user is interested in the economic performance of the aquaculture sector (e.g. their profitability, economic robustness, economic situation of the sector and its dynamics), then the statistical unit should be the enterprise.

On the other hand, if the end-user is interested in the economic and social importance from a regional point of view and in a more detailed knowledge of the economic performance and sustainability of particular aquaculture techniques, then there is the need to have the farm (production unit) as the statistical unit. This should not be confused with an agricultural farm, and it refers to a local unit of production. In general terms, the production unit in fisheries is the vessel, in aquaculture the fish farm and in the processing industry the local unit or the kind-of-activity unit. Economic and social analysis, policy planning and impact assessment may require regional (subnational level) data, and therefore may require farm level data. However, EWG 13-18 is currently unable to assess if economic data disaggregated by farm could be obtained in all MS. Therefore, a study should is needed to address the feasibility and cost of this kind of collection of disaggregated data.

Aquaculture companies can have farms or processes taking place in different countries, also outside the EU. This can hamper collecting, reporting or interpreting data from those companies. In the current DCF, the data of aquaculture farms abroad operated by European companies is not differentiated from the EU aquaculture farms. An option would be to collect all or at least some variables for both EU and non-EU farms. This issue of non-EU aquaculture farms requires further attention by the Commission.

These considerations for the pros and cons of the enterprise level or processing plant and the important issue of collecting data on certain stages of the processing taking place in enterprise outside the EU apply similarly to the processing industry.

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[19]In accordance with the SBS and the DCF (EC 2008/949), EWG 13-18 will use the term "enterprise" across this report in order to designate the legal unit that may be national or international, and that is the owner of the production units. The terms "firm" and "company" have therefore been avoided for the sake of clarify.

11.2 The discrimination of performance of aquaculture from other activity of the enterprise.

According to EWG 13-10, aquaculture data collection is done at the enterprise level, and it is possible that an enterprise has other economic activities than aquaculture (i.e. processing, marketing, oil drilling). EWG 13-18 recommends that revenues and costs from other activities of the enterprise that are not related to the aquaculture sector are separated from the aquaculture data collected when possible. Specific categories should be created if these data are collected (i.e. "other activity income" and "other activity costs"), to avoid that these items appear in the economic performance estimation of the aquaculture sector. However, the EWG 13-18 considers that the collection of these disaggregated data could be very difficult and not cost-efficient. Turnover as a variable has to be defined in a clearer way if there is a need to separate turnover from aquaculture and from other activities.

Similarly, this could also affect the processing sector. In the case of the processing industry, it must be taken into consideration that under the current legislation the population for the data collection of the processing industry refers to enterprises having the processing of fish and fish products as their main (primary) activity according to the appropriate NACE code from Eurostat (EC 2008/949). For enterprises not having fish processing as their primary activity, the number of enterprises and their turnover attributed to fish processing will also be collected.

The fishing industry itself should most likely not be affected by this consideration as the reference unit is, by definition, the vessel. Any conceivable turnover not generated from fishing should be covered through the variable "other income".

11.3 Segmentation of aquaculture data on the basis of findings and recommendations of previous STECF and PG-ECON meetings and harmonization needs against EUROSTAT.

As presented in the EWG 13-10 report, for all fish species (marine and freshwater), current "farming techniques" included in the DCF Multiannual Programme ("hatcheries and nurseries", "on-growing", "combined" and "cages") could be replaced by the following "aquaculture techniques" included in the (Eurostat) statistical Regulation (EC) No 762/2008 on aquaculture ("ponds", "tanks and raceways", "enclosures and pens", "cages", "recirculation systems", "other methods") as well as "combined" and "hatcheries and nurseries" which should be maintained from the current DCF (include a justification on why these should be maintained) .

Shellfish segments are to be renamed as mollusc segments, in line with the (Eurostat) statistical Regulation (EC) No 762/2008 on aquaculture. However, further disaggregation of the mollusc segment into species groups, ("mussels", "oysters", "clams" and "other molluscs"), as are included in the current DCF Multiannual Programme, should be maintained. Even though such level of detail is not included in the Eurostat statistical regulation on aquaculture data on these economically relevant species groups is of additional use.

Furthermore, the EWG recommends to keep the current technical segmentation in the DCF ("raft", "long-line", "bottom" and "Other") rather than to adopt those in the Eurostat statistical regulation on aquaculture ("on bottom", "off bottom" and "others") because the current DCF segmentation better reflects the cost structure. There may be a need to further define the different aquaculture techniques in the future DCF, and a possible partial source of definition can be found in FAO. The new segment "Others" would report under the aquaculture technique "all methods".

Currently the DCF Multiannual Programme only covers marine aquaculture (as mandatory). Once freshwater aquaculture is included in the revised DCF, there will be a need to differentiate the environment (saltwater or freshwater) for all segments, in line also with the Eurostat statistical regulation on aquaculture. EWG 13-10 recommended that this differentiation by environment should

not disaggregate for brackish water (it would be under saltwater aquaculture, clarifying that the latter includes both marine and brackish.).

11.4 Pros and cons and possible solutions for providing geographically disaggregated socio economic data in support of the regionalization of CFP.

The regionalization of the CFP implies recording the effect of policy measures (among others) on the communities in land. The data on impacts should be clearly linked to the drivers of those impacts, which would be the corresponding data from fisheries, aquaculture or fish processing. To answer the TOR the expert group considered that geographically disaggregated data could be:

1. Disaggregation of economic fleet data to a lower level than supraregion level;

2. Provision of the data for fish processing and aquaculture on the subnational level (e.g. NUTS3)

For the first case there is already a study suggested by PGECON, and the topic was already discussed by EWG 13-02.

Regarding the 2nd point, data could be collected so that it allows for regional analysis, and therefore sampling plans would be designed accordingly. Disaggregated data would be used for bioeconomic analysis and impact assessment among others.

There is room for cost efficiency in data collection by MS as some data is already collected for the national purposes and this data can sometimes be re-used. In order to achieve this, the collection of the data could be organized in different ways, for example, based on current practices in MS, these could include the following set-ups: a) the national statistical office collects data for both Eurostat and the DCF, b) the national statistical office collecting data for the Eurostat and another organization collecting it for DCF and c) an intermediate solution where the national statistical office collects the data for the Eurostat and can deliver certain data to other organizations in charge of the DCF. It should be the MS's responsibility to ensure that the data collection and provision to different end users is carried out in the most efficient and cost-effective way.

The use of **business registers** to acquire data for regional analysis has been evaluated, and as it occurs that some aquaculture and processing firms have their legal address very far from the plants/farms (for example in the capital of the MS) it has been judged that other registers as veterinary registers or certification registers may be more effective sources.

Another aspect is the possibility to have in the future DCF an overview of the **spatial distribution of the sectors**. The periodicity and extent of this overview needs to be discussed with the end users, on the basis among others of the cost of the potentially additional data collection. This shall be done when possible by using existing data on the fisheries, processing and aquaculture sectors. The data needs for this kind of analysis would be at least employment and GVA. Annual collection of data for GVA is deemed cost efficient. In any case an approximation for data collection would include at least employment and turnover. After consulting a representative of the agriculture and fisheries department of EUROSTAT about the aquaculture data, the data provided to this institution was found out to be only on national basis, while the data might have a lower aggregation level at the national statistical offices and could maybe be accessed by them directly.

12 REFERENCES

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ICES 2012.Report of the Study Group on Practical Implementation of Discard Sampling Plans (SGPIDS 2). ICES 2012 /ACOM:50pp.

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13   CONTACT DETAILS OF STECF MEMBERS AND EWG-13-18 LIST OF PARTICIPANTS

1 - Information on STECF members and invited experts' affiliations is displayed for information only. In some instances the details given below for STECF members may differ from that provided in Commission COMMISSION DECISION of 27 October 2010 on the appointment of members of the STECF (2010/C 292/04) as some members' employment details may have changed or have been subject to organisational changes in their main place of employment. In any case, as outlined in Article 13 of the Commission Decision (2005/629/EU and 2010/74/EU) on STECF, Members of the STECF, invited experts, and JRC experts shall act independently of Member States or stakeholders. In the context of the STECF work, the committee members and other experts do not represent the institutions/bodies they are affiliated to in their daily jobs. STECF members and invited experts make declarations of commitment (yearly for STECF members) to act independently in the public interest of the European Union. STECF members and experts also declare at each meeting of the STECF and of its Expert Working Groups any specific interest which might be considered prejudicial to their independence in relation to specific items on the agenda. These declarations are displayed on the public meeting's website if experts explicitly authorized the JRC to do so in accordance with EU legislation on the protection of personnel data. For more information: http://stecf.jrc.ec.europa.eu/adm-declarations

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14   LIST OF BACKGROUND DOCUMENTS

Background documents are published on the meeting's web site on:
http://stecf.jrc.ec.europa.eu/web/stecf/ewg1318

List of background documents:

EWG 13-18 Doc 1 -Declarations of invited and JRC experts (see also section 13 of this report – List of participants)

EWG 13-18 Doc 2 -ICES. 2013. Report of the Working Group on Bycatch of Protected Species (WGBYC), 4–8 February, Copenhagen, Denmark. ICES CM 2013/ACOM:27. 73 pp.

EWG 13-18 Doc 3 -ICES. 2013. Report of the Workshop on Bycatch of Cetaceans and other Protected Species (WKBYC), 20–22 March 2013, Copenhagen, Denmark. ICES CM 2013/ACOM:36. 55 pp.

EWG 13-18 Doc 4 -FAO.Fishing operations. 2. Best practices to reduce incidental catch of seabirds in capture fisheries. FAO Technical Guidelines for Responsible Fisheries.No.1, Suppl. 2. Rome, FAO. 2009. 49p.

EWG 13-18 Doc 5 -ICES. 2013. EU_bycatch of cetaceans and other protected species. Request from EU concerning monitoring of bycatch of cetaceans and other protected species.Special request, Advice April 2013.

EWG 13-18 Doc 6 -ICCAT A5 By-catch Species.

EWG 13-18 Doc 7 -ICES advice on EU impact of fisheries.New information regarding the impact of fisheries on other components of the ecosystem. Special request, Advice June 2013

EWG 13-18 Doc 8 -ICES. 2013. EU_ data_ collection_issues. Request from EU for Scientific advice on data collection issues.Special request, Advice June 2013.

EWG 13-18 Doc 9 -ICES. 2013. OSPAR special request on maximizing the use of available sources of data for monitoring of biodiversity. Special request, Advice June 2013.

EWG 13-18 Doc 10 -ICES. 2013. Report of the Workshop on DCF Indicators, 21 - 25 October 2013, ICES Headquarters, Copenhagen, Denmark. ICES CM 2013/ACOM:38. 78 pp.

EWG 13-18 Doc 11 -ICES. 2013. Report of the Workshop on Data Collection - assessments of non-fishery impacts (WKDCF-NF), 8 -10 October 2013, ICES Headquarters, Copenhagen, Den-mark. ICES CM 2013/ACOM:74. 68 pp.

EWG 13-18 Doc 12 -DG ENV. Proposed list of key MSFD indicators prepared by COM.

EWG 13-18 Doc 13 -Scientific, Technical and Economic Committee for Fisheries (STECF) – Landing obligation in EU fisheries (STECF-13-23). 2013. Publications Office of the European Union, Luxembourg, EUR 26330 EN, JRC 86112, 115 pp.

EWG 13-18 Doc 14 -Ad hoc expert paper on possible approaches to quality assurance for biological variables (including relevant outcomes of WKPCS3).

EWG 13-18 Doc 15 -Scientific, Technical and Economic Committee for Fisheries (STECF) – Review of DC MAP – Part 2 (STECF-13-12). 2013. Publications Office of the European Union, Luxembourg, EUR 26095 EN, JRC 83566, 84 pp.

EWG 13-18 Doc 16 -JRC Technical Report.Evaluation of DCF data calls and variables managed by JRC in preparation of the new DC MAP. 2013 – 75 pp. Italy.

EWG 13-18 Doc 17 -Scientific, Technical and Economic Committee for Fisheries (STECF) – 44th Plenary Meeting Report (PLEN-13-03). 2013. Publications Office of the European Union, Luxembourg, EUR XXXX EN, JRC 86096, 124 pp.

EWG 13-18 Doc18 -RECOMMENDATION GFCM/33/2009/4 ON REPORTING OF AQUACULTURE DATA AND INFORMATION.

EWG 13-18 Doc 19 -ICES. 2013. Request from EU for scientific advice on data collection issues – part 2. Special request, Advice November 2013.

EWG 13-18 Doc 20 -NAFO.Northwest Atlantic Fisheries Organization Conservation and Enforcement Measures.Serial No. N6131, NAFO/FC Doc. 13/1. 2013.

EWG 13-18 Doc 21 -Scientific, Technical and Economic Committee for Fisheries (STECF) – Review of DC MAP – Part 1 (STECF-13-06). 2013. Publications Office of the European Union, Luxembourg, EUR 25974 EN, JRC 81593, 42 pp.

EWG 13-18 Doc 22 -Zampoukas Nikolaos, Piha Henna, EmanueleBigagli, Nicolas Hoepffner, Georg Hanke& Ana Cristina Cardoso. Monitoring for the Marine Strategy Framework Directive: Requirements and Options.

2012. Publications Office of the European Union, Luxembourg, EUR 25187 EN, 36 pp.
EWG 13-18 Doc 23-Aquatrace project - General presentation.
EWG 13-18 Doc 24-Aquatrace project - Newsletter_Sept 2013.

ANNEX 1.COMMENTS BY THE EWG 13-18 TO THE: EU DATA COLLECTION FOR FISHERIES 2014-2020. CONSULTATION DOCUMENT – UPDATED BLOCKS C. 21 NOVEMBER 2013

In annex is based on the consultation document "EU Data Collection for Fisheries 2014-2020. Consultation document – Updated Blocks C. 21 November 2013" presented by the EU Commission at the EWG 13-18 meeting. The EWG 13-18 has inserted its comments and suggestions directly into the document. The suggested changes to the consultation documents have been drafted in a style similar to the one used in the consultation document, i.e. in a style used in regulations. The suggestions from the expert group shall, however, not be considered as firm proposals for legal text but solely as comments to the Commission as requested in the terms of reference.

GENERAL PROVISIONS

Scope

1. This regulation establishes rules on Member States collection and management of biological, environmental, technical, and socio-economic data necessary for fisheries management and end–users access to those data. Those data shall, in particular, enable the assessment of:

(a)   the state of exploited marine biological resources within and outside Union waters;

(b)   the level of fishing and the impact that fishing activities have on the marine biological resources and on the marine ecosystems including those species under Regulations and Conventions within and outside Union waters;

(c)   the socio-economic performance of the fisheries, aquaculture and processing sectors within and outside Union waters;

(d)   the sustainability of aquaculture in the European Union; and

(e)   the impacts of management measures on the marine biological resources, the marine ecosystems and the socio-economic performance of the fisheries and aquaculture.

Definitions

'Union waters' means the waters under the sovereignty or jurisdiction of the Member States, with the exception of the waters adjacent to the territories listed in Annex II to the Treaty;

'marine biological resources' means available and accessible living marine aquatic species, including anadromous and catadromous species during their marine life;

'fresh water biological resources' means available and accessible living fresh water aquatic species;

'fishing vessel' means any vessel equipped for commercial exploitation of marine biological resources or a blue fin tuna trap;

'Union fishing vessel' means a fishing vessel flying the flag of a Member State and registered in the Union;

'ecosystem-based approach to fisheries management' means an integrated approach to managing fisheries within ecologically meaningful boundaries which seeks to manage the use of natural resources, taking account of fishing and other human activities, while preserving both the biological wealth and the biological processes necessary to safeguard the composition, structure and functioning of the habitats of the ecosystem affected, by taking into account the knowledge and uncertainties regarding biotic, abiotic and human components of ecosystems;

'discards' means catches that are returned to the sea;

'stock' means a marine biological resource that occurs in a given management area;

'minimum conservation reference size' means the size of a living marine aquatic species taking into account maturity, as established by Union law, below which restrictions or incentives apply that aim to avoid capture through fishing activity; such size replaces, where relevant, the minimum landing size;

'fishing effort' means the product of the capacity and the activity of a fishing vessel; for a group of fishing vessels, it is the sum of the fishing effort of all vessels in the group;

'fishing capacity' means a vessel's tonnage in GT (Gross Tonnage) and its power in kW (Kilowatt) as defined in Articles 4 and 5 of Council Regulation (EEC) No 2930/86[20];

'aquaculture' means the rearing or cultivation of aquatic organisms using techniques designed to increase the production of the organisms in question beyond the natural capacity of the environment, where the organisms remain the property of a natural or legal person throughout the rearing and culture stage, up to and including harvesting;

'fishing licence' means a licence as defined in point (9) of Article 4 of Council Regulation (EC) No 1224/2009[21];

'fishing authorisation' means an authorisation as defined in point (10) of Article 4 of Regulation (EC) No 1224/2009;

'fishing operation' means all activities in connection with searching for living aquatic resources, the shooting, towing and hauling of active gears, setting, soaking, removing or resetting of passive gears and the removal of any catch from the gear, keep nets, or from a transport cage to fattening and farming cages; [EWG 13-05]

'fishery products' means aquatic organisms resulting from any fishing activity or products derived therefrom;

'operator' means the natural or legal person who operates or holds any undertaking carrying out any of the activities related to any stage of production, processing, marketing, distribution and retail chains of fisheries and aquaculture products;

'serious infringement' means an infringement that is defined as such in relevant Union law, including in Article 42(1) of Council Regulation (EC) No 1005/2008[22] and in Article 90(1) of Regulation (EC) No 1224/2009;

'end-user' means a body with a research or management interest in the data on the fisheries sector;

'aquaculture products' means aquatic organisms at any stage of their life cycle resulting from any aquaculture activity or products derived therefrom;

'fisheries sector' means activities related to commercial fisheries, recreational fisheries, aquaculture and industries processing fisheries products;

'recreational fisheries' means non-commercial fishing activities exploiting living aquatic resources; [EWG 13-05]

'primary data' means data associated with individual vessels, natural or legal persons or individual samples; [EWG 13-05]

'meta data' means data giving qualitative and quantitative information on the collected primary data;

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[20]   Council Regulation (EEC) No 2930/86 of 22 September 1986 defining characteristics for fishing vessels (OJ L 274, 25.9.1986, p. 1).

[21]   Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006 (OJ L 343, 22.12.2009, p. 1).

[22]   Council Regulation (EC) No 1005/2008 of 29 September 2008 establishing a Community system to prevent, deter and eliminate illegal, unreported and unregulated fishing, amending Regulations (EEC) No 2847/93, (EC) No 1936/2001 and (EC) No 601/2004 and repealing Regulations (EC) No 1093/94 and (EC) No 1447/1999 (OJ L 286, 29.10.2008, p. 1).

'detailed data' means data based on primary data in a form which does not allow individual vessels, natural persons, legal entities or individuals to be identified directly or indirectly; [EWG 13-05]

'aggregated data' means the output resulting from summarising the primary or detailed data for specific analytic purposes;

'personal data' means any information relating to an identified or identifiable natural person. An identifiable person is one who can be identified, directly or indirectly, in particular by reference to an identification number or to one or more factors specific to his or her physical, physiological, mental, economic, cultural or social identity; [Reg. 45/2001]

'fishing trip' means any voyage of a fishing vessel during which fishing activities are conducted that starts at the moment when the fishing vessel leaves a port and ends on arrival in port; [Reg. 404/2011]

'day at sea' means any continuous period of 24 hours (or part thereof) during which a vessel is present within an area and absent from port; [Decision 2012/93/EU]

'fishing day' means any day at sea with fishing operation. In case of passive gears, each day of a fishing gear being deployed counts as fishing day and is associated to the fishing trip during which the gear was deployed; [EWG 13-05]

'soaking time' means the time calculated from the point where each individual unit of gear has been set, to the time when the same unit starts to be removed; [Decision 2010/93/EU]

'operational unit' means group of fishing vessels which are engaged in the same type of fishing operation within the same Geographical Sub-Area, targeting the same species or group of species and belonging to the same economic segment; [GFCM]

'metier' means a group of fishing operations targeting a similar (assemblage of) species, using similar gear, during the same period of the year and/or within the same area and which are characterised by a similar exploitation pattern; [Decision 2010/93/EU]

'mesh size range' means a range of mesh sizes of fishing nets as determined in accordance with Regulation (EC) No 517/2008; [Reg. 39/2013]

'active vessels' means fishing vessels that have been engaged in any fishing operation (more than 0 days) during a calendar year. A vessel that has not been engaged in fishing operations during a year is considered 'inactive'; [EWG 13-05 adopted from Reg. 199/2008]]

'population of vessels' means all vessels in the Community Fishing Fleet Register as defined in Commission Regulation (EC) No 26/2004 at any time during the reference year; [Decision 2010/93/EU and STECF PLEN 10-02, p. 17]

'predominant fishing gear' means fishing gear in use by a vessel by more than 50% of its fishing time using that gear. If not, the vessel shall be allocated to one the following fleet segments:

'Vessels using Polyvalent active gears' if it only uses active gears;

'Vessels using Polyvalent passive gears' if it only uses passive gears;

(c) 'Vessels using active and passive gears'; [Decision 2010/93/EU]

'fleet segment' means group of fishing vessels with the same length class (LOA) and predominant fishing gear, operating within the same supra-region during the calendar year; [Decision 2010/93/EU, amended by EWG 13-05]

'sampler' means a person appointed to collect information under the Member State's Data Collection Programme [EWG 13-05]

'official observer' means a person appointed to observe fishing operations in the context of law enforcement, control and inspection and designated by the Member State's control and enforcement bodies; [EWG 13-05]

'scientific observer' means a person appointed to observe fishing operations in the context of data collection for scientific or management purposes and designated by a body in charge of the implementation of (parts of) the Annual Work Plans for Data Collection; [EWG 13-05]

'target population' means population for which information is required, e.g., the commercial catch of a species that is landed in a country; [ICES WKMERGE]

'sampling frame' means list of all individuals or primary sampling units that can be selected independently with known probability by randomised sampling. The frame may represent the entire population of interest or may be incomplete because not all sampling units are accessible for sampling; [EWG 13-05 adopted from ICES WKMERGE]

'research survey at sea' means a voyage dedicated to the collection of data for scientific purposes, carried out by a vessel designated for this task; [EWG 13-05]

'supra-region' means geographical areas grouped for data collection purposes, according to Appendix II of Commission Decision 2010/93/EU; [EWG 13-05]

'fishing ground' means (a group of) geographical units based on existing areas defined by Regional Fisheries Management Organisations or scientific bodies; [EWG 13-05]

'catch' means all living biological material retained or captured by the fishing gear, whether brought on board the vessel or not; [Kelleher, K. 2005: Discards in the world's marine fisheries – an update. FAO Fisheries Technical Paper 470, p.3]

'by-catch' means the part of a catch of a fishing operation taken incidentally in addition to the target species towards which fishing effort is directed; [FAO/GFCM]

'incidental bycatch' / 'accidental bycatch' means unintentional or fortuitous catch of non-target species that is caught during the normal fishing operation, regardless its commercial interest [GFCM]

'slipping' means releasing fish into the sea without being brought on board the vessel after being retained in a net ; [Kelleher, K. 2005: Discards in the world's marine fisheries – an update. FAO Fisheries Technical Paper 470, p.3]

Establishment of national and cross national multi-annual work plans

Member States shall establish multi-annual national or cross-national work plans on the basis of recommendations by the Regional Coordination Groups and the Planning Group for Economists, and shall adjust these regularly when necessary

Multi-annual national or cross-national work plans shall include, in particular:

a sampling design for data required to assess the level of fishing;

a sampling design for data required to assess the state of exploited marine biological resources and the impact of fishing activities on the marine biological resources;

a sampling design for data required to assess the impact of fishing activities on the marine ecosystem;

a sampling design for data required to assess the socio-economic performance of the fisheries, aquaculture and processing sectors within and outside Union waters; and

a sampling design for data required to assess the sustainability of aquaculture in the European Union.

The protocols and the methods used for the establishment of work plans shall be made available by Member States upon request from the Commission or other Member States and shall be, as far as possible:

stable over time;

standardised within regions, on the basis of recommendations from Regional Coordination Groups or at EU-level, on the basis of recommendations by the Planning Group for Economists;

in accordance with the quality standards established by the appropriate regional fisheries management organisations to which the EU is contracting party or observer and relevant international scientific bodies.

Access to on board sampling

Where necessary for the purposes of the collection of the data under the work plans, Member States shall monitor commercial and recreational fisheries.

Where monitoring of commercial or recreational fisheries requires at-sea sampling, the masters of EU fishing vessels shall accept on board samplers operating under the at-sea monitoring scheme and designated by the body in charge of the implementation of the national work plan and cooperate with them in order to allow them to discharge their duties while on board EU fishing vessels.

The masters of EU fishing vessels may refuse to accept on board the samplers operating under the at-sea monitoring scheme only on the basis of an obvious lack of space on the vessel or for safety reasons in accordance with national legislation.

Member States shall verify that the obligation in paragraph (2) above is fulfilled and that access on board is only refused in duly justified cases Member States shall report on cases where access was refused in their Annual Report.

DATA REQUIRED TO ASSESS THE LEVEL OF FISHING (TRANSVERSAL DATA)

Member States shall ensure that involved institutes, agencies or organisations designated by the body in charge of the implementation of the national work plan have timely access to all primary data fleet register information, special fishing permits information, fishing authorisation information, logbook information, sales notes information and VMS information or information collected for vessels not carrying logbooks.

Member States shall ensure that samplers designated by the body in charge of the implementation of the national work plan have access to: all landings, including as appropriate, transhipments and transfers to aquaculture; vessel and business registers operated by public bodies relevant for the collection of economic data; economic data of fisheries related businesses.

Member States shall ensure that selected variables given in appendix III collected according to Council Regulation 26/2004 are made available.

Member States shall if needed carry out additional collection of information on fishing gear used if the fleet register information on gears are not sufficient to meet the requirements of this regulation.

Member States shall ensure that fishing licenses and fishing authorisation information recorded according to Commission Regulation 404/2011 article 4, 5 and 6, annex II and annex III are made available.

Member States shall ensure availability of:

data on landings of fish and shell fish in terms of volume in weight and value recorded according to Council Regulation 1224/2009,

data on discards recorded according to provision on logbooks given in Council Regulation 1224/2009 and annex X of the Commission Regulation 404/2011.

data on landings and discards for vessels not carrying a logbook collected according to Council Regulation 1224/2009 article 16 and the provisions given in Commission Regulation 404/2011 annex XVI.

If the quality of the landing/catch statistics recorded according to Council Regulation 1224/2009 does not meet the requirements for the use defined in this regulation, Member States shall implement additional collection of the data concerned..

Member States shall ensure that fishing effort data recorded according to the provisions in Council Regulation 1224/2009 are made available. The minimum variables to be made available are those mandatory logbook variables given in Commission Regulation 404/2011 annex X.

If it on a regional level is agreed that the optional variables, given in Commission Regulation 404/2011 annex X is needed, Member States shall carry out additional sampling.

Member States shall ensure that data for vessels not carrying a logbook, collected according to Council Regulation 1224/2009 article 16 and the provisions given in Commission Regulation 404/2011 annex XVI, are made available.

If the quality of the recorded fishery effort information according to Council Regulation 1224/2009 does not meet the requirements for the use of the DC-MAP, Member States shall implement additional collection of the data concerned. Justification for additional DC-MAP data collection should be provided.

Member States shall ensure that Vessel Monitoring System Data (VMS) variables, collected according to the Council Regulation 1224/2009 article 9, are made available.

If other electronic vessel monitoring data are collected, Member States shall ensure availability of these data.

DATA REQUIRED FOR ASSESSING THE STATE OF EXPLOITED MARINE BIOLOGICAL RESOURCES AND THE IMPACT OF FISHING ACTIVITIES ON THE MARINE BIOLOGICAL RESOURCES.

End Users need

Data collection must be aligned to the specific assessment or management requirements of end-users.

In line with[article 37 of Council general approach of CFP, COM (2011)425 final of the 11th of June 2013], the final list of end users shall be established by the Commission.

The various categories of end-user needs23 as defined by regional management or advisory organisations for commercial fisheries are shown in Appendix IV along with their statements of the generic core data requirements that are necessary to attain the assessment or management outcome as defined by each category.

Data collection on recreational fishery shall be mandatory if a fishery is likely to have a measurable impact on a marine biological resource.

Species caught in recreational fisheries as identified by end users for data collection purposes are outlined in Appendix V.

Variables to be collected

Commercial Fisheries

Species lists that are identified by stock or management unit as provided by regional management or advisory organisations are given in Appendix VI24. These are indexed against the relevant end-user's categories, and indicate the core data that are necessary to be collected for each species to attain the appropriate assessment or management outcome.

For shore-based sampling, the Member State on whose territory the first sale take place, shall be responsible for ensuring that biological sampling occurs according to the standards defined in this EU Programme.

Member States shall co-operate with the authorities of non-EU countries to set up biological sampling programmes for the landings carried out by vessels flying the third country's flag and to ensure that any catch from Member State vessels that are offered for first sale in a third country are sampled by that country.

For at-sea sampling the Member State shall be responsible for sampling vessels flagged by that flag Member State.

Recreational Fisheries

Specific details of survey schemes such as periodicity of estimates (e.g. annual, twice a year or quarterly) and type of data to collect (e.g. numbers, weight, length compositions) shall be agreed at a regional level.

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[23]ICES' consultation response on end user data needs was the only one available to the group that was sufficiently specific to permit the sort of use that we have made of it. Other regional management or advisory groups will need to specify something along the same lines specific to their own needs.The ICES example can be considered illustrative of the approach we have taken.

[24]Use is made of the ICES example as an illustration of the approach we have take. There was insufficient information available to populate other regional examples.

For recreational fisheries Member States shall be responsible for sampling recreational fishing carried out within the state, including territorial waters

Design-based sampling

Member States are responsible to ensure best practice in design and implementation of statistically sound catch sampling schemes. 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. Guidelines for best practice are not yet fully developed, but indicative guidance documents are listed in Appendix VII.

A summary of the sampling protocols carried out by Member States shall be made available through the Annual Work Plan. All national surveys should document the sample frame, sample selection procedures, response rates, imputation methods for missing data and weighting procedures employed to derive national estimates. Deviation from the best practice guidelines (Appendix VII) should be described to allow the identification of possible bias in the final estimates.

Minimum sampling effort

Commercial fisheries

A minimum sampling target shall be set, remaining at least at the present level of activity. Threshold levels shall be defined for sampling programmes rather than targets. These threshold levels shall be consistent with best practice in terms of statistical robustness. A provision for a minimum sampling effort shall be set, rather than precision targets. Regional coordination shall ensure that national work plans are organized such that they satisfy the end user requirements within the operational constraints of the work plans.

Recreational fisheries

Countries with a very low share of the recreational catches of target stocks in a region shall have correspondingly lower survey effort and precision requirements for the delivery of data. Regional coordination shall ensure that national work plans are organized such that they satisfy the end user requirements within the operational constraints of the work plans.

Exemptions

Member States landing in their flag state

The work plan of a Member State may exclude the estimation of biological variables for stocks for which TACs and quota have been defined under the following conditions:

the relevant quota must correspond to less than 10 % of the Community share of the TAC or to less than 200 tonnes on average during the previous three years;

the sum of relevant quotas of Member States whose allocation is less than 10 %, must account for less than 25 % of the Community share of the TAC.

If the condition set out in above point 1(a) is fulfilled, but not the condition set out in point 1(b), the relevant Member States shall establish a joint sampling scheme.

Appropriate adjustment may be made to annual workplans to take account of quota exchanges between Member States:

For stocks for which TACs and quotas have not been defined and that are outside the Mediterranean Sea and Black Sea the same rules established under point (1), above, apply on the

basis of the average landings of the previous three years and with reference to the total Community landings from a stock;

For stocks in the Mediterranean Sea and Black Sea, the landings by weight of a Mediterranean or Black Sea Member State for a species corresponding to less than 10 % of the total Community landings from the Mediterranean Sea or Black Sea, or to less than 200 tonnes, except for Bluefin tuna.

Member States landing outside their flag state[25]

[26]*RCM Baltic and RCM NA both proposed a procedure to identify were bilateral agreements on sampling of foreign landings have to be set up. RCM NA reflecting on the issue after RCM Baltic had a different view, but it appeared that the rule proposed by RCM Baltic was set for the biological parameters whereas the rules set by RCM NA would apply to métier related variables. Eventually, LM agreed to propose the following:*

For métier related variables (RCM NA proposal) a bilateral agreement must be set up:

• *where less than 5% of a member state's total landings are landed abroad, sampling is excluded from the obligation of sampling abroad (corresponding to the application of 1639/2001) if the other 95% of the landings are sufficiently sampled by the landing countries for the relevant métier(s);*

• *the reference period to be used in the analysis should be the latest available reference year;*

For biological variables (RCM Baltic proposal) it was agreed:

• *that 200 tonnes limit exemption rule (2010/93/EU B2.1.5) is applied also for foreign landings;*

• *that species where less than 5% of a member state's total landings are landed abroad are excluded (corresponding to the application of 1639/2001);*

• *that if No. of samples according the old DCR (1639/2001appendix XV) are 3 or less, there is no need for sampling of the landings by the landing country and can instead be sampled by the flag country. Also, in these cases no formal agreement needs to be set up;*

• *that the analysis on when bilateral agreements are needed should be done annually by the RCM using landing data from the previous year."*

Following the above procedure performed on RCM NS&EA, also endorsed by both LM and STECF, the RCM Baltic carried out an evaluation of foreign landings based on the data available in FishFrame.

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[25]EWG 13-18 has not addressed who should be responsible for collecting data from landings outside the flag state.

[26] This section is based on text provided by the Liaison meeting. It refers to sampling metier related variables and biological variables. However, EWG 13-05 now have only biological variables and sampling is not necessarily carried out at the metier level, so the following wording needs to be modified to take account of those changes. The original LM text is in italics and EWG 13-05 suggested wording, is provided in standard font below the italicised section.

The workplan of a Member State may exclude the sampling of biological variables for stocks for which TACs and quota have been defined under the following conditions:

the relevant quota corresponds to less than 200 tonnes on average during the previous three years;

less than 5% of a Member State's total landings of the stock concerned are landed abroad;

the number of samples according the old DCR (1639/2001appendix XV) are 3 or less. In this situation there is no need for sampling of the landings by the landing country and can instead be sampled by the flag country. Also, in these cases no formal agreement needs to be set up;

Consideration of metiers

Member States shall continue to define metiers in accord with requirements of the relevant Regional Coordination Meetings. Transversal data including landed weights by species, should include information required to allow allocation to metiers based on the defined target assemblage and fishing gear characteristics as defined in Appendix ?**[27]**to ensure the continuation of time series data for fisheries based management models. Metiers shall be ranked at the regional level to decribe the relevant importance of metiers based on the landed weight of species, value and effort to allow Member States to check that their sample frames encompass their important metiers.

DATA REQUIRED FOR ASSESSING THE IMPACT OF FISHING ACTIVITIES ON THE MARINE ECOSYSTEM.

By-Catch

Member States shall monitor incidental catches of marine mammals, birds and marine turtles in their existing observer monitoring programmes

The following variables shall be monitored

Number of individuals by-caught, by species including zero observations and also indications on animals lost during hauling the gear or released alive

Date and geographic location (following the geographic stratification as listed in Appendix I, EC 93/2010)

The type of fishery/gear characteristics

Any mitigation device used

Vulnerable Marine Ecosystems

Member States shall collect the data required to assess the impact of fishing activities on vulnerable marine ecosystems.

Aquaculture

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[27]Not provided here. It will be an update of Appendix IV from 93/2010

Member States shall collect the data required to assess the impact of aquaculture on marine ecosystems.

DATA REQUIRED FOR ASSESSING THE SOCIAL AND ECONOMICAL PERFORMANCE OF FISHING, AQUACULTURE AND PROCESSING SECTOR.

Economic and social data required for assessing the performance of the fishing sector

Variables

Variables to be collected are listed in Appendix XI. All economic variables are to be collected on an annual basis and by fleet segment (Appendix III of EC 93/2010). The population is all vessels in the EU Fishing Fleet Register on December 31st and any active vessel fishing at least one day during the year28. All economic variables have to be collected for active vessels. For each vessel for which economic variables defined in Appendix XI are collected, the corresponding transversal variables defined in Appendix III have also to be collected.

For inactive vessels fleet variables (Appendix XI) shall be collected.

National currencies shall be transformed into Euro using the average annual exchange rates available from the European Central Bank (ECB).

Disaggregation levels

Economic variables shall be reported for each fleet segment (Appendix III of EC 93/2010) and supra region (Appendix II).

The dominance criteria shall be used to allocate each vessel to a segment based on the number of fishing days used with each gear. If a fishing gear is used by more than the sum of all the others, the vessel shall be allocated to that segment. If not, the vessel shall be allocated to the following fleet segment:

"Vessels using Polyvalent active gears" if it only uses active gears;

"Vessels using Polyvalent passive gears" if it only uses passive gears;

"Vessels using active and passive gears".

In cases where a vessel operates in more than one supra region as defined in Appendix II, Member States shall explain the criteria of allocation in their national work plans to which supra region the vessel is allocated.

In case confidentiality criteria apply for less than 10 vessels or 3 enterprises29 MS might use clustering in order to design the sampling plan and to report economic variables. If clustering is made:

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[28]The fixed day include also the inactive vessels in that year.With this method all active and inactive vessels during the year will be included.

[29]10 vessels would keep the time series stable as we used it before. 3 enterprises is always the threshold for confidentiality issues (see EUROSTAT Manual on disclosure control methods).

Member States shall report which fleet segments have been grouped at the national level and shall justify the clustering on the basis of statistical analysis;

In their annual report, Member States shall report the number of sampled vessels for each fleet segment regardless of any clustering made to collect or provide the data;

MS should follow guidelines recommended by STECF when clustering.

SAMPLING STRATEGY

Member States shall describe their methodologies used for estimating each economic variable, including quality aspects, in their national work plan.

Member States shall ensure consistency and comparability of all economic variables when derived from different sources (e.g. surveys, fleet register, logbooks, sales notes).

QUALITY INDICATORS

Member States shall include in their annual report information on the quality of estimates.

Economic and social data required for assessing the performance of the aquaculture sector

VARIABLES

All variables listed in Appendix XII are to be collected on an annual basis per segment according to the segmentation set out in Appendix XII. Except for CHECK appendix

The statistical unit shall be the enterprise30 or the farm defined as the lowest legal entity for accounting purposes.

The population shall refer to enterprises whose primary activity is defined according to the EUROSTAT definition under NACE Code [03.02]: "Fish Farming".

National currencies shall be transformed into Euro using the average annual exchange rate available from the European Central Bank (ECB).

DISAGGREGATION LEVEL

Data shall be segmented by species and technique for aquaculture, as mentioned in Appendix XII.

SAMPLING STRATEGY

Member States shall describe their methodologies for estimating each economic variable for aquaculture, including quality aspects, in their national work plans.

Member States shall ensure consistency and comparability of all economic variables when derived from different sources (e.g. questionnaires, financial accounts). [MS should follow Best Practice from the MRR.

QUALITY INDICATORS

Member States shall include in their annual report information on the precision) of estimates.

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[30]EUROSTAT collects on farm level (not economic data). It is up to end users to say on which level (for example to have a more detailed regional approach) they want the data.

Economic and social data required for assessing the performance of the processing sector

VARIABLES

All variables listed in Appendix XIII are to be collected [for the population [in year 2 and 5 of the timeframe of the DCMAP]][Wherever possible MS shall use EUROSTAT data to avoid double sampling.]

The population shall refer to enterprises whose main activity is defined according to the EUROSTAT definition under NACE Code [10.20]: "Processing and preserving of fish and fish products".

As a guideline, the national codes applied by Member States under Council Regulations (EC) No 852/2004 of 29 April 2004 on the hygiene of foodstuffs, (EC) No 853/2004 of 29 April 2004 on hygiene rules for food of animal origin and (EC) No 854/2004of 29 April 2004 on the organisation of official controls on products of animal origin intended for human consumption, shall additionally be used as a means of cross checking and identifying enterprises classified under NACE code 10.20.

National currencies shall be transformed into Euro using the average annual exchange rate available from the European Central Bank (ECB).

DISAGGREGATION LEVEL

The statistical unit for collection of data shall be the "enterprise" as defined as the lowest legal entity for accounting purposes.

For enterprises that carry out fish processing but not as a main activity, it is mandatory to collect the following data, in the first year of each programming period:

Number of enterprises;

The turnover attributed to fish processing.

SAMPLING STRATEGY

Member States shall describe their methodologies for estimating each economic variable for the processing industry, including quality aspects, in their national work plans.

Member States shall ensure consistency and comparability of all economic variables when derived from different sources.

QUALITY INDICATORS

Member States shall include in their annual report information on the precision) of estimates.

Research surveys at sea

Member States shall carry out research surveys at sea, independently of fishery-based data, to collect the data required by end-users to assess the state of the marine biological resource and the impact of the fishing activity on the state of the marine biological resource and on the marine ecosystem.

Member State shall confirm their commitment to carry out their contribution to the surveys at sea, listed in the Appendix VIII in their Work Plan.

Member States shall ensure within their Work Plan continuity with previous survey designs.

Notwithstanding points 2) and 3), changes can be made in the list and modification in the survey effort or sampling design may be proposed, provided that this does not negatively affect the quality of the results. Proposals for amendments will emerge through the process of evaluation and end user consultation and be approved by the Commission.

Member States shall ensure that the primary data collected under the research surveys at sea are transmitted to international scientific organisations and appropriate scientific bodies within regional fisheries management organisations in accordance with the international obligations of the Union and the Member States.

Access to information sources

Member States shall ensure that, in order to carry out their duties, samplers designated by the body in charge of the implementation of the national and cross-national work plans have access to:

all relevant data on landings, catches, discards, including as appropriate, transhipments and transfers to aquaculture;

vessel and business registers operated by public bodies relevant for the collection of economic data;

socio-economic data of fisheries related businesses.

VMS, electronic logbooks and transversal data

National co-ordination and co-ordination between the Commission and Member States

Each Member State shall designate a national correspondent who shall serve as the focal point for exchange of information between the Commission and Member States regarding the preparation and implementation of work plans.

In the case of several bodies participating in data collection, management and use, the national correspondent shall be responsible for the co-ordination of this work. To this end, at least one national coordination meeting shall be convened once a year. The Commission shall be invited to such meetings.

Reporting about national co-ordination shall be included in the annual report.

Evaluation and approval of national Workplans

The Commission shall approve Workplans and the amendments thereto made in accordance with [Article XX] and in accordance with [art xx EMFF] on the basis of the evaluation by the STECF

The Scientific, Technical and Economic Committee for Fisheries (STECF) shall evaluate:

the conformity of the work plans with [Articles 1 and 2 and art 37 CFP]; and this regulation;

the scientific relevance of the data to be covered by work plans for the purposes laid down in Article 1A(1) and the quality of the proposed methods and procedures.

If the evaluation by STECF, referred to in paragraph 1, indicates that a national work plan does not comply with Articles 1 and 2 or does not guarantee the scientific relevance of the data or sufficient quality of the proposed methods and procedures, the Commission shall immediately inform the Member State concerned and propose amendments to that plan. Subsequently, the Member State concerned shall submit a revised national work plan to the Commission.

Reporting and evaluation of implementation of national programmes and annual workplans

[To be further elaborated in line with new provisions for implementation under shared management]

The Commission shall assess the implementation of the national programmes on the basis of:

the evaluation by the STECF;

the consultation of appropriate regional fisheries management organisations to which the EU is contracting party or observer, relevant international scientific bodies and other end users of DCF data;

the evaluation of the data provision by Member States to the DCF database(s), once these have been established.

Member States shall submit by electronic means an annual report

The STECF shall evaluate:

the execution of the national programmes approved by the Commission in accordance with Article [XX]; and

the quality and coverage of the data collected by the Member States.

CHAPTER III - REGIONAL COORDINATION AND COOPERATION

Biological and environmental data

Regarding collection of the data referred to in Article 1a,b,d and e Member States shall coordinate their work plans with other Member States in the same marine region and make every effort to coordinate their actions with third countries having sovereignty or jurisdiction over waters in the same marine region. For this purpose the Commission shall establish Regional Coordination Groups consisting of the Member States fishing in each region.

The tasks of the Regional Coordination Groups shall include the following:

- provide guidance on work plans in order to fulfil end user needs at a regional level within the legal and operational constraints of the annual work plans.

-advise on issues relating to the implementation of the collection, management, use and availability of the data in the same region,

-provide guidance on the development and implementation of integrated regional sampling programmes where appropriate,

- provide Member States' scrutiny and consent to any proposed amendments of work plans,

- review and study the feasibility and costs of amendments of work plans,

- propose amendments to the EU multiannual programme,

- assessing quality of the data collected at a regional level and advising on the data quality to be achieved,

Regional Coordination Groups may consult RFMOs, Advisory Committees (ACs), advisory bodies, other end users, third countries, and independent experts where relevant.

Member States should cooperate within Regional Cooperation Groups in order to adopt joint recommendations and other instruments to achieve the tasks outlined in paragraph (2).

In the framework of Regional Cooperation Groups, and concerning the tasks outlined in paragraph (2), the Commission shall only adopt measures through implementing acts or delegated acts where all Member States concerned in a region agree on a joint recommendation.

In the absence of a joint recommendation, the Commission should submit a proposal for the relevant measures pursuant to the Treaty. The Commission will do this on the basis of criteria to be defined in the EU Multiannual Programme.

A Chair and a deputy Chair of the Group shall be designated by the Regional Coordination Group in agreement with the Commission for a two year period. The task of the chair, with assistance from the deputy chair, will be to:

 coordinate the work of the group during and between meetings of the Regional Coordination Group,

to propose recommendations to be agreed by consensus,

to report to the Commission at least annually.

Meetings of the Regional Coordination Group shall be convened at least once a year. During its first meeting a Regional Coordination Group shall agree on its rules of procedure. The terms of reference for the meeting shall be proposed by the Chair in agreement with the Commission and shall be communicated by the Chair to the national correspondents referred to in Article [XX] one month prior to the meeting.

Member States shall submit to the Commission the lists of participants two weeks prior to the meeting and proposals for independent experts to be invited three weeks before the meeting.

In order to take into account any recommendation made at regional level by Regional Coordination, Member States shall where appropriate submit amendments to their Annual Work Plans during the programming period. Those amendments shall be sent to the Commission at the latest two months prior to the year of implementation.

Social and economic data

Regarding social and economic data collection, Member States shall coordinate their national work plans with other Member States at EU-level. For this purpose; the Commission shall establish the Planning Group for Economists, consisting of the Member States representatives. The Planning Group for Economists should consult RFMOs, Advisory Committees (ACs), advisory bodies, other end users, third countries, and independent experts where relevant.

The tasks of the Planning Group for Economists shall include the following:

- ensuring that national sampling programmes are organized so that they satisfy the end user requirements within the legal and operational constraints of the national work plans.

-advising on issues relating to the implementation of the collection, management, use and availability of the data,

- to provide Member States' scrutiny and consent to the amendments of end user needs,

- review and study feasibility and costs of amendments of end user requirements,

- propose amendments to the EU multiannual programme,

- assessing quality of supra-regional data and on the data quality to be achieved

The Planning Group for Economists may consult RFMOs, Advisory Committees (ACs), advisory bodies, other end users, third countries, and independent experts where relevant.

Member States should cooperate within the Planning Group for Economists in order to adopt joint recommendations and other instruments to achieve the tasks outlined in paragraph (2).

In the framework of Regional Cooperation Groups, and concerning the tasks outlined in paragraph (2), the Commission should only adopt measures through implementing acts or delegated acts where all Member States concerned agree on a joint recommendation. In the absence of a joint recommendation, the Commission should submit a proposal for the relevant measures pursuant to the Treaty. The Commission will do this on the basis of criteria to be defined in the EU Multiannual Programme.

A Chair and a deputy Chair of the Group shall be designated by the Planning Group for Economists in agreement with the Commission for a two year period.

The task of the chair, with assistance from the deputy chair, will be to:

coordinate the work of the group during and between meetings of the Planning Group for Economists,

to propose recommendations to be agreed by consensus,

to report to the Commission at least annually.

Meetings of the Planning Group for Economists shall be convened at least once a year. During its first meeting the Planning Group for Economists shall agree on its rules of procedure. The terms of reference for the meeting shall be proposed by the Chair in agreement with the Commission and shall be communicated by the Chair to the national correspondents referred to in Article 3(1) one month prior to the meeting.

In order to take into account any recommendation made at EU-level by the Planning Group for Economists, Member States shall where appropriate submit amendments to their Annual Work Plans during the programming period. Those amendments shall be sent to the Commission at the latest two months prior to the year of implementation.

CHAPTER IV - Data Quality Assurance

Member States shall ensure that all sampling programmes are designed and implemented so that the data they collect are adequate for their intended use, that sufficient sampling effort is allocated to meet the objectives of the programme and that the performance of the programme can be reliably evaluated.

Member States shall ensure within their quality assurance framework, that all aspects of the sampling programmes, including the design, allocation of sampling effort, implementation, data archiving and data processing, is documented and can be evaluated against guidelines and standards for best practice as developed by the international scientific and statistical bodies, regional fisheries management organisations and recommended by STECF.

Member States shall ensure that the quality assurance framework encompasses biological, transversal, economical and social data.

Member States are responsible for the validation, quality and completeness of the primary data collected under national programmes, and for the detailed and aggregated data that are derived from them before they are transmitted to end-users or uploaded to international or other data storage systems.

Member States shall, in their national programmes describe their sampling designs, including levels of sampling effort, The national quality assurance frameworks shall be referenced.

Member States shall report on the performance of their sampling programmes in their Annual Reports. This reporting should include quality indicators as developed by the international scientific and statistical bodies, regional fisheries management organisations and recommended by STECF. Accuracy and precision for the data collected shall be systematically estimated where required.

STECF shall evaluate if the quality assurance framework meet international standards, if the sampling design and intensity are adequate for the objectives as well as the quality of the data collected by Member States. STECF may were appropriate recommend modifications to improve the quality of data. Member States have a responsibility to act upon such recommendations.

Pilot surveys, in a statistical sense, may be used in establishment of new sampling programmes or procedures.

CHAPTER V - DATA STORAGE

Data storage at national level

Member States shall:

ensure that any interested party may have access to data save for reasons of protection of commercial or personal data [to be further elaborated and specified]

ensure that data collected under national work plans are safely stored in computerised databases and take all necessary measures to ensure that the EU rules on protection of data are correctly applied;

take all necessary technical measures to protect such data against any accidental or illicit destruction, accidental loss and deterioration.

set up and manage national computerised databases allowing cost efficient exchange of data and information within Member States.

maintain one national website serving as a repository for information related to the implementation of the data collection programme.

Data storage at regional level, EU level and connectivity of data storage systems

Member States shall ensure possibilities for exchange and uploading from national databases to regional, EU and international data storage systems and ensure the possibility for connecting to data sharing systems in order to allow for the free exchange of all data collected in the framework of this Regulation taking into account the restrictions posed by the relevant EU legislation on data protection. To ensure compatibility between systems and regions the Commission may organise annual meetings on data storage among relevant representatives from the Member States, end users and data managers.

CHAPTER VI - USE AND PROVISION

Data covered

Data availability(from EWG 13-05 and Reg. 199/2008)

Member States shall ensure availability of the following data for scientific support of the Common Fisheries Policy:

Fleet capacity data

Data on Fishing licenses and fishing authorisation information

Catch data including landings and discards from commercial and recreational fisheries

Data on gear specifications required to monitor changes in gear selectivity

Fishing effort data

 Data from the Vessel Monitoring System

all biological data needed to assess the status of exploited stocks;

ecosystem data needed to evaluate the impact of fishing activities on the marine ecosystem;

the social and economic data from the fisheries sector, aquaculture and processing.

Member States shall avoid any duplication in the collection of the data referred to in paragraph 1.

Processing of primary data

Member States shall process the primary data into data sets of detailed or aggregated data in accordance with:

relevant international standards, wherever they exist;

protocols agreed at international or regional level, wherever they exist.

The Member State shall provide to the end-users and the Commission, whenever necessary, a description of the methods applied to process the requested data and their statistical properties.

Access to and provision of primary data

Member States shall conclude agreements with the Commission to ensure effective and unhindered access for the Commission to their national computerised databases, without prejudice to the obligations established by other EU rules.

Member States shall ensure that data collected under the research surveys at sea are transmitted to international scientific organisations and appropriate scientific bodies within regional fisheries management organisations.

Submission and provisions of detailed and aggregated data

Member States shall make detailed and aggregated data available to end-users to support scientific analysis:

as a basis for advice to fisheries management, including to Regional Advisory Councils;

in the interest of public debate and stakeholder participation in policy development;

for scientific publication.

to inform policy making regarding the state of the fisheries sector, including aquaculture and processing

Member States shall provide detailed and aggregated data in a secure electronic format.

Procedure for provision of detailed and aggregated data

Member States shall ensure that relevant detailed and aggregated data are provided in a timely manner to the appropriate regional fisheries management organisations to which the EU is a contracting party or observer, relevant international scientific bodies, and other end users in accordance with the international obligations of the EU and the Member States.

Where detailed and aggregated data are required for specific scientific analysis, Member States shall ensure that the data is provided to end-users:

for the purpose referred to in Article [xx],within one month from the receipt of the request for these data;

for the purpose referred to in Article [XX] within two months from the receipt of the request for these data.

Where detailed and aggregated data are requested for scientific publication referred to in Article xx, Member States:

may, in order to protect the professional interests of the data collectors, withhold data transmission to the end-users for a period of three years following the date of collection of the data. Member States shall inform the end-users and the Commission of any such decisions. In duly justified cases the Commission may authorise that period to be extended;

shall in case that three years period has already expired, ensure that the data is provided to end-users within two months from the receipt of the request for these data.

Member States may refuse to provide the relevant detailed and aggregated data only:

if there is a risk of natural persons and/or legal entities being identified, in which case the Member State may propose alternative means to meet the needs of the end-user which ensure anonymity;

in the cases referred to in Article 23(3);

if the same data are already available in another form or format which is easily accessible by end-users.

Where justified by provisions in EU legislation on protection of personal data, to ensure anonymity Member States may refuse to provide data on vessels' activity based on information from vessel satellite monitoring to end-users for the purposes referred to in Article [XX], to the extent that such data constitutes personal data according to regulation 45/2001. The definition of personal data is personal data' shall mean any information relating to an identified or identifiable natural person hereinafter referred to as 'data subject'; an identifiable person is one who can be identified, directly or indirectly, in particular by reference to an identification number or to one or more factors specific to his or her physical, physiological, mental, economic, cultural or social identity;

Member States may charge those end-users the actual costs of extraction and, if required, aggregation of the data before their transmission in cases where no contractual obligations to provide data exist.

Data provision may via data calls may gradually be replaced by data provision via DCF databases or other tools, and obligations will be detailed in the EU Multiannual Programme.

Review of refusal to provide data

If a Member State refuses to provide data under Article [XX], the end-user may request the Commission to review the refusal. If the Commission finds that the refusal is not duly justified, it may require the Member State to supply the data to the end-user within one month.

End-users responsibilities

The end-users of data shall:

use the data only for the purpose stated in their request in accordance with Article [XX];

duly acknowledge the data sources;

be responsible for correct and appropriate use of the data with regard to scientific ethics;

inform the Commission and the Member States concerned of any suspected problems with the data, about what additional data are needed, and indicate where data are no longer needed or how data collection efforts can be optimized with regard to cost benefits of obtaining data (see STECF 12-02);

provide the Member States concerned and the Commission with references to the results of the use of the data;

not forward the requested data to third parties without consent with the Member State concerned;

not sell the data to any third party.

The Member States shall inform the Commission of any non-compliance by end-users.

Serious infringement

Failure to comply with one or several of the following provisions shall be considered as a serious infringement:

Submission of a national work plan to the Commission by the date established in accordance with [to be established]

Submission of the annual implementation report to the Commission by the date established in accordance with [to be established]

the evaluation of the execution of a national work plan concludes that it does not comply with this [Act];

the consultation [of STECF]. indicates that the data has not been provided or uploaded by Member States in accordance with the provisions in [to be established];

data quality control and data process were not achieved in accordance with [to be established]

an official request for data has been made by an end-user and the data was not delivered in accordance with [to be established] to the end-user concerned or the quality control and the processing of these data were not in accordance [to be established]

List of appendices – to update in light of EWG discussions

Appendix N°	Title
0	List of groups of incidental catches (species) and relevant Regulations
I	Geographic Stratification by Regional Fisheries Management Organisations
II	Geographical stratification by region
III	Fleet segmentation per region
IV	Fishing activity (metier) per region
V	Disaggregation levels
VI	List of economic variables
VII	List of biological variables with Species sampling specification
VIII	List of transversal variables with sampling specification
IX	List of research surveys at sea
X	List of economic variables for the aquaculture sector
XI	Sector segmentation to be applied for the collection of aquaculture data
XII	List of economic variables for the processing industry sector
XIII	Definition of environmental indicators to measure the effects of fisheries on the marine ecosystem

Categories of data to be covered by the DCF and detailed in the EU Multiannual Programme(new categories are indicated by a *)

21 November 2013

This document serves as a basis for discussion with the STECF EWG 13-18 on 25-28 November 2013. It cannot in any circumstances be regarded as the official position of the Commission. It is intended solely for those to whom it is addressed.

Appendix 0

List of groups of incidental catches (species) and their relevant Regulations

Appendix I

Geographic Stratification by Regional Fisheries Management Organisations

Levels	I.C.E.S.	N.A.F.O	I.C.C.A.T	G.F.C.M.	C.C.A.M.L.R.	IOTC	Other

Appendix II

Geographical stratification by Region

	Sub region / Fishing ground[1]	Region	Supra region
Level	1	2	3

Appendix III*

List of raw data on fisheries-dependent information that shall be made available for DCF purpose.31

Type of data	Mandatory/Optional	Comment
CAPACITY DATA REG(EC)26/2004		
….		
CATCH DATA - REG(EU)404/2011 (ANNEX X)		
….		
EFFORT DATA - REG(EU)404/2011 (ANNEX X)		
…..		
LANDING DECLARATION REG(EU) 404/2011 (ANNEX X)		
….		
SALES NOTES - REG(EC) 1224/2009 - article 64		
….		
VMS DATA - REG(EU) 404/2011 (ANNEX XXXII)		
…		
FISHING AUTHORIZATION - REG(EU) 404/2011 (ANNEX III)		
…		
DATA FROM CONTROL SAMPLING PLANs - REG(EU) 404/2011 (ANNEX XVI)		
…		

Appendix IV

End user core data needs

ICES (North Sea & Eastern Arctic and North Atlantic & Baltic)[32]

Commercial Fisheries

ICES has identified six categories of data needs based on the 'assessment type' relevant to different degrees of data availability. The categories range from data-rich to data-poor and they are described below and reflect the availability of data collected under early Commission Decisions governing the EU Data Collection Framework. Various other types of data and information may be relevant to assessing the state and productivity of a stock and the fishery exploiting it, e.g. life-history traits, gear selection parameters, distribution of fishing effort, genetic stock structure.

Assessment Type	Category
Analytic	1
Trends assessment	2
Trends survey	3.1
Trends cpue/lpue	3.2
Trends catches	4
Catch only	5
Catch only (data not species specific)	6

Analytic – Category 1

Stocks with analytical assessments and forecasts.

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[32] ICES' consultation response on end user data needs was the only one available to the group that was sufficiently specific to permit the sort of use that we have made of it. Other regional management or advisory groups will need to specify something along the same lines specific to their own needs. It may be possible to provide a single over-arching annex covering all regional end user needs in one set of descriptors and table, but that cannot be determined until all end users provide the relevant information. EWG 13-05 has assumed that each regional end-user will have their own set of descriptors and table of which the ICES case shown here is one example.

These are the stocks that are not considered data-limited and this category includes stocks with full analytical assessments and forecasts as well as stocks with quantitative assessments based on production models.

Trend Assessment – Category 2

Stocks with analytical assessments and forecasts that are only treated qualitatively.

This category includes stocks with quantitative assessments and forecasts which for a variety of reasons are merely indicative of trends in fishing mortality, recruitment, and biomass.

Trend Survey or CPUE/LPUE

Stocks for which survey-based assessments indicate trends.

Trend Survey - Category 3.1

This category includes stocks for which survey indices that provide reliable indications of trends in stock metrics such as mortality, recruitment, and biomass

Trend CPUE/LPUE Category 3.2

This category includes stocks for which indicators of stock size such as reliable fishery-dependent indices; e.g. lpue, cpue, and mean length in the catch are available that provide reliable indications of trends in stock metrics such as mortality, recruitment, and biomass.

Trend Catches – Category 4

Stocks for which only reliable catch data are available

This category includes stocks for which a time-series of catch can be used to approximate MSY

Catch only - Category 5

This category includes stocks for which only landings data are available.

Catch only (data not species specific) - Category 6

This category includes stocks where landings are negligible compared with discards. It also includes stocks that are part of stock complexes and are primarily caught as bycatch species in other targeted fisheries. The development of indicators may be most appropriate to such stocks.

Tabulation of core data needs for ICES' categories.[33]

			Category						
			1	2	3.1	3.2	4	5	6
Assessment Type			Analytic	Trends assessment	Trends survey	Trends cpue/lpue	Trends catches	Catch only	Catch only (data not species specific)
Discards information			Included	Not included, but are or might be relevant	Partially included	Not included	Not included, considered to be low	Not available	?
Fisheries dependent information	Length	current use	Yes	Yes	Yes	not used	Yes	not used	Other
		future use				needed on short/medium term		no need to collect	
	Age	current use	Yes	Yes	Yes	No	Yes	not used	not used
		future use						needed on short/medium term	no need to collect
	Weight	current use	Yes	Yes	Yes	not used	Yes	not used	Other
		future use				needed on short/medium term		no need to collect	?
	Sex ratio	current use	Yes	Yes	Yes	No	Yes	not used	not used
		future use						needed on short/medium term	no need to collect
	Maturity	current use	Yes	Yes	Yes	No	Yes	not used	not used
		future use						needed on short/medium term	no need to collect
	Fecundity	current use / future use	Yes	Yes	Yes	Yes	Yes	No	No
	Landings	current use / future use	Yes	Yes	Yes	No	Yes	Zero TAC for the time being	? / ?
	Discards	current use	Yes	Yes	Yes	not used	Yes	No	not used
		future use				?			needed on short/medium term
	Effort	current use	Yes	Yes	Yes	No	Yes	not used	not used
		future use						needed on short/medium term	no need to collect
Fisheries independent information	General current survey use		Yes	Yes, but the existing surveys are not directed to this species	Time series of the current surveys is too short	No	No surveys are currently available, but are needed	?	?
	Length	current use / future use	?	?	?	? / ?	?	? / ?	?
	Age	current use / future use	?	?	?	Yes	?	? / ?	? / ?
	Weight	current use / future use	?	?	?	? / ?	?	? / ?	? / ?
	Sex ratio	current use / future use	?	?	?	Yes	?	? / ?	? / ?
	Maturity	current use / future use	?	?	?	Yes	?	? / ?	? / ?
	Fecundity	current use / future use	?	?	?	?	?	Yes	?

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[33] This is essentially a transposed version of ICES original table provided in one of the worksheets of the master stock table that it provided in its consultation response. It needs to be reviewed by ICES given the use to which it is now being put.

Appendix V

Recreational fisheries: species for which biological sampling should be carried (listed by region)

Appendix VI

Commercial fisheries: species for which biological sampling should be carried (listed by region)

Stock ID	Stock	Region???? OR??	Current Assesment Methodology	Current Category

Appendix VII*

Expert groups providing best practice guidance for sampling commercial and recreational fisheries.

Group acronym	Group name

Appendix VIII

List of the surveys to be carried out

Name of the survey	Acronym	Area	Period	Main targeted species	Survey effort-Days	Countries involved	

Appendix IX

List of economic variables and social indicators* for the fleet

Variable group	Variable	Specification for the collection of data [19]	Unit	Mandatory or Optional?	Frequency of collection

Appendix X

List of economic variables and social indicators* for the aquaculture sector

Variable group	Variable	Specification	Unit	Mandatory or Optional?	Frequency of collection

Variable group	Variable	Specification	Unit	Mandatory or Optional?	Frequency of collection

Sector segmentation to be applied for the collection of aquaculture data

Species	Fish farming techniques							Shellfish farming techniques			
	Land based farms						Cages				

List of environmental and ????data of aquaculture sector

Variable group	Variable	Specification	Unit	Mandatory or Optional?	Frequency of collection

Appendix XII

List of economic variables and social indicators* for the processing industry sector

Variable group	Variable	Specification	Unit	Mandatory or Optional?	Frequency of collection

ANNEX 2. DATA QUALITY INDICATORS FOR BIOLOGICAL DATA AS INPUT TO DISCUSSIONS ON REVISION OF THE DCF

Working Document for EWG 13-18 Revision of DCF[34]

Data quality indicators for biological data as input to discussions on revision of the DCF

Mike Armstrong

Independent Expert: UK

This report was prepared with subsequent input from the third ICES Workshop on Practical Implementation of Statistical Sound Catch Sampling Programs (WKPICS3), 19-22 November 2013, Copenhagen. The author accepts all responsibility for the views contained within the report, which may not reflect the views of all WKPICS3 members.

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[34]Commission Request for Services:*Preparation of a paper on data quality indicators for biological data as input to discussions on revision of the DCF*

Commitment no. 812,644592; Legal base: Commission Decision 2005/629/ec; OJ l37, p. 52 of 4 February 2010

Summary

This report was requested by the European Commission to review possible data quality indicators for biological data as input to STECF EWG 13-18 discussions on revision of the DCF. The requirement was to provide a review covering the following three topics related to fleet-based and stock-based biological sampling from marine fisheries:

Overview and compilation of discussions that have already taken place on quality indicators/measures of quality for DCF biological data (including in the context of ICES, STECF and other appropriate EU fora).

Overview of approaches used in other important fishing nations (eg USA, Canada, New Zealand, Australia, Norway...) to measure and ensure quality of biological data.

A reflection on whether MS following best practice guidance for data collection is sufficient or whether measures of quality of the collected data are necessary in addition. Possible measure of quality/quality indicators that could be used and pros/cons of these.

This review proposes that the present system of reporting data quality in DCF programmes is inappropriate. Experience in other countries is that quality evaluation should be through a well-structured peer-review process supported by clear documentation of all components of the sampling programmes and the sampling outcomes. This type of review is a complex process that may be carried out in stages within Institutes and through external peer review, and requires appropriate experts in statistical survey design and practical implementation.

Quality of a sampling survey programme should be evaluated in relation to two aspects of sampling: 1) the ability of the programme to (in principle) deliver data that are fit for purpose, by reviewing the design of the programme against guidelines and standards for best practice; and 2) evaluation of the quality of the data following implementation of the sampling survey, covering each of the two components of accuracy: bias and precision.

Some specific Quality Indicators for each of these aspects are discussed. These relate to i) design of the sampling programme (e.g. coverage of the sampling frame), ii) bias arising during implementation (e.g. non-response rates; proportion of total landings in strata with missing samples), and iii) indicators related to precision (e.g. relative standard error - referred to in DCF texts as CV; effective sample sizes (ESS); numbers of primary sampling units sampled). Quality indicators should be examined in the context of a broader review of a sampling programme, as on their own they may be uninformative or even misleading, and should be clearly distinct from indicators of compliance to DCF legal requirements. Quality standards for fishery sampling are as yet still in development and are incomplete.

For a well-designed, probability-based sampling survey, the detailed outcomes will reflect the sampling intensity and coverage as well as factors beyond the control of the samplers, including changes in abundance of fish stocks and in fishing activities, gears and non-response rates. The outcomes should feed back into improvements in design.

Sampling programmes should be designed in consultation with end-users, particularly at a regional scale, so that the level of disaggregation of estimates that can be supported is clearly understood, and the cost of acquiring more detailed estimates can be considered.

Overview and compilation of discussions that have already taken place on quality indicators/measures of quality for DCF biological data (including in the context of ICES, STECF and other appropriate EU fora).

Sampling surveys are widely used to collect information in all walks of life, and there is a large body of literature dedicated to the design and interpretation of such surveys, and evaluation of their quality (Cochran, 1977; Lessler and Kalsbeek, 1992; Levy and Lemeshow, 1999; Lohr, 2010.). Lohr (2010) concludes that the definition of survey quality as "fitness for use" recognises the multiple purposes of survey data, and when referring to seven dimensions of quality given by Eurostat (2000) also concludes that data accuracy is the most important aspect of data quality. The two key components of accuracy – bias and precision -are examined in Appendix 1 with reference to the outcomes of two ICES workshops (WKACCU – ICES 2008a and WKPRECISE – ICES 2009a).

Accuracy of data is not always clearly and objectively considered when compiling data for stock assessments carried out by ICES, partly because the accuracy has not been formally evaluated, and no, or limited, indicators of quality are supplied. Problems with the fit of an assessment model cannot be traced back to individual data sets when good-quality and poor-quality data such as catches at age are combined across countries. Decisions on whether to include, exclude or down-weight particular data sets cannot be made in an informed way.

Discussions within the ICES community on data quality

A substantial investigation into the quality of fisheries sampling programmes, data and associated analysis has been conducted by the ICES Planning Group on Commercial Catches, Discards and Biological Sampling (PGCCDBS), in their role to promote the ICES Quality Assurance Framework (Nedreaas*et al* 2009), and by workshops and study groups established by PGCCDBS. In addition to establishing protocols and standards for fish ageing and maturity determination, the PGCCDBS and its workshops and study groups have covered topics such as sampling and estimation for maturity ogives (WKMAT: ICES 2007a; WKMOG: ICES 2008b), accuracy of sampling data (WKPRECISE: ICES 2009a; WKACCU: ICES 2008a), discard raising procedures (WKDRP: ICES 2007b); design of commercial fishery sampling schemes (WKMERGE: ICES 2010b; WKPICS: ICES 2011a, 2012c; SGPIDS: ICES 2011b, 2012a, 2013b) and recreational fishery surveys (WKSMRF: ICES 2009b; WGRFS: ICES 2012b, 2013a).

These ICES initiatives have had a progressive impact since the late 2000s in increasing the awareness within the ICES community of the need for statistically-sound sampling design rather than ad-hoc methods, and have developed an important and well-documented body of knowledge on fishery sampling design, implementation and analysis. An important component of this has been the development of guidelines for best practice as well as proposals for ways in which the quality of sampling programmes and the data gathered from them can be documented for a range of end users such as stock assessment scientists, regional coordination groups and the European Commission.

An overview and compilation of discussions that have already taken place on quality indicators or other measures of quality for DCF biological data within the ICES community since 2007 is given in Appendix 2. Some important conclusions are given below:

Data quality evaluation is a complex process as it encompasses the statistical soundness of the sampling design, the outcomes of implementing the scheme, how the data are managed, and how the data are analysed. Aspects of quality related to bias and precision need to be considered separately. Several ICES groups dealing with commercial and recreational fisheries sampling have devoted considerable efforts to designing reporting systems that can identify quality issues at all the stages from design to analysis, as would be required for a full audit of survey design and data quality. These can show, through suitable diagnostics, how quality problems propagate from national sampling strata through to final combined international data,

so that sampling can be improved in a well targeted way. National sampling schemes need not have identical design, if they follow best practice standards and have correctly-calculated, representative estimates with associated variance.

Data end-users must not expect estimates at a higher level of disaggregation than the survey was designed for. A recurrent example is the unrealistic expectations to post-stratify fishery sampling data into highly resolved fleet metiers, when the inevitable outcome is many metiers having no or very few samples. It is essential that end users work with survey experts to ensure that surveys and end-user needs are properly aligned at a national and regional scale

Precision for a given survey design is an outcome related to sampling effort. Sampling schemes should be designed to deliver the desired precision at the scale of aggregation needed by end users – e.g. for catches-at-age for a stock, it is the precision of the combined international estimates. The process of coordination of sampling between countries should identify the sampling needed at a national scale to deliver the desired precision for combined international data. Sampling programmes should then evolve in response to achieved precision relative to the desired precision.

Estimation of precision is only meaningful if sampling has been designed around the basic principles of random sampling. It follows that the primary requirement is to adopt good practice in designing a sampling scheme so that biases are minimised, and to have procedures for evaluating any biases that may arise during the implementation phase.

Assuming that a statistically-sound sampling scheme is in place, the calculation of precision should take into account the sampling design and any cluster sampling effects which are common in fisheries sampling.

A key to effective quality evaluation is full and accurate documentation of national sampling programmes. It is vital that such documentation is stored in repositories providing easy access to all users who need them.

Discussions within STECF on DCF and DCMAP data quality indicators

The Scientific, Technical and Economic Committee on Fisheries (STECF) has established a series of expert working groups (EWG) over the lifespan of the Data Collection Regulation and the Data Collection Framework to advise the Commission on the content of these regulations and to review the achievements of Member States against their national obligations as laid out in the relevant Commission Decisions. During 2012 and 2013, the attention of STECF has been focused on the structure, content and operation of the new Multiannual Programme for Data Collection (DCMAP), including how the quality of data can be enhanced through a revised Regional Coordination process. Of particular interest is how the quality and performance of national sampling programmes can be evaluated, and what types of quality indicator (QI) should be defined as part of this purpose.

An overview of the recent STECF discussions on DCMAP and quality indicators is given in Appendix 2. Some important conclusions are given below:

STECF fully acknowledges and agrees with ICES proposals demonstrating the need for statistically-sound fishery sampling programmes, and for collaboration within regions to ensure that these principles are pursued within a regional sampling programme driven by end-user needs.

A key aspect of quality evaluation is adherence to best practice guidelines, which implies the need for guidelines and standards and appropriate documentation of national sampling schemes to allow evaluation

against these standards. In general, STECF EWGs have highlighted a need for two components of quality evaluation: design vs best practice, and quality indicators (e.g. as listed by Eurostat) to demonstrate the quality of supplied data.

The DCMAP should not contain prescriptive precision targets such as target CV values, as have previously been included in the DCR and DCF, but it is important that the precision of estimates needed by end users can be evaluated.

Conclusions from review of ICES and STECF discussions on data quality evaluation

The conclusions of ICES and STECF discussions on reporting of quality of fleet-based and stock-based biological data in the DCF can be distilled down to two core elements:

An evaluation of whether national sampling programmes are designed and implemented, and the data managed and processed, in a way that follows agreed sets of standards. A national programme meeting these standards is in principle capable of providing the desired standard for data quality.

An evaluation of the quality of the data that have been collected, using diagnostics and quality indicators that identify potential (or known) bias, and those that provide estimates or indexes of achieved precision. ICES groups such as WKPICS, SGPIDS and WGRFS have proposed that this should be an evaluation of national contributions as part of a regional sampling programme, because quality indicators for national programmes are of limited value in isolation as you cannot easily see how they impact the estimates at a regional or stock scale, or how they can be optimised to improve data quality for stocks or regional fleets. The Regional Data Bases are seen as a work in progress towards facilitating regional data quality evaluation.

Overview of approaches used in other important fishing nations (eg USA, Canada, New Zealand, Australia, Norway...) to measure and ensure quality of biological data.

In response to a query circulated to contacts in fisheries laboratories in the USA, Canada, New Zealand and Australia, detailed responses were obtained from the USA, New Zealand and Norway. Detailed responses are given in Appendix 3, and a summary of key points related to data quality evaluation is given below. When viewing these responses, consideration must be given to factors such as the extent to which there are shared stocks with other countries, or to the existence of legal requirements for peer review of data collection and assessments (as in the USA) which are not applicable to the EU.

Data quality assurance in New Zealand

New Zealand has developed its fisheries data quality evaluation further than Europe by having published a "Research and Science Information Standard for New Zealand Fisheries". Key elements are that:

Data must be collected according to documented procedures, and in a manner that reflects standard best practices generally accepted by the relevant science and technical communities. Data and information sources must be identified or made available upon request.

Data collection methods, systems, instruments and statistical sampling designs must be designed to meet the requirements and objectives of the research projects concerned, and should be validated before use. Instruments must be calibrated using applicable standards or fundamental engineering and scientific methods.

Data must undergo internal or external quality assurance prior to being used in analyses that are intended or likely to inform fisheries management decisions.

There is emphasis on the need for independent peer review to ensure the relevance, integrity, objectivity and reliability of information, and the science quality assurance and peer review processes are required to use a quality ranking system with four categories: 1 = High Quality (which should essentially be anything that is good enough to be used in an assessment or to inform management decisions in other ways); 2 = Medium or Mixed Quality (data that might be used but would have many associated caveats); 3 = Low Quality (data that

should not be used at all because it is not reliable and may produce misleading results); U = Unranked (has not been reviewed – and therefore should be used with caution if at all).One of the key purposes of the science information quality ranking system is to inform fisheries managers and stakeholders of those datasets, analyses or models that are of such poor quality that they should not be used to make fisheries management decisions (i.e. those ranked as "3" or "U"). The NZ Science Working group processes involve "staged technical guidance" on data quality, for example evaluating a survey design, evaluating the preliminary analyses, suggesting sensitivity analyses, and ensuring that the conclusions are justified by the data and analyses.

Data quality assurance in the USA

In the USA, there is national coordination of the NOAA Fisheries activities regarding implementation of the Data Quality Act. Activities to strengthen the integrity of scientific information include science program reviews of the NOAA Fisheries science centers and the scientific peer review process. External peer reviews are also conducted through the Center for Independent Experts (CIE). As part of the Northeast Regional Stock Assessment Workshop (SAW) process, SAW working group members routinely review and evaluate data inputs used in stock assessments. Major independent peer reviews of sampling surveys include the recent National Academies review of the marine recreational fisheries survey program, which led to a major revision of the program (now known as the Marine Recreational Information Program MRIP) with stronger emphasis on aspects of statistical design.

Data quality assurance in Norway

Norway has a national strategy to develop the NorskMarintDatasenter (NMD: the Norwegian Marine Data Center), which will manage all research data from research surveys and fisheries sampling programs such as the Norwegian Reference Fleet conducted by the Institute of Marine Research, Norway, in accordance with national requirements, standards, and international agreements. As part of this development, IMR is currently refining the data handling, management and dissemination of data and data products through a large infrastructure project called Sea2Data. IMR is developing the infrastructure to facilitate easier access to data, improve the quality control and quality assurance (QA/QC) of data from their collection, through data entry, data storage, analysis, and dissemination. The relational database used for data storage, as well as modules for data analysis to provide stock assessments and other end-products is integrated in the Sea2Data framework, using open-sources programming tools and analysis packages (such as R). The QA/QC includes documentation of sampling protocols for research surveys and fisheries monitoring programs, instructions for data punching, and a range of checks to minimize data entry errors and other sources of errors.

A reflection on whether MS following best practice guidance for data collection is sufficient or whether measures of quality of the collected data are necessary in addition. Possible measure of quality/quality indicators that could be used and pros/cons of these.

Evaluation of quality against best practice guidelines

The process of evaluating the quality of fisheries data includes quality assurance, such as comparison with documented standards, monitoring of processes, and error prevention to ensure data are "fit for purpose", and quality control using systems to detect and correct errors in the data. The desired quality is determined by the end users. There are parts in the process of data collection and processing within an Institute where formal quality accreditation through, for example, ISO 9000, may have been awarded (e.g. quality systems in a fish ageing laboratory). These provide a part of the evidence for adherence to quality standards, but for many other key aspects of fisheries sampling such as design and implementation of sampling surveys, there is no consolidated set of standards for best practice. Elements of this are contained in a diverse range of ICES reports, including the guidelines for best practice for fishery sampling surveys given by ICES WKPICS2 (ICES,

2012c) and WGRFS (ICES, 2013a), IBTS manuals, guidelines for sampling for maturity given in ICES WGMAT/WGMOG (ICES 2007a & 2008b), guidelines for discard raising given in WKDRP (ICES, 2007b) etc. Some of these need updating and expanding.

There is a clear need to develop a consolidated, updated and more complete set of guidelines for best practice, and quality standards, for fishery sampling programmes. These will help countries to develop statistically sound sampling programmes, allow the quality of those programmes to be properly evaluated, and ensure that data collected by different countries for a stock or fishery are compatible and can be combined.

A possible process of conducting such an evaluation is shown in Table 1. This is purely illustrative. Such an evaluation is a technically and statistically complex process, and can only be done through peer review by people with appropriate competences. There is strong emphasis on peer review in the USA and New Zealand, and this occurs at several stages including internal reviews within Institutes, and reviews involving external experts. Within Europe, the establishment of the ICES benchmark system involving data compilation and evaluation meetings prior to assessment meetings, involves external experts and peer review, but does not consistently or fully adopt the procedures shown in Table 1. The current process of evaluation of Member States annual DCF reports by STECF in no way constitutes a peer review as described.

Table 1. Possible elements of quality evaluation of a fishery sampling programme (illustrative)

Programme stage	Existing guidelines and standards ("best practice")	Quality evaluation procedure	Performance measures	Possible Quality Indicators
Design of sampling scheme	e.g. WKPICS & WGRFS best practice guidelines; IBTS protocols etc.	Review of documentation on sampling design relative to quality standards	Indicators of bias potential due to design.	Score against quality standards, e.g. frame coverage, sample selection procedures etc.
Implementation of sampling scheme	e.g. WKPICS & WGRFS best practice guidelines; IBTS protocols etc.	Review of sampling outcomes – e.g. diagnostics of coverage, refusal rates, sample numbers and precision etc.	Indicators of extent of bias (e.g. low, medium, high, unknown); Indicators of precision.	Number of primary sampling units sampled in each sampling stratum; CV; frame coverage; refusal rates.
Data archiving and extraction	To be done.	Review of documentation of QA/QC procedures relative to quality standards. e.g. use of electronic data capture; error traps; ………	Indicators of extent and effectiveness of QA/QC procedures.	Score against quality standards
Data analysis	e.g. WKPICS & WGRFS best practice guidelines; IBTS protocols; etc.	Review of documentation of estimation procedures relative to quality standards.	Indicators of extent of bias (e.g. low, medium, high, unknown)	Score against quality standards, e.g. analysis follows design

Quality indicators (QI)

The core of a quality evaluation is a peer review of all aspects of a sampling programme against documented standards, and the critical requirement is to have accurate and complete documentation of all components of the programme, including key assumptions in the processing and analysis of the data. The existence of this documentation is an important aspect of quality evaluation. A range of QIs are possible for used in the overall quality evaluation procedure, to deal with 1) aspects of bias related to design; 2) aspects of bias related to implementation, and 3) precision. Design-related indicators are a direct indicator of quality of the sampling programme, whilst implementation bias and precision are aspects of data accuracy (uncertainty). This distinction must be clear in the quality evaluation process. Quality Indicators should also be clearly distinguished from any metrics to indicate compliance with DCF legal requirements.

QI's for quality of design should relate to guidelines and standards for best practice such as those developed by WKPICS2 (Appendix 6). A simple but important QI is:

Coverage of the sampling frame (e.g. how much of the landed catch of each species into a country is into the ports included in an on-shore sampling scheme)

This should be known at the design stage, and the potential impact evaluated then.

QI's for bias related to implementation error could include:

Non-response rates (e.g. refusal to allow access to vessels or catches for sampling). This also needs to be backed up with documentation of reasons, and any analysis to indicate if these vessels or sites have different characteristics and activities to those sampled.

Proportion of total landings in strata with missing samples (a problem of over-stratification)

Non-response is of concern if it is suspected that the actual bias may be large. If the non-respondents have the same catch rates or catch compositions as those who provide access, there is no bias. A QI based on a figure for non response may not be sufficiently informative on its own, and should be an indicator derived as part of a specific evaluation of non response and its effects. Non-response may be impossible to control.

QIs related to precision could include

Relative standard error RSE (referred to in DCF texts as CV, referring to coefficient of variation of the mean)

Effective sample sizes (ESS)

Numbers of primary sampling units sampled, ideally by stratum

The advantage of RSE/CV values is that they are a direct measure of precision, and can easily be incorporated into statistical assessment models.

Effective sample sizes provide a meaningful index of precision, having accounted for cluster sampling effects. The alternative common practice of reporting actual numbers of fish measured or aged is highly misleading except perhaps for rare species where only one or two are present in the catch from any PSU. The downside of ESS as an indicator is that it is not widely used and would require development of skills and software in each lab to carry out the estimation.

Numbers of PSUs sampled can be considered as a proxy for ESS. It is likely to be smaller than the ESS, but much closer to ESS than to numbers of fish sampled. Simulations in Norway (Aanes and Vølstad in prep) demonstrated that ESS is closely associated with number of PSUs.

The current DCF requires MS to report data quality as achieved sample numbers vs expected sample numbers, and achieved precision estimates (CV) vs target CV values (Appendix 5). For some variables such as length-at-age or maturity-at-length or age, additional rules are specified for calculating the average CV over a range of length or age groups (see footnote 2 to Appendix 5). It is implicitly expected that MS will have calculated the CVs correctly, in accordance with a sampling design that yields meaningful CVs. Some MS will have used COST tools for this purpose (for example for estimating fleet raised discards and associated CV). Where MS are not

collaborating within a region, they are expected to achieve the target CV specified in the DCF Commission Decision. If collaborating with other MS, it is the combined estimates that must meet this requirement (i.e. a lower precision is needed for each MS).

There are several major shortcomings of the current DCF reporting of precision. For example, the required precision levels are arbitrary and do not reflect any agreement or analysis of the desired precision for combined national estimates for supporting assessments or management advice, and calculated CVs only reflect the true precision if the sampling scheme has adopted a probability-based design and there are no major biases in design and implementation such as inadequate frame coverage or extensive non-response. Reporting of CVs or sample numbers for estimating growth parameters, maturity ogives or sex ratio on their own provide no information on the quality of the data. Such estimates are critically dependent on the design of the sampling to achieve unbiased data for a stock over its full range. The quality of such data and estimates can only be evaluated through expert peer review of the entirety of the sampling scheme within and between countries, and of the adherence to protocols for ageing and maturity staging. In some cases, the data are from collaborative surveys such as IBTS and the sampling achieved by individual participating countries is not very informative on its own.

Combined indicators

A possible approach to "scoring" the quality of a sampling programme is to develop some form of combined indicator. The idea behind the ICES WKACCU traffic-lights score card was to have an overall bias score based on all the component sources of bias. This has proved a difficult concept to put into operation as the biases need to be weighted somehow. Lohr (2010) presents the ideas of **total survey error** and **total survey design** proposed by other authors:

Total survey error = coverage error + nonresponse error + measurement error + processing error + sampling error

Total survey design: designing a survey to reduce errors in general, not just sampling errors. This needs an understanding of where the major error components are, so that steps can be taken to reduce them. As Lohr (2010) states, this calls for an interdisciplinary approach. For fisheries sampling this would need experts in statistical sampling design, and experts in implementation.

The idea of "data quality reports" being developed through PGCCDBS, WKPICS, SGPIDS and WGRFS are a move towards Total Survey Design and provision of diagnostics that can highlight elements of total survey error. The WGRFS 2013 proposal for a "Quality Assurance Toolkit" valuably extends this to addressing the needs of different end users – for example the diagnostics needed to evaluate the quality of survey programmes in terms of design quality and uncertainty related to implementation, and simpler quality indicators needed by stock assessment scientists. These reports are an important concept and need to be tested and developed further.

Quality standards

Currently, documentation of quality standards is patchy and incomplete for all the stages in Table 1 relevant for DCF / DC-MAP data collection on fleet-based and stock-based biological variables. Available documentation includes:

The "best practice guidelines" for fishery sampling schemes produced by WKPICS2 (2012c) and WGRFS (2013a), which are an important step forward but represent guidelines rather than agreed quality standards.

Standards and protocols for age reading and maturity staging developed and documented by ICES PGCCDBS and its workshops including the workshop for national age reading chairs (WKNARC). A further workshop (WKSABCAL) is planned to improve the methods of estimating and reporting the quality of age readings.

Standards and protocols for aspects of design and implementation of research trawl surveys given by ICES groups such as IBTSWG

Documentation of methods of data analysis by classes of catch sampling schemes, given by WKPICS2 & 3.

Some important omissions are:

Quality standards for data archiving and management - i.e. validation of data through quality assurance and quality control procedures to avoid or trap errors, and to identify and correct errors in databases. Some Institutes may have existing protocols or standards for this. The RCM NS&EA asked WKPICS3 to initiate a process of developing such standards, and progress is reported in WKPICS3.

Quality standards / best practice for collection of data to estimate biological parameters such as growth parameters, maturity ogives, weight-at-length, sex ratio. Some guidelines on maturity ogive estimation were provided by earlier ICES workshops (WKMAT, WGMOG) but there is a clear role for the new ICES Working Group on Biological Parameters to develop the necessary quality standards although this group will not meet until 2012.

There are many other sources of error, such as incorrect species identification or non-compliance to sampling instructions. The use of training schemes, and other schemes such as temporary exchanges of sampling staff between laboratories to ensure consistency of methods, should be encouraged.

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Appendix 1. Components of data quality

ICES groups such as WKPICS, SGPIDS and WGRFS have focused on three main components of the quality of data and the estimates derived from them: i) The design of a sampling scheme, ii) The implementation of the sampling, and iii) The analysis of the results. Within each of these elements, two different aspects of data quality and uncertainty in estimates have been explored:

Systematic errors (bias)

Random errors as measured by precision.

Systematic errors: The Workshop on Methods to Evaluate and Estimate the Accuracy of Fisheries Data used for Assessment (WKACCU: ICES 2008a) focused on aspects of bias, how to document it in an informative way, and considered approaches to reduce such bias. The workshop noted that bias is a systematic departure from the true values, and can generally not be quantified because the true values seldom are known. To the extent possible, it is therefore important to minimize or eliminate sources of bias **by developing and following sound field data collection procedures and analytical methods**. WKACCU examined sources of bias inherent in fishery data collection that relate directly to elements of the EU Data Collection Framework: a) species identification; b) landings weight; c) discard weight; d) fishing effort; e) length structure; f) age structure; g) mean weight ; h) sex-ratio; and i) maturity stages. The workshop identified several indicators to detect bias in each of these parameters. A score-card was then developed where each indicator was rated as green (minimal or no risk of bias), yellow (some risk of bias), and red (established sources of bias). ICES has promoted the use of the scorecard in the data compilation and evaluation part of benchmark stock assessments, but this approach turned out to be too complex and difficult to implement and combine for a fish stock across several countries which may also have different sampling schemes.

Precision of estimates: The Workshop on methods to evaluate and estimate the precision of fisheries data used for assessment (WKPRECISE: ICES 2009a) focused on sources of variability and on the procedures to estimate the precision of national level fishery statistics (quantities landed, discards, fishing effort, CPUE) and biological data collected from the fisheries. While precision of fisheries statistics can be improved by increasing the sample sizes in data collection programs, this will generally not reduce bias. It was recognized by WKPRECISE that measures of precision based on fisheries data used for assessments are only meaningful for catch sampling programmes that obtain representative data. The workshop advised that **a minimum requirement should be that the sampling programmes pass basic checks for bias using the scorecard developed by WKACCU**.

An important concept is the trade-off between precision and bias, which is a core issue for the design of sampling surveys, and for estimating biological parameters such as fish age. This comes down to issues such as the cost of reducing bias and increasing precision, and the relative impact that bias and precision have on stock assessments and quality of advice based on them.

Appendix 2: Developing a body of knowledge within ICES on statistical sampling design for fisheries sampling

Since the late 2000s, there has been a rapid and important increase in awareness within the ICES community of the need for statistically-sound sampling and advice on how to do it. A series of ICES expert groups has developed advice and guidelines to help national scientists adapt their fishery sampling schemes from what has in many cases been an *ad-hoc* approach to data collection, to one that is more firmly grounded in statistical sampling theory. These ICES groups have devoted considerable effort to develop formats for reporting data quality, and guidelines for good practice. In the area of trawl surveys, international coordination has been the norm, and the need for clear guidelines and standards has been addressed for many years by ICES groups such as the International Bottom Trawl Survey Working Group (IBTSWG). Considerable work has also been devoted by the ICES Planning Group on Commercial Catches, Discards and Biological Sampling (PGCCDBS) since 2002 to establish guidelines and standards for good practice in fish ageing and maturity estimation, based on the results of many workshops, exchanges, and studies, and the PGCCDBS has established a repository of reports on this. Two ICES workshops established by PGCCDBS on estimation of maturity ogives, which produced guidelines for best practice, were also carried out (WKMAT - ICES 2007a and WGMOG - ICES 2008b)

For commercial fisheries sampling design, implementation and estimation, the first significant developments that went beyond basic descriptions of national practices were the workshop on discard raising procedures (WKDRP – ICES 2007b) and WKMERGE (ICES, 2010b), which was set up initially to provide guidelines for merging of fleet metiers, a concept introduced into the DCF from 2008 onwards. The workshop focused instead on the statistical problems introduced by the metier approach, including:

Inappropriateness of defining sampling strata according to dynamic metier characteristics such as gear type, mesh size, target species, due to problems in controlling sampling probabilities;

Incentives for "quota sampling" whereby samplers abandon any random, probability-based approach (if one existed) to deliberately fill sample quotas for specified metiers for a specified quarter or other time period.

The WKMERGE report triggered ICES PGCCDBS to instigate a series of Workshops on Practical Implementation of Statistical Sound Catch Sampling Programmes (WKPICS1 -3: ICES 2011a, 2012c & 2013 in prep) and the Study Group on Practical Implementation of Discard Sampling Programmes (SGPIDS 1-3: ICES 2011b – 2013b). These groups documented principles for statistical sampling design and its implementation in practical conditions, for different classes of sampling schemes. Methods for reporting data quality were explored. WKPICS2 (ICES 2012c) developed Guidelines for Best Practice for sampling of commercial fisheries for biological variables at the request of the European Commission, and a version of these for recreational fishery surveys was developed by ICES WGRFS in 2013 (ICES, 2013a).

The series of ICES meetings on commercial and recreational fishery sampling design since 2008 have hugely raised awareness of sampling survey concepts within the participating countries, and within linked processes such as the Regional Coordination Meetings. Input from experts from non-EU countries including Norway, USA, Australia and New Zealand have been highly influential in this, particularly in the field of recreational fishery survey design. The ICES groups have also been influential in some changes to the way in which DCF sampling achievements for fleet based biological sampling are now reported, including the definition of sampling frames.

In practice, the ability of EU Member States to report the achieved precision of metier related and stock related biological variables has been problematic where data have (a) not been collected according to a probability-based design; and (b) the analysis has not necessarily followed the typically hierarchical cluster sampling structure of the data, or appropriate software has not been available. Development of analysis routines in the COST project (ICES 2010c) has helped for estimation of precision and for providing visual diagnostics of sampling coverage, but may not always cope with individual sampling designs and some

countries have developed separate software for this. The matching of the analysis method to the design of the sampling remains an ongoing challenge for the Regional Data Bases set up to facilitate regional coordination of sampling.

Data quality indicators and data quality reports

Since the introduction of the EU Data Collection Regulation in 2002, and its successor the Data Collection Framework in 2008, EU Member States have been required to include metrics of achieved data quality in their annual reports of sampling completed in the previous year. The regulations included the concept of "precision levels" corresponding to 95% confidence intervals of +/- 5%, 10% or 25% for estimates of fishery discards, recreational fishery catches, length and age compositions and biological variables such as length-at-age or maturity-at-length or age.

The idea of data quality reports was developed by PGCCDBS in 2011 (ICES, 2011c) following a request from ICES WGCHAIRS 2011 to develop some templates for reporting on quality of input data for stock assessments, mainly for ICES assessment Review Groups. There was a need for easily comprehended overviews of how data quality has varied over time, and a range of such templates would be needed according to the nature of the data (e.g. landings; discards quantities; length or age compositions). PGCCDBS included the concept of WKACCU scorecards for bias in its proposals. Inspired by the formal review system for stock assessments conducted in the US through the Centre for Independent Experts, PGCCDBS also proposed a system of "data compilation and evaluation" workshops to be carried out in advance of benchmark stock assessments, where data for the assessment would be compiled and evaluated for bias and precision. Simple diagnostics such as tabulation of numbers of trips sampled for length or age, by country and stratum, were proposed.

The concept of the WKACCU bias scorecard and its utility has since then been discussed in several ICES meetings of PGCCDBS, WKPICS, SGPIDS and WGRFS in an attempt to develop data quality reports that more explicitly highlight bias issues around sampling design and incomplete sampling coverage. The proposed reports also considered precision issues such as low numbers of samples overall or within individual national sampling schemes for particular stocks. A developing concept was towards reports that document types of bias at different levels in the hierarchy of design, implementation and analysis in each national sampling scheme and in the final international data supplied to ICES stock assessment Working Groups. Methods of indicating precision achieved were considered, either direct estimates (CVs) or proxies such as effective sample sizes or just numbers of primary sampling units sampled.

During 2012, the idea of data quality reports was developed further by three ICES groups: SGPIDS, WKPICS and WGRFS. Their findings are summarised below.

The ICES SGPIDS meeting (ICES, 2012a) examined potential quality indicators for at-sea observer sampling, based around:

The number of unique vessels and fishing trips in the total population, the study population and the planned and realized samples;

The non–response rate (proportion of all attempted contacts that ultimately failed to provide a sample, for whatever reason)

The refusal rate (the proportion of vessel skippers who, having been successfully contacted, ultimately failed to allow the observer to go on board to obtain the sample).

WGRFS 2012 addressed a Term of Reference on recreational fishery surveys to *"Develop and implement a score card system (see for example: WKACCU – Workshop on Methods to Evaluate and Estimate the Accuracy and Bias) in order to evaluate country survey programs."* Their approach was to develop a logical, hierarchical framework for documenting the accuracy of recreational fishery catch estimates combined over countries for individual fish stocks, and for tracing the source and type of errors at each stage from the design and implementation of national surveys through to the compilation of international estimates (Fig 1). The two components of accuracy (precision and bias) were considered: The proposed QA scorecard framework for

recreational fishery data included numerical metrics such as catches, precision, numbers of primary sampling units sampled etc. and WKACCU-type traffic lights highlighting bias at each of the three stages of sampling design, implementation and bias. Different detail would be provided for the different levels of aggregation from national survey components to the combined international data:
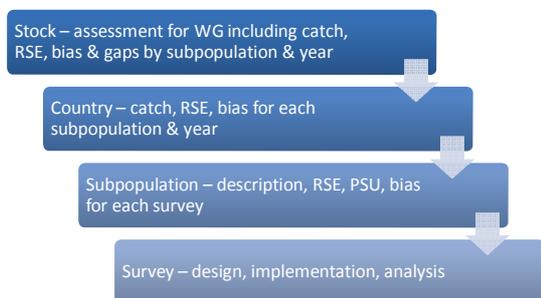

Figure 1: WGRFS 2012 proposal for a nested schema for the assessment of recreational fishing data for stakeholder use such as in stock assessments.

WKPICS2 (ICES 2012c) reviewed the proposals of SGPIDS 2012 and WGRFS 2012, and proposed a simple one-page form that can be used to evaluate quality of biological data used for stock assessments. They suggested the following four Quality Indicators (QI): type 1 – Target vs sampled population (frame coverage); type 2 – Response rates (e.g. refusals to take observers); type 3 – "Goodness of fit" (diagnostics on how representative the data are of the population on a temporal and spatial scale); type 4 – Precision estimates. It was suggested that these indicators, together with other information on the sampling, should be included in a quality assurance (QA) report. It was envisaged that the QA report could eventually be automatically provided via the Regional Data Base.

WKPICS2 suggested that QA reports should describe the contribution each country makes to the total catches (discards and landings) of that stock, and the proportion caught or landed within each stratum of the national sampling frame. Given the particularities of each region or the stocks within a region, the Regional Coordination Groups (in the new DC-MAP) and/or assessment groups should develop the quality indicators further according to their specific needs and concerns. WKPICS2 also produced a set of "best practice guidelines" for fishery sampling, at the request of the European Commission.

PGCCDBS 2013 proposed sending the WKPICS2 QA reports for a trial on a few stocks, but it was later felt that more development was needed.

The WGRFS meeting in 2013 (ICES, 2013a) further explored and tested the scorecard system developed by the group in 2012. "Best practice" guidelines for recreational fishery sampling were also developed based on WKPICS2, covering the design, implementation and analysis of sampling schemes whilst also providing information on the existence and possible magnitude of biases. The conclusion from this exploratory work was that there is no single way to document data quality that is suitable for all end users, and a "toolkit" of reporting systems was needed to provide different end users with the information they require (Fig. 2). A fundamental requirement was to have **detailed documentationof national sampling and estimation schemes, structured in line with the elements of the "best practice" guidelines, highlighting specific bias and precision issues with design, implementation and estimation.**

WGRFS quality assurance toolkit
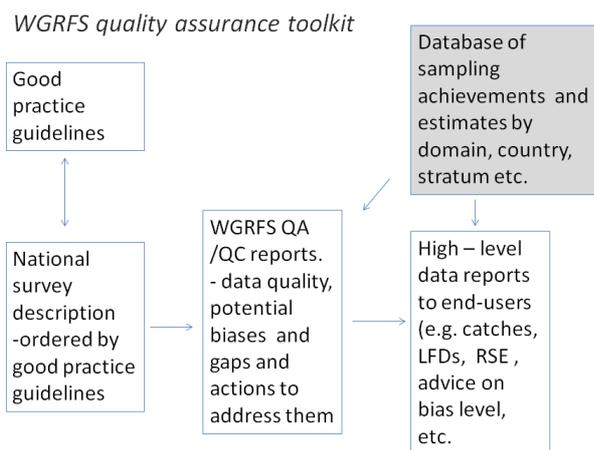
Fig. 2.Scope of a "Quality assurance toolkit" proposed by ICES WGRFS 2013.

Finally, the SGPIDS 2013 meeting used some case studies to generate Quality Indicators (QI) based on the numbers of vessels in the national fleets, and the number of trips they conduct, in relation to the planned and realized number of trips sampled. Spatial mapping of fleet activities and sampled vessel locations was carried out. The quality indicator table developed by WKPICS2 was modified (Fig. 3). It was aimed at investigating potential bias caused by non-successful contact attempts, improving the national sampling efforts, and documenting and providing a meaningful and transparent overview of the quality of the sampling. The group agreed on the usefulness of the quality indicator table for different potential end-users. Possible end-users would include: stock assessment working groups, auditors of annual reports (DCF/STECF/RCGs), EU commission. At the national level the quality indicators would be of use to ministries, national administrations, and fisheries as well as for in-house evaluation at national fishery institutes. For stock assessment purposes, it was recognized that part of the information has to be completed at the stock coordinator level, and that the national fishery institutes would provide data on the sampling scheme and its operation.

AT-SEA-SAMPLING

Stock - Species - Area - Year (e.g. Cod - North Sea - 2011)

	Country A		Country B	Country C	...
	Design		Design		
	Implemention		Implemention		
Importance: Contribution to stock landing	40		60		

Sampling / design effect/diagnostic for randomness... (Description according to best practice)

	Country A	Country B
Sampling design	probability based discard sampling	quota sampling of catches
Primary sampling unit	Vessel	Trip
Sampling frame	quarterly vessel list	annual vessel list
Periodicity	ca. 1 sample per week during fishing season	1 sample per month
Contact protocol	yes	no
Sampling manual available	under preparation	
...		

Strata from the sampling frame	Fleet 1	Fleet 2	Fleet 3	...	...
	e.g. active gear (Trawler)	e.g. passive gear	e.g. seine netters		
Importance: Contribution to national landing	75%	20%	5%		
Importance: Contribution to national discards	95%	1%	4%		

Quality indicator

	Fleet 1	Fleet 2	Fleet 3
1 Total number of vessels in the fleet	60	300	5
Number of trips sampled onboard of vessels	30	20	0
Number of unique vessels sampled	5	17	0
Total number of trips conducted by the fleet	1000	8000	6
Age key quality indicator (e.g. Mean number of age samples per trip sampled)	100	50	0
2 Total number of vessels contacted in the year	81	77 not determined	
Not available	32	48 not determined	
No contact details	1	0	
No answer	0	0	
Observer decline	9	7	
Industry decline	9	2	
Successful sample	30	20	

3 Goodness of fit

Bias 1: Spatio-temporal coverage	tested and considered all right
Bias 2: Vessel selection	smaller vessels rejected observers
Bias 3: ...	comment

4 Precision levels of e.g. parameter a, b, ...
e.g. CV, variance, relative sampling error
e.g. Input data for XSA model:
maturity at age
stock weight
catch weight
catch at age

Fig. 3 SGPIDS (ICES 2013b) proposal for a quality assurance report for regional assessment data from at-sea sampling, modified from a version designed by WKPICS2 (ICES, 2012c). Sections in green are likely to be completed by the national fisheries institutes, those in yellow by stock coordinators.

WKPICS3 (ICES 2013 in prep) is currently reviewing the state-of-play with development of data quality reports and is planning a trial on some stocks as had been planned by PGCCDBS in 2013.

Appendix 3. STECF views on data quality indicators in DCF and DCMAP

A feature of the original Data Collection Regulation and its successor the Data Collection Framework has been the requirement for Member States to annually report their achieved sampling in terms of numbers of samples, numbers of fish collected or precision (CV). When planning the DCF in 2007, the STECF Study Group on Research Needs (SGRN 06-03) saw no need to change the precision levels in the new DCR, but was very much in favour of a strictly pragmatic approach with regards to the their use. In SGRN's opinion, precision levels should primarily be used as a guide when setting up sampling programmes (how many samples should be taken, when and where), and not as a compulsory threshold for financing purposes. Reaching the required precision levels was a national responsibility although for a number of parameters, (such as ALKs, sexual maturity, fecundity, etc.), there was room for regional, co-operative data collection systems and a regional approach to the calculation of precision levels. The SGRN 06-03 was very supportive of such moves and recommended that the new DCR had provisions for promoting the regional, co-operative approach to achieving precision.

STECF in its recent meetings dealing with the development of the DC-MAP have considered the implications of the revision of the roles and work programmes of the current Regional Coordination Meetings (to be re-designated as Regional Coordination Groups; RCGs) as proposed by STECF 12-07 (2012). The STECF 12-07 report proposed that the RCGs would develop regional work plans in which end-user priorities are ranked to ensure work plans operate within (limited) capital and human resources. For example, it would be for the RCGs in close liaison with the end-users to determine whether for a given resource base it was preferable to take fewer samples from more species or vice versa. Assuming that Member States develop statistically-sound schemes for sampling commercial fisheries (as emphasized through the "Oostende Declaration" produced by the North Sea & Eastern Arctic RCM in 2012), regional coordination would revolve around the stock/species-orientated sampling priorities based on regional assessment and advisory needs. A national catch-sampling scheme could be seen as comprising sampling frames and strata within the overall regional sampling activity, but with priorities and sampling levels coordinated at the regional level. STECF 12-07 also considered the possibility of defining appropriate sampling frames and strata that could cross national borders, and also of accommodating nationally important issues that may have a lesser priority in regional terms.

The STECF "Review of Proposed DCF 2014-2020, Part 1" (STECF-12-07 − EWG 12-01 April 2012), report emphasized that it is essential that the quality of data is known when it is used for analysis by end-users, because management actions based on poor data should be avoided. However in its report, **EWG 12-01 no longer advocated pre-defined quality targets (e.g. precision levels) as at present there was no basis for setting such targets**. In many cases, it would also be impossible to evaluate how many sampling resources would be needed to meet predefined targets. Instead EWG 12-01 proposed to set a minimum sampling target, remaining at least at the present level. However, **it would be required to evaluate the quality of the data every year at the regional level (RCM) and end user aggregation level**. **If it appears that this would lead to unacceptable quality, there should be provisions to adjust the minimum sampling level in consultation with the end-user**. These proposals by STECF also identified a need for:

clear documentation and prioritising by end-users of the estimates needed to support regional assessment and advisory needs;

implementation of best practice in designing and running statistically-sound sampling schemes;

a need for some degree of optimisation of sampling across countries to achieve the most cost-effective data collection supporting assessments and advice.

The STECF "Review of Proposed DCF 2014-2020 PART 2" (STECF-13-01 Jan 2013: EWG 12-15) discussed the need to include quantitative targets for sampling effort to ensure maintenance of sufficient sampling by

the MS. **Such quantitative targets could be motivated by quality requirements.** They discussed how quality could be evaluated and assured. In the present DCF precision (Coefficient of Variation of the mean, CV) is the "standalone" indicator of data quality. Even if data are precise they could be corrupted by bias. **Quality indicators could relate to the design, performance and documentation of the sampling programme as well as to the output data.** Quality indicators need to be developed by relevant expert groups. The DCMAP needs to assure that MS are obliged to report on the quality of the data in accordance with the indicators. **The indicators themselves do not need to be included in DCMAP but have to be listed somewhere.Annual work plans should be evaluated against a best practice**. Guidelines on the application of best practice in statistically sound sampling programmes in a national as well as in regional sampling designs need to be developed.In relation to sampling intensity,MS should be obliged to sample the stocks that appear on the priority list. **The number of samples should be based on an aspirational precision level agreed with the end-users at the RCG for each stock and variable**. The planned number of samples by stock should be included in the annual workplan. Reference list should be made available at a repository. MS should report on achieved quality for the performance of the sampling programmes as well as the sampled data. The quality assessment should be done using different quality indicators. The quality indicators should be made available at the repository.

TheExpert Working Group on "Review of DC MAP- Part 1" (STECF 13-06 April 2013 EWG-13-02)noted that in the past DCR and present DCF, quality targets for biological variables had been defined in the form of coefficient of variation (CV) of the estimates. In practice, problems have been experienced by this approach. **The target CV values listed in the DCF are questioned because they seem to be arbitrary choices and are not based on any pre-analyses or advice.**EWG 13-02, after reviewing the present requirements of the DCF and the related problems, proposed the following **framework for data quality requirements**. This proposal has to be considered for all type of data (biological, economic and transversal):

1. **The DC-MAP should not include any pre-defined quality targets**

2. **MS should design sampling schemes in accordance with best practice guidelines**

3. **MS should provide quality indicators (QI) in the annual report according to international standards (i.e. Eurostat) and as specified in the guidelines for annual reports**

All national sampling schemes 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. **EWG 13-02 suggested that the DC-MAP should include the obligation for MS to apply best practices guidelines and Quality Indicators (QI) as provided by STECF or RCGs**.

On the topic of Quality indicators (QI); EWG 13-02 referred to EUROSTAT standards for quality reports (Anon 2009a) that provide a list of potential Quality and performance indicators. In particular, EUROSTAT standards for quality reports advocate the CV, a range of CV or confidence intervals as the most appropriate indicators to quantify sampling errors. This is consistent with WKPRECISE (ICES, 2009a) which recommended that the precision of estimates of key parameters should be given in terms of standard errors (or relative standard errors)

In the follow-up meeting "Review of DC-MAP – Part 2" (STECF-13-12 July 2013 & EWG-13-05), it was again emphasized that biological data collection must be aligned to the specific assessment or management requirements of end-users. The EWG recommended that for commercial and recreational fisheries, **Member States should be responsible to ensure best practice in design and implementation of statistically sound catch sampling schemes**. 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. The EWG also proposed the following requirements:

All national surveys should document the sample frame, sample selection procedures, response rates, imputation methods for missing data and weighting procedures employed to derive national estimates. Deviation from the best practice guidelines (*as given by WKPICS2*) should be described to allow the identification of possible bias in the final estimates.

For commercial fisheries, a minimum sampling threshold (not target) should be set rather than precision targets, remaining at least at the present level of activity and consistent with best practice in terms of statistical robustness. Regional coordination should ensure that national sampling programmes are organized to satisfy the end user requirements within the operational constraints of the sampling programmes.

Countries with a very low share of the recreational catches of target stocks in a region should have correspondingly lower survey effort and precision requirements for the delivery of data. Regional coordination should ensure that national sampling programmes are organized such that they satisfy the end user requirements within the operational constraints of the sampling programmes.

Appendix 4. Overview of approaches used in other important fishing nations (eg USA, Canada, New Zealand, Australia, Norway…) to measure and ensure quality of biological data.

Data quality assurance in New Zealand

Information was provided by Pamela Mace (New Zealand Ministry of Fisheries). In New Zealand there are a number of different standards for different types of data. For example, it is usually expected that research trawl surveys (which tend to be random-stratified) should provide biomass estimates with a CV of the mean no greater than 20% (or, in some cases 30% where there are other data that informs an assessment to the extent that a lower precision is OK). Should a survey have poorer precision than this, the indices will be down-weighted accordingly in the assessment, so it is not a case of whether the data should be used or not, it may be more of a case of whether it is cost-effective to collect such data if this is the best you can do.

The NZ Science Working group processes involve "staged technical guidance" on data quality, for example evaluating a survey design, evaluating the preliminary analyses, suggesting sensitivity analyses, and ensuring that the conclusions are justified by the data and analyses. This process was formalised a few years ago in the New Zealand Governmentdocument **"Research and Science Information Standard for New Zealand Fisheries"** published in May 2011. An extract is given later in this section. The document outlines a system now used for ranking the quality of science information:

 1 = High Quality (which should essentially be anything that is good enough to be used in an assessment or to inform management decisions in other ways).

2 = Medium or Mixed Quality (data that might be used but would have many associated caveats)

3 = Low Quality (data that should not be used at all because it is not reliable and may produce misleading results).

U = Unranked (has not been reviewed – and therefore should be used with caution if at all).

One of the key purposes of the science information quality ranking system is to inform fisheries managers and stakeholders of those datasets, analyses or models that are of such poor quality that they should not be used to make fisheries management decisions (i.e. those ranked as "3" or "U"). Most other datasets, analyses or models that have been subjected to peer review or staged technical guidance in the Ministry's Science Working Group processes and have been accepted by these processes should be given the highest score (ranked as "1"). *Uncertainty*, which is inherent in all fisheries science outputs, should not by itself be used as a reason to score down a research output, unless it has not been properly considered or analysed, or if the uncertainty is so large as to render the results and conclusions meaningless (in which case, the Working Group should consider rejecting the output altogether). A ranking of 2 (medium or mixed quality) should only be used where there has been limited or inadequate peer review or the Working Group has mixed views on the validity of the outputs, but believes they are nevertheless of some use to fisheries management.

One expected issue was nobody ever wanting to give anything a "1" because all fisheries data are uncertain. However, after three years of using this classification scheme, people stopped equating Quality and Uncertainty (except at the extreme of course). The following link also has a document on fish ageing protocols and catch sampling protocols in New Zealand.

http://www.fish.govt.nz/en-nz/Publications/Research+and+Science+Information+Standard.htm

Extracts from the New Zealand Government document "Research and Science Information Standard for New Zealand Fisheries. May 2011"[35] are given below:

"Fisheries 2030 is the Government's goal and plan of action for New Zealand fisheries…. Internationally and locally there is an increasing move towards ensuring that high-quality evidence is used for policy formulation and decision-making, with increasing emphasis on the need for independent peer review to ensure the relevance, integrity, objectivity and reliability of information. These key principles for science information quality have been integrated into the Research and Science Information Standard."

In relation to Key Principles for Science Information Quality:

The quality of research and science information relates primarily to relevance, integrity, objectivity and reliability. The primary, internationally-accepted mechanism for evaluating the quality of research and science information is peer review and, as such, peer review is both a principle and a mechanism. These five key principles should underpin all quality assurance processes for research and science information. Ideally, the key principles should be satisfied PRIOR to research and science information being used to inform fisheries management decisions.1

Peer Review – Is the principal process used to ensure that the quality of scientific methods, results and conclusions meet the accepted standards and best practices of the science community. Peer review is an organised process that uses peer scientists with appropriate expertise and experience to evaluate the quality of research and science information.

Relevance – Scientific research must be relevant to the fisheries management question(s)1 being addressed,contributing directly to answering those management questions and addressing management objectives for that fishery.

Integrity – Refers to the security of information, and to the protection of information from inappropriate alteration, selective interpretation or selective presentation. It must be ensured that the information is not compromised or biased, particularly with regards to presenting the uncertainty of that information, to ensure that information remains complete throughout the science-to-decision process.

Objectivity – Refers to whether the information presented is accurate, impartial and unbiased. Objective interpretations or conclusions do not depend upon the personal assumptions, prejudices, viewpoints or values of the person presenting or reviewing the information. Scientific methods must be used in the collection and analysis of data, and science processes must be free of undue non-scientific influences and considerations. Data must be obtained from credible and reliable sources. To the extent possible, data and analyses must be accurate and unbiased.

Reliability – Relates to the accuracy and reproducibility of information. Research and science information must be accurate, reflecting the true value of the results being reported within an acceptable level of imprecision or uncertainty appropriate to the data and analytical methods used. Information should not be biased and should not suffer from such a high level of imprecision that the results and conclusions are rendered meaningless. Methods and models used to produce science information must be verified and validated to the extent necessary to demonstrate that results may be reliably reproduced by an independent scientific expert using the same data and analytical methods.

In relation to data collection:

- Data must be collected according to documented procedures, and in a manner that reflects standard best practices generally accepted by the relevant science and technical communities. Data and information sources must be identified or made available upon request.

- Data collection methods, systems, instruments and statistical sampling designs must be designed to meet the requirements and objectives of the research projects concerned, and should be validated before use. Instruments must be calibrated using applicable standards or fundamental engineering and scientific methods.

- Data must undergo internal or external quality assurance prior to being used in analyses that are intended or likely to inform fisheries management decisions.

Science quality assurance and peer review processes implemented in accordance with this Standard are required to assess the quality of information by applying the following quality ranking system:

- **1 – High Quality** is accorded to information that has been subjected to rigorous science quality assurance and peer review processes as required by this Standard, and substantially meets the key principles for science information quality. Such information can confidently be accorded a high weight in fisheries management decisions.[1]

- **2 – Medium or Mixed Quality** is accorded to information that has been subjected to some level of peer review against the requirements of the Standard and has been found to have some shortcomings with regard to the key principles for science information quality, but is still useful for informing management decisions. Such information is of moderate or mixed quality, and will be accompanied by a report describing its shortcomings.

- **3 – Low Quality** is accorded to information that has been subjected to peer review against the requirements of the Standard but has substantially failed to meet the key principles for science information quality. Such information is of low quality and should not be used to inform management decisions.[1] Where it is nevertheless decided to present such low quality information in fisheries management decisions,[1] the quality shortcomings of the information should be reported and appropriate caution should be applied.

- **Unranked – U** is accorded to information that has not been subjected to any formal quality assurance or peer review against the requirements of this Standard. Where unranked information is used to inform fisheries management decisions,[1] it should be noted that the information has not been reviewed against the Standard, and that the quality of the information has not been ranked and cannot be assured.

Fisheries managers particularly need to be informed when information is unranked (U), or is ranked as being of low quality, so that the uncertainties or shortcomings regarding information quality can be noted, and appropriate weight given to such information when used to inform fisheries management decisions

Data Quality assurance in the USA

Fishery dependent sampling in the Northeast (NE) region of the USA is a shared responsibility of two major institutions within the National Marine Fisheries Service (NMFS), numerous state agencies, and for recreational catch data, a national office in Washington DC. Collectively these groups provide the raw data that are used in stock assessments and management advice.

Commercial fishery discards and/or landings

The NE region uses a dual system of estimating total landings. Dealers who sell federally regulated species are required to report landings on a weekly basis. Individual fishermen with federal permits are required to report landings by stock area. These logbooks are known a Vessel Trip Reports (VTR). Matching of VTR and Dealer records is required by end users and this requires significant reliance on imputation methods. Potential errors of imputation have been estimated but such data are not routinely reported for landings. Fishery discards are based on a comprehensive at-sea sampling program for all fleets. The sampling design and allocation of

observers to vessels is updated annually under the provisions of a fishery amendment known as the Standardized Bycatch Reporting Methodology (SBRM). The SBRM evaluate the precision of discard estimates by species or groups of species. Sampling requirements for the next year are based on the sample size necessary to achieve a standard level of precision, defined as a coefficient of variation of 30% of the estimate. Since each fleet captures and discards multiple species, the sampling requirements for the fleet are based on the sampling requirements for a species or group of species. A formalized algorithm is used to reduce sampling requirements by taking into account the magnitude of the estimate in relation to the total catch and total discard of the species. This ensures that sampling effort is not inappropriately targeting elusive estimates of precision for small quantities. Sampling precision and discard estimates are provided to stakeholders on an annual basis.

Recreational fishery catches

Recreation catches are based on a two-stage sampling design that independently measure fishing effort and catch per unit effort. Estimation of fishing effort was, until recently, based on a random digit dialing phone survey of households in coastal counties. Catch per unit effort is measured via intercept sampling where individual fishermen are interviewed as they complete their fishing trips on shore or when landing their boats at boat ramps and other locations. Charter boats / head boats are also sampled. The design of the recreational fishery survey programme in the USA was recently subject to a major peer review by the National Acadamies at the request of NMFS, and the remit of the review can be found at:ftp://ftp.gulfcouncil.org/Ecosystem%20Folder/NRC%20Summary%20of%20Review%20of%20Rec%20Fisheries%20Survey.pdf

Current survey methods and recommended alternatives were compared with relation to costs, sources of bias, precision, and timeliness. Criticisms of the programme included the freedom that the survey staff had to target particular sites or times of day, and inadequate coverage of the day. The revised Marine Recreational Information Program (MRIP) is based on a more sophisticated approach that fully corresponds to the actual sampling design, and places greater emphasis on adherence to strict protocols for statistical design, particularly randomisation of sites and days

Length compositions of fishery catches (landed; discarded)

Length samples are routinely taken via a port sampling program that relies on stratification by geographic region, species, stock area, market category and season. Sampling requirements for each species are determined annually by individual analysts. For species that have multiple stocks, extra care is required to ensure that samples are properly attributed to stock area. Length compositions of discarded fish are based on samples taken by at-sea observers.

Age compositions of fishery catches (landed and discarded)

Age samples are routinely taken via a port sampling program that relies on stratification by geographic region, species, stock area, market category and season. For most species, age samples for landings are processed by NMFS; but for some species, Canada and a number of other states provide additional processing capacity. Ageing standards are validated by cross validation among various laboratories, and occasionally by direct validation methods. Results of age estimation samples and comparisons among readers are available on a web page that provides measures of precision. The rationale, methods, data presentation and statistical measures of quality assurance and quality control estimates for the production ageing of Northwest Atlantic species are given athttp://www.nefsc.noaa.gov/fbp/QA-QC/index.html. While age samples of landed and discarded fish are routinely taken by at-sea observers, most of these samples are not processed. Instead, estimates of age compositions of landed fish are derived from port samples and age composition of discards are based on age-length keys derived from fishery independent surveys.

Growth parameters

Growth parameters using von Bertalanffy growth models are usually derived by analysts and are typically the products of academic theses rather than routine sampling efforts. Most peer-reviewed articles provide some measure of precision of derived parameters and their covariance.

Maturity ogives (proportion mature at age or length)

Maturity ogives are routinely derived for fishery independent data. Maturity ogives for landings and discards are difficult because many species are not landed whole. Subsampling for maturity status increases the costs of sampling (due to destructive cutting of fish) and is therefore not provided. Instead, we rely on measures of maturity derived from fishery independent surveys or special studies for species whose maturity status cannot be reliably determined during our spring or fall bottom trawl surveys.

Sex ratios

Sex ratios are important for a number of fisheries particularly spiny dogfish, and increasingly, in various flatfish and monkfish assessments. Empirical evidence suggests higher mortality rates for males than females although direct experimental confirmation is lacking. Obtaining sufficient samples to derive length specific sex ratios is difficult especially when external sex determination cannot be done. For these species, special sampling programs have been devised (e.g., summer flounder).

Science Quality Assurance

There is national coordination of the NOAA Fisheries activities regarding the implementation of the Data Quality Act. Activities to strengthen integrity of scientific information include science program reviews of the NOAA Fisheries science centers and the scientific peer review process. External peer reviews are also conducted through the Center for Independent Experts (CIE).

As part of the Northeast Regional Stock Assessment Workshop (SAW) process, SAW working group members routinely review and evaluate data inputs used in stock assessments.

Further information is available at http://www.st.nmfs.noaa.gov/science-quality-assurance/index and http://www.nefsc.noaa.gov/saw/ .

Information that might be of interest to working group members:

Northeast Fisheries Science Center's Northeast Fisheries Observer Program (NEFOP)

http://www.nefsc.noaa.gov/fsb/program.html

Standardized Bycatch Reporting Methodology (SBRM) http://www.nefsc.noaa.gov/fsb/SBRM/

The NMFS Science Program Reviews on Stock Assessment Data Collection Programs and Management occurred in 2013. Information pertaining to each region can be found at http://www.st.nmfs.noaa.gov/science-program-review/

Optimization model used as a tool to guide sea day allocation

http://www.nefsc.noaa.gov/publications/crd/crd0509/ (Rago et al. 2005). One important aspect of using the optimization model to allocate sea days is that it explicitly incorporates a regular feedback mechanism for continuously improving the performance of the bycatch monitoring and thus, can be viewed as a set of quality assurance/ quality control measures that provide a formal way of updating and improving the sampling design as new information is obtained (Figure 12). {Note: this optimization tool is no longer applied in the Northeast region due to changes in fishery management regulations}

Pre-Trip Notification System (PTNS) – a recently developed system that used a self-adjusting probability-based, tiered selection process to randomly assign observer coverage across the groundfish fleet on a proportional basis for the purpose of monitoring discards.

Data quality assurance in Norway

As a part of the national strategy for developing NorskMarintDatasenter (NMD) (Norwegian Marine Data Center), a national marine data centre, IMR is currently refining the data handling, management and dissemination of data and data products through a large infrastructure project called Sea2Data. The main objective of this project is to prepare the institute to be able host a wide suite of marine data, and to make them readily available to researchers and other users. As a first step along this route, a general infrastructure is developed and applied for our field operations. However, the technical solutions, the strategy and work flows are general and will be used as a template for other types of data.

The project is organized in well-defined tasks to: Improve and operationalize the operational infrastructure; incorporate and quality testing historical data; and improving tools to extract data/products from the data model. The project consists of seven work packages.

NorskMarintDatasenter (NMD) (Norwegian Marine Data Center) will manage all research data from research surveys and fisheries sampling programmes (such as the Norwegian Reference Fleet) conducted by the Institute of Marine Research, Norway, in accordance with national requirements, standards, and international agreements. Through Sea2Data, IMR is developing the infrastructure to facilitate easier access to data, improve the quality control and quality assurance (QA/QC) of data from their collection, through data entry, data storage, analysis, and dissemination. The relational database used for data storage, as well as modules for data analysis to provide stock assessments and other end-products is integrated in the Sea2Data framework, using open-sources programming tools and analysis packages (such as R). The QA/QC includes documentation of sampling protocols for research surveys and fisheries monitoring programs, instructions for data punching, and a range of checks to minimize data entry errors and other sources of errors.

Appendix 5. Current DCF data quality indicators

Standard report table number	Quality indicators [1]	Precision estimation
Table III.C.3 - Expected sampled trips by metier	Achieved vs expected nos. trips sampled by region, fishing ground and metier, at sea and on shore (DCF specifies minimum 12 samples per metier per year). Only metiers in top 90% ranking as agreed by RCMs expected to be sampled.	
Table III.C.4 - Metier sampling strategy	Achieved vs expected nos. trips sampled by region and sampling frame, at sea and on shore	
Table III.C.5 – Sampling intensity for length compositions (all metiers combined)	Precision (CV) of length compositions by stock, region and fishing ground from sampling on shore or at sea, in relation to DCF required annual precision. Total numbers of fish measured.	CV (relative standard error) based on sampling design
Table III.C.6 - Achieved length sampling of catches, landings and discards by metier and species	Numbers of fish measured from landings and discards, by species, region, fishing ground and metier	
III.D.1 recreational fisheries	Planned and achieved numbers of samples.	
Table III.E.3 - Sampling intensity for stock-based variables	Number of fish sampled and CV for length@age, weight@age, maturity@age, sex ratio in relation to planned numbers and required precision target, by species, region and fishing ground. Results can be given for the individual country, or as a collaborative sampling between countries in a region (CV target the same as for individual country).	CVs calculated for individual length or age groups and averaged over groups[2]

Notes:

[1] Shortfalls of less than 10 % from the plan are considered to be an acceptable operational margin for length and age sampling, and need not be justified.

[2] Precision estimates should be calculated as the weighted average of CVs over all length/age classes. The weight to be used is the total estimated number of individuals per length/age classes. Precision estimates should be calculated following the provisions of the DCF (Commission Decision 2010/93/EUC section B.B2.4).

For stocks of species that can be aged, average weights and lengths for each age shall be estimated at a precision level 3, up to such an age that accumulated landings for the corresponding ages account for at least 90 % of the national landings for the relevant stock.

(2) For stocks for which age reading is not possible, but for which a growth curve can be estimated, average weights and lengths for each pseudo age (e.g. derived from the growth curves) shall be estimated with a precision of level 2, up to such an age that accumulated landings for the corresponding ages account for at least 90 % of the national landings for the relevant stock.

(3) For maturity, fecundity and sex ratios, a choice may be made between reference to age or length, provided that Members States which have to conduct the corresponding biological sampling, have agreed the following:

(a) For maturity and fecundity, calculated as proportion of mature fish, precision of level 3 must be achieved within the age and/or length range, the limits of which correspond to a 20 % and 90 % of mature fish;

(b) For sex ratio, calculated as proportion of females, precision of level 3 must be achieved, up to such an age or length that cumulated landings for the corresponding ages or lengths account for at least 90 % of the national landings for this stock.

Appendix 6: WKPICS2 Guidelines for best practice in catch sampling schemes

DOCUMENTATION OF SAMPLING DESIGN, PERFORMANCE OF SAMPLING AND PRODUCTION OF ESTIMATES			
Process that need to be described	Best practice	Comment	Bad practice
Target population	The target population needs to be identified and described. Access to the target population for sampling purposes need to be analysed and documented.		
Primary sampling units (PSUs)	Choice of PSUs should be identified, justified and documented. PSUs could be trips, vessels*time or sites*time (harbours, markets, access points). Size of PSUs should be documented	If PSU is something else than trip, vessel or site the choice need to be thoroughly explained.	
Sampling frame	The sampling frame (list of PSUs) should be a complete list of non-overlapping PSUs. The sampling frame should ideally cover the entire target population.	If it is not possible to cover the entire target population with the sampling frame it is good practice to clearly describe how large the excluded part of the population is and the reason for excluding it.	To exclude large parts of the target population in an ad-hoc way.
Stratification of the sampling frame	Strata should be well defined, known in advance and fairly stable. Clear definitions and justifications of strata should be available. One PSU can only be in one stratum. The minimum number of samples within a stratum is dependent on objective, PSU and variance and needs to be calculated. The number of samples within a stratum needs to be justified, in particular if it is below 10.	If the desired minimum number of samples per stratum is not analytically assessed, the choice needs to be justified and described. Care needs to be taken to avoid over-stratification.	To over-stratify (few or no samples in each strata) the sampling schemes. Over-stratification results in increased risk for bias, particularly for ratio estimates, and a need to impute data.
Distribution of sampling effort	The way sampling effort is distributed between strata needs to be described. In accordance with best practice, this can be based on analysis of variance or just distributed proportionally. The different sampling inclusion probabilities/weighting need to be	If other methods, such as expert judgment are used, this should be explained and justified.	

	documented.		
Sample selection procedure	In accordance with good practice, the selection of PSUs to sample should be done in a controlled way allowing for estimation of sampling inclusion probabilities for the different samples. In principal this mean that samples shall be chosen randomly (probability based sampling). Random sampling can be either simple random sampling or systematic random sampling. The selection procedure needs to be justified and described	If it is impossible to use probability-based sampling, the samples need to be thoroughly validated for how representative they are. This process need to be described. If a non-probability based sampling design is applied, this needs to be accounted for in the estimation process (e.g model based estimations). This needs to be thoroughly explained. For small-scale fisheries where there is no census information on the target population, the only way to sample in accordance with good practice is randomly.	Ad-hoc based sampling, without proper documentation to allow estimation of bias, where the sampling inclusion probabilities cannot be estimated.
Hierarchical structure in the sampling	All the levels in the hierarchical structure of the sampling scheme need to be documented. Sampling should be random at all levels. Sampling probabilities should be worked out at each level, and information for this needs to be collected (e.g number of boxes)		Failure to account for the different levels of sampling units in the design and estimation processes. (Risk for bias as well as hiding true variation)
Protocol for selection of samples at lower sampling levels (SSU, etc.)	Such protocols should exist in a national repository		
System to monitor performance of sampling schemes - Quality Indicators	Non-response rates should be recorded. Precision of estimates (relative standard error) should be calculated, where relevant. Effective sample size (or appropriate proxy such as number of vessels or trips sampled) should be calculated and recorded.		
Documentation of raising/weighting procedure for national estimates	Data analysis methods should be fully documented, covering: (1) how the multi-stage sample selection is accounted for in the raising/weighting procedures; (2)		

	ancillary information (for example from fleet census data), that is used to adjust sample weights to correct for any imbalance in samples compared to the population; (3) methods of adjustment for missing data and non-responses.		

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Abstract

The Expert Working Group meeting of the Scientific, Technical and Economic Committee for Fisheries EWG 13-18 was held from 25 – 28 November 2013 in Brussels - Belgium, to review block C of the Consultation Document proposed by DG MARE, and make comments on: The scope of the DCF (new areas of data collection to be covered), Landings obligation, Quality assurance, End-user consultation mechanism/Cycle Regional coordination and task sharing mechanism, relation to other EU data collection provisions, definitions for the revised DCF Regulation. Aside from these, EWG was also tasked to comment and suggest on the simplification of the DCF based on previous discussions and on the Revision of the EU Multiannual Programme, namely on the social & economic data on the fisheries, aquaculture and fish processing sectors. The report was reviewed by the STECF by written procedure in February 2014.

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The Scientific, Technical and Economic Committee for Fisheries (STECF) has been established by the European Commission. The STECF is being consulted at regular intervals on matters pertaining to the conservation and management of living aquatic resources, including biological, economic, environmental, social and technical considerations.