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Report of the Working Group on Commercial Catches

5-9 November 2018

Nicosia, Cyprus

ICES CIEM
International Council for the Exploration of the Sea
Conseil International pour l'Exploration de la Mer

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Executive summary

The Working Group on Commercial Catches (WGCATCH), chaired by Ana Ribeiro-Santos, UK, and Kirsten Birch Håkansson, Denmark, met in Nicosia, Cyprus, from 5 to 9 November 2018. The meeting was attended by 30 members from 17 institutes and 16 countries.

WGCATCH contributes to ensure for ensuring the quality of commercial catch data, which underpins stock assessments and advice. In order to achieve this, the group documents sampling schemes and estimation methods, establishes best practice guidelines and provides advice on the uses of commercial fishery data. The group also evaluates how new data collection regulations, or management measures, may alter the way data needs to be collected and provides guidelines about biases and disruptions induced in time-series of commercial data.

This year the group carried out the following work:

Statistical and technical developments in sampling design, estimation, optimization and quality control of commercial catch data: A series of presentations were carried out through ICES workshops and a training course promoted by WGCATCH during 2018: WKBIOPTIM2, WKPETSAMP, and training course "Statistically sound inference for commercial catch sampling programmes" (See Annex 6 for details on the presentations).

Analyses and summaries were produced on the outcomes of the "Data Quality and Quantity Information" questionnaires in 2017 regarding data provision on Data Limited Stocks (DLS) for the period 2014-2016. The analyses gave an overview on the completeness and significance of the information provided for DLS and of the threshold(s) applied by each country during its data provision for each stock assessment expert group (EG). A series of output plots and summary tables were produced for each stock assessment EG (Annex 10). The structure of the questionnaires was revised and a set of stocks were selected to be further tested in 2019, using the revised templates. A set of tools will be developed to be used by the data submitters and stock coordinators to summarise the quality of the data provided for DLS (Annex 10).

During last year's meeting a set of bilateral case-studies was identified for in-depth examination of the quality and quantity of the sampling of national landings in foreign ports. Intersessional work was carried out to analyse the importance of the **foreign landings** in flag country and at stock level, assess and evaluate the sampling, data sharing and estimation procedures for those landings. A set of tools were developed to evaluate the importance of the foreign landings at regional and national level and list of best practices for sampling, data sharing and estimation procedures for this component of the landings (See Annex 9 for details).

Review developments in sampling and estimation practices of catch, effort, length and age distributions and other biological parameters of small-scale fisheries: The responses of a questionnaire developed in 2017 on small-scale fisheries (SSF) data standardisation/harmonisation and quality were analysed. The main outcomes were: 1) summary of the methodologies used by each MS to calculate SSF fishing effort and of the difficulties to apply the standard methodology (see Report of the 2nd Workshop on Transversal Variables. Nicosia, Cyprus. 22-26 February 2016.). Principal conclusions/recommendations are summarized in Annex 12 and 13, and 2) evaluation of the quality of SSF transversal data (e.g. landings, effort) and development of a list of data quality indicators and quality checking methodologies (Annex 14). Additionally, the

subgroup continued to review the current projects and initiatives for collecting SSF data using new technologies and defined the structure for a scientific paper that will detail the work completed by WGCATCH since 2015 (Annex 15).

Sampling of Protected, Endangered and Threatened Species (PETS) by national programmes: WGCATCH continued the compilation of sampling of PETS information, however no country updated information. It was agreed that a follow up joint intersessional meeting or a workshop is necessary to developing of guidelines for at-sea sampling programs, listing best practices and relevant parameters for PETS sampling for specific fisheries. An update and overview of the changes/adaptation needed in the regional database to incorporate incidental bycatches into the Regional Database and Estimation System (RDBES) was presented and discussed during the meeting (See Annex 16 for details on the proposed fields).

Follow-up on developments of the Regional Database (RDB): Progress on the new RDBES was presented by ICES Data Centre. WGCATCH discussed the future role of this group in respect to RDBES. A RDB subgroup has been formed within WGCATCH and the group encourages its members to engage and actively get involved in the development of the RDBES, by joining the RDBES core group. WGCATCH's role is not to approve sampling or estimation methods, but to provide guideline and best practices. Following the working group's multiannual Terms of References, one of the major topics for WGCATCH 2019 will be estimation of commercial catch data. WGCATCH will start to develop guidelines for ratio estimators and create an overview of methods currently used, which can help inform the development of the RDBES.

Collaborate in the advisory process: WGCATCH have contributed to the development of WKCELTIC, Benchmark Workshop on Celtic Sea Stocks, which will be carried out during 2019 and 2020. WGCATCH reviewed the templates to documenting data quality and quantity provided for data limited stocks (DLS) which will be included for 2019 ICES data call, for certain stocks.

Respond to recommendations: WGCATCH answered 11 recommendations originated from both ICES Expert groups (Annex 18).

Intersessional workshops: WGCATCH proposes one workshop for 2019: Workshop on Optimization of Biological Sampling 3 (WKBIOPTIM3).

1 Administrative details

Working Group name:

Working Group on Commercial Catches (WGCATCH)

Year of Appointment within the current cycle:

2018

Reporting year within the current cycle (1, 2 or 3):

2

Chair(s):

Ana Ribeiro-Santos (UK), Kirsten Birch Håkansson (Denmark)

Meeting venue:

Nicosia, Cyprus

Meeting dates:

5–9 November 2018

2 Terms of Reference

The following multiannual ToRs were approved by ACOM/SCICOM for WGCATCH 2017–2019 work.

ToR	Description	Background	Science Plan topics addressed	Duration	Expected Deliverables
a	Review current and emerging statistical and technical developments in sampling, estimation and quality control of commercial catch data, focusing on total catches, length and age distributions and other biological parameters of ICES stocks	WGCATCH is the most recent of a long series of EGs that have addressed different aspects of sampling of commercial catches in ICES waters [e.g. WKACCU, WKMERGE, PGCCDBS, SGPIDS, and WKPICS], but less attention was put on estimation. The recast of DCF and implementation of EU-MAUP is intented to improve the quality of data collected. WGCATCH will provide guidance for monitoring the sampling levels and data quality, documentation of changes on sampling design and guidelines for estimation procedures. Guidelines also needed for development of the optimization methods for data collection that meet end-users needs and facilitate the multi-purpose and resource limited of the national insitutes. In 2016 a request to evaluate how foreign landings in national ports are being sampled was sent by LM 2016 to WGCATCH that will now be addressed.	25, 26, 27, 31	3 years	Documentation of sampling designs and estimation methods R-Scripts for within-sample optimization of length and age sampling Best practice guidelines for sampling national landings in foreign ports Best practice guidelines in data request and provision for frequency data Best practice guidelines for chosing methods and variables used to expand commercial sampling data Theme Session in ICES ASC Peer-reviewed publication on statistically sound sampling design Book on best practices for sampling commercial catches

ToR	Description	Background	Science Plan topics addressed	Duration	Expected Deliverables
b	Review developments in sampling and estimation practices of catch, effort, length and age distributions and other biological parameters of small-scale fisheries	SSF data are still highly biased(e.g. lack of coverage) and lacking on standardized concepts (e.g. fishing day, see WKTRANSVERSAL2, 2016) that jeopardize recognition of their significance and use in stock assessments. WGCATCH has previously compiled information on SSF and drafted best practice guidelines for data collection on these fisheries WG effort is now needed in a) monitoring the implementation of those guidelines and advise on regionalization of data collection, b) standardize reporting and RDB formats, c) define quality indicators for SSF sampling and census, d) improve knowledge-sharing on new data collection technologies useful for SSF.	25, 27, 28, 31	3 years	Best practice guidelines for standardized reporting of fishing effort Peer-reviewed publication on SSF
c	Review developments in sampling and estimation of incidental bycatch, including Protected, Endangered and Threatened Species (PETS) and other rare fish species	The sampling and estimation of incidental catches of PETS and other rare species in commercial fisheries has been a long-term ICES concern and is now mandatory under the new EU MAUP. WGBYC and WGCATCH have been collaborating to develop sampling protocols and design and estimation of rare events, to ensure that bycatch is properly sampled and estimated in DCF and EU-MAUP at-sea programmes.	25, 27, 28, 31	3 years	Report from WK on sampling of incidental bycatch (2018) Report from WK on estimation of incidental bycatch (2019) Theme Session in ICES ASC (2019)

ToR	Description	Background	Science Plan topics addressed	Duration	Expected Deliverables
d	Document and review changes in legislation that affect data collection and data quality and evaluate their impacts	The landing obligation has brought changes in reporting all catches and have implications on sampling of commercial catches. . Furthermore in 2017 the first EU-MAUP will be implemented and the pace of transition to statistically sound sampling is expected to increase. The complexity of these processes has been followed up closely by WGCATCH through routine ToRs with the group meetings acting as fora where difficulties and changes can be reported, advice for sampling and estimation obtained and recommendations on best practice or data quality issues to both national laboratories and end-users.	25, 27, 31	Routine ToR	Forum to discuss specific problems and find appropriate solutions and recommendations of best practice
e	Review and suggest developments of the Regional Database (RDB) from a design-based sampling and estimation perspective	WGCATCH have been involved in the support of the RDB and advising its development. The development of the new RDB will encompassstatistically sound sampling and estimation of commercial catches and can be used to provide data for assessment EGs. The ICES Data Centre and SC-RDB have requested WGCATCH to continue advising RDB development and ensuring the development encompasses statistically sound sampling schemes and proper methods of estimation.	25, 31	Routine ToR	Report to ICES Data Centre and SC-RDB.

ToR	Description	Background	Science Plan topics addressed	Duration	Expected Deliverables
f	Liaise with other ICES groups (e.g. WGBIOP, WGRFS, PGDATA and SSGIEOM), RCMs/RCGs, the LM and research projects	WGCATCH links with ACOM, SCICOM, SSGIEOM, EGs under SSGIEOM (e.g. PGDATA, WGBIOP) and the ICES secretariat to inform ICES policies and guidelines on quality and quantity of catch data. WGCATCH further links and obtains information from research projects that address sampling and estimation of commercial catches	25, 26, 27, 28, 30, 31	Routine ToR	Report liason initiatives
g	Collaborate in the advisory process, informing assessment groups and benchmarks on commercial catch data issues.	The accuracy of commercial catch data are dependent on the quantity and quality of the sampling and estimation carried by at national level and stock coordination level. WGCATCH can advise on the quality of the time-series used and suggesting improvements for sampling and estimation methods. Over 2017-2019, WGCATCH will phase-in a more active participation in the assessment and benchmark processes.	25, 26, 27, 30, 31	Routine ToR	Report relevant findings to benchmark steering group.

The following generic ToRs are also addressed routinely by WGCATCH

Identify research needs, amend work-plan and propose new workshops, training courses and study-groups, reviewing their outcomes.

Respond to recommendations to WGCATCH from ICES expert groups, RCM/RCGs, Liaison Meetings and other end-users of commercial catch data.

Ensure, where appropriate, that systems are in place to quality assure the products of WGCATCH.

3 Summary of work plan

The following multi work plan was approved by ACOM/SCICOM for WGCATCH 2017–2019 work.

Year 1 (2017)	ToR a.1) **Draft templates for description of sampling schemes and estimation methods; test the templates in selected stock(s) (note: in separate WK: WKSDECC I) and review results at the meeting;** ToR a.2) **Compile information on the importance of foreign landings in national ports and discuss and draft best practice guidelines for their sampling and estimation at the meeting;** ToR a.3) **Produce R-script for within-sample optimization of length and age data (note: in separate WK: WKBIOPTIM) and review results at the meeting** ToR b. 1) **Intersessional work quality indicators and data quality checks using case-studies; Compilation information of the quality indicators used in different member countries;** ToR b. 2) **Intersessional work on documentation of fishing effort definitions used in different member countries; discussion at the meeting;** ToR b. 3**) Compile list of FAQs on implementation of best practice and guidelines on SSF data collection.** ToR c) **Intersessional liaison with WGBYC and draft ToRs for a WK that addresses sampling of incidental bycatches and rare species; discussion of ToR proposal at the meeting.** **Routine and generic ToRs that will be dealt with on a yearly basis by WGCATCH**
Year 2 (2018)	Topics planned include: **ToR a)** i) quality of length frequency data, ii) extension of historical documentation of sampling and estimation to additional stocks, iii) best practice and guidelines to improve their sampling and estimation**; ToR b**) proposals for quality indicators and definitions of fishing effort, and **ToR c**) sampling of incidental bycatches and rare species. Routine and generic ToRs that will be dealt with on a yearly basis by WGCATCH
Year 3 (2019)	Topics planned include: **ToR a)** i) choice of methods and variables used to expand commercial sampling data, ii) extension of historical documentation of sampling and estimation to additional stocks, **ToR b**) regional database requirements to hold and estimate SSF data, and **ToR c**) estimation of incidental bycatches and rare species. Routine and generic ToRs that will be dealt with on a yearly basis by WGCATCH

Detailed work plan for year 2 (2018);

Year 2 (2018)	ToR a.1) **Discuss sampling and estimation methods, including results from intersessional WKs and training courses.** ToR a.2) **Define best practice on sampling and estimation of national landings in foreign ports, based on the case studies.** ToR a.3) **Length and age frequency quality indicators for data limited stocks. Analyse the outcomes of the "Data Quality and Quantity Information" questionnaires on 2016 data on Data Limited Stocks and define best practice and guidelines on data request and data provision for frequency data (age and length).** ToR b. 1) **Compile information on how different labs calculate effort for small-scale fleets and passive gears.** ToR b. 2) **Evaluate the quality and cross check between declarative data and register data.** ToR b. 3**) Using case studies develop a list of quality indicators for sampling and estimation of small-scale fleets.** ToR b. 4**) Compile information on the importance of new technologies for the monitoring of small-scale fleets.** ToR c) **Intersessional joint WK on Sampling of Protected Species (WKPETSAMP); Define the requirements to accommodate incidental bycatches and propose new fields in the RDBES.** **Routine and generic ToRs that will be dealt with on a yearly basis by WGCATCH**

The detailed work plan for year 3 (2019) can be found in Annex 3.

4 List of Outcomes and Achievements of the WG in this delivery period

ToR a) Review current and emerging statistical and technical developments in sampling, estimation and quality control of commercial catch data, focusing on total catches, length and age distributions and other biological parameters of ICES stocks

R-Scripts for optimization of length and age sampling: The second workshop on Optimization of Biological Sampling (WKBIOPTIM 2) focused on practical aspects of optimization, improvement of the R-scripts developed in WKBIOPTIM 1 and development of additional R-scripts. The toolbox was expanded with scripts for e.g. optimization of other biological variables (age & maturity), inclusion of present sampling designs, new outputs for evaluation of the results and more ways of specifying stratification and domains of interest in the simulations. It was agreed that the compilation of the scripts and procedures being developed, improved and tested during these workshops should be compiled and documented in a Toolbox (e.g. an R-Package), so national institutes can analyse their own data and improve their resources allocation and/or distribution. The Toolbox will also incorporate vignettes to facilitate the application of the methods in national labs.

Define best practice on sampling and estimation of national landings in foreign ports, based on the case studies. In 2015, the RCM NA recommended that analyses were conducted to evaluate the sampling of the landings of national vessels in foreign ports. In 2017, WGCATCH meeting a set of bilateral case studies were identified for intersessional work during 2018. The case studies investigated the overall importance of the foreign landings for each stock, bilateral agreements currently in place, data sharing and sampling and estimations procedures. At the 2018 WGCATCH meeting, 13 case studies were reviewed with the aim to identify successes, shortcomings and pitfalls in the current practices. For several countries that provided an analytical overview for their landings abroad, this was the first opportunity to critically evaluate the importance of landings abroad by flag countries, and more importantly to evaluate the current sampling, data sharing and estimation procedures in place.

Based on the RDB data, analytical tools were developed (R-functions and list of possible tabular and graphical outputs) to quantify the landings abroad at a stock level and at national level, and to identify the need to direct sampling effort to this component of the landings. A list of criteria was developed to classify the need to address the landings abroad and best practices on sampling, data use and estimation were outlined (Annex 9).

Length and age frequency quality indicators for data limited stocks. Analyse the outcomes of the “Data Quality and Quantity Information” questionnaires on 2014-2016 data on Data Limited Stocks and define best practice and guidelines on data request and data provision for frequency data (age and length).

Preliminary analyses and summaries were produced on the outcomes of the “Data Quality and Quantity Information” questionnaires issued during 2017 with respected to Data Limited Stocks (DLS) for the years 2014-2016 (See Annex 10).

It was proposed to develop a set of tools to be used by the data submitters and stock coordinators to summarise the quality of the data provided. These tools will be developed intersessional during 2019, using the information from a group of selected stocks, and presented at the 2019 meeting.

The structure of the questionnaires was revised and corrected to be clearer and allow national institutes to complete them accurately and in a standardized manner. The revised templates will be incorporated for the 2019 ICES data call for a group of stocks.

ToR b) Review developments in sampling and estimation practices of catch, effort, length and age distributions and other biological parameters of small-scale fisheries

WGCATCH continues to review developments for collection of transversal variables and biological data in small-scale fisheries (SSF) with the objective to improve data quality. A questionnaire on SSF data standardization/harmonization and quality was produced for the participants to complete intersessionally (Annex 12). 21 countries/country regions replied on the questionnaire and provided data, which resulted in a great deal of material to analyse, in order to address ToRs b.1 and b.2. Based on the responses of the questionnaire, the SSF subgroup work for this year's meeting focused on: 1) summarise the methodologies used by each MS to calculate SSF fishing effort and the difficulties to apply the standard methodology (see Report of the 2nd Workshop on Transversal Variables. Nicosia, Cyprus. 22–26 February 2016.) and then develop principal conclusions/recommendations for SSF (Annex 12 and 13) and 2) evaluate the quality of SSF transversal data (e.g. landings, effort) and develop a list of data quality indicators and quality checking methodologies (Annex 14).The subgroup continued to document and review the different programs and projects currently in development on new technologies to monitor SSF. It also discussed the details and the structure for a scientific manuscript that will detail and review the work completed by WGCATCH since 2015 on this specific topic (annex 15).

Intersessional work was done in the elaboration of an abstract and participation for the 9th 2018 International Fisheries Observer and Monitoring Conference *(IFOMC, 11–15 June 2018, Vigo, Spain)* summarizing the work completed by WGCATCH during the 2015–2017 period. The 2018 WGCATCH SSF subgroup work began with this presentation, so all the participants were aware about where we stand and the expected next steps.

ToR c) Documentation of the sampling of PETS by national programmes

WGCATCH continued to update the yearly questionnaire on PETS sampling under the DCF and it continues to reveal that National protocols and databases have not yet been adjusted by most countries. The Workshop on the Sampling of Protected species (WKPETSAMP) was carried out in 2018 with the aim to document and evaluate the strengths and limitations of the current sampling programmes under DCF and directed studies to collect data of bycatch of birds and marine mammals and to develop criteria to evaluate if at-sea sampling programmes meet end-user needs. WKPETSAMP was also tasked to define proper mechanism(s) for storage, maintenance and dissemination of monitoring data. For this task, an overview of the variables that need inclusion in the various RDBES data model, so the incidental bycatches can correctly store and estimated (See Annex 16 for details).

There are however two other issues that need to be addressed: ToR D of WKPETSAMP *to provide evidence of preparation of guidelines for at-sea sampling programs, listing best practices and relevant parameters for PETS sampling for specific fisheries* has only been addressed briefly and still needs to be fulfilled. Secondly, the proposed fields on sampling of protected species for the RDBES require the preparation of definitions. It was agreed that these tasks will be dealt with in an intersessional meeting or at WGBYC with some members of WGCATCH.

ToR e) Review and suggest developments of the Regional Database (RDB) from a design-based sampling and estimation perspective

The data model for sampling data in the new Regional Database and Estimation System (RDBES) has been reviewed by the RDB subgroup under WGCATCH intersessional work during 2018. The outcome has been communicated directly from individual members to ICES data centre.

During the 2018 WGCATCH meeting, the group reviewed and discussed several issues related with the current RDB and the development of RDBES, from which resulted in various recommendations to the ICES data Centre and RDB steering group:

- WGCATCH reviewed and support the suggestion for the fields relevant to recording of incidental bycatch suggested by WKPETSAMP and the RDBES core group (Annex 17).
- WGCATCH suggest that the RDBES core group reviews the present formats for commercial landings statistics (CL) and effort statistics (CE), since there are issues with the present RDB format relating to e.g. effort, small-scale fisheries and inclusion of information relevant to estimation. See recommendations (Annex 2).
- WGCATCH suggest two new reference lists to be included and maintained in ICES vocabulary, one for stock and one for assessment working group fleets, see recommendations (Annex 2).

ToR g) Collaborate in the advisory process, informing assessment groups and benchmarks on commercial catch data issues.

WGCATCH have contributed to the development of WKCELTIC, Benchmark Workshop on Celtic Sea Stocks, which will be carried out during 2019 and 2020. The first of the three meetings held under WKCELTIC will follow the objectives of the WKDECC series: focus on the documentation of national data preparation for stock assessment, commenting on their statistical soundness, quality of estimates they deliver and provide guidelines for data compilation for these stocks.

WGCATCH reviewed the templates for documenting data quality and quantity provided for data limited stocks (issued with ICES Fisheries data call, 2017), which will be included for 2019 ICES data call for certain stocks.

Respond to recommendations to WGCATCH from ICES expert groups, RCM/RCGs, Liaison Meetings and other end-users of commercial catch data

Eleven recommendations from eight Expert groups and RCGs were answered (Annex 18).

Other:

One of the goals of WGCATCH is to provide a forum for training, exchange of knowledge, ideas, and recent developments in sampling and estimation of commercial catches (WGCATCH, 2016). During the WGCATCH 2018 meeting, discussions were carried out on what are the best ways to communicate and publish the existent and new guidelines and best practices produced by the various Workshops, planning groups and working groups, in the last years. Numerous reports have been produced, but it has been acknowledged that is difficult to find the guidelines/best-practice produced. It was decided, that there is a need to have them extracted from the reports and organized in the WGCATCH repository, by themes. An intersessional subgroup will be responsible to carry out this work.

5 Progress report on ToRs and work plan

5.1 ToR a) Review current and emerging statistical and technical developments in sampling design, estimation, optimization and quality control of commercial catch data, focusing on total catches, length and age distributions and other biological parameters of ICES stocks

5.1.1 ToR a.1) Discuss sampling and estimation methods, including results from intersessional WKs and training courses

The outcomes of a set of intersessional workshops spanned by WGCATCH 2017 and the training course were presented and reviewed during the meeting (abstracts can be found in Annex 6):

- **Workshop on Optimization of Biological Sampling at Sample Level (WKBIOPTIM),** chaired by Ana Cláudia Fernandes, Portugal, and Julie Coad Davies, Denmark, at the IPMA headquarters (Lisbon, Portugal), between 20 and 22 June 2017;
- **Joint WGBYC/WGCATCH Workshop on the Sampling of Protected species (WKPETSAMP)** 24–26 April 2018, in Lysekil Sweden, chaired by Bram Couperus (The Netherlands) and Katja Ringdahl (Sweden);
- **Training course: Statistically sound inference for commercial catch sampling (TCCATCH)**, instructed by Mary C. Christman (USA) and Jon Helge Vølstad (Norway), in ICES headquarters (Copenhagen), between 18 and 22 June 2018;
- **RCG Transnational Workshop on the North Sea Sole data compilation (WKTRANSDATA),** 19–23 February 2018 in Nantes France, chaired by Laurent Dubroca (Ifremer, France) and Ana Ribeiro Santos (Cefas, UK).

5.1.2 ToR a.2.) Compile information and define best practice on sampling and estimation of national landings in foreign ports.

In 2015, the RCM NA recommended WGCATCH to produce guidelines and best practices for sampling landings of national vessels in foreign ports. During 2017 meeting, WGCATCH compiled national vessels landings into foreign ports submitted by 13 countries. Alongside Commercial Landings (CL) from the RDB were also analysed. From those analyses, a set of bilateral case studies was identified for further analysis to be presented and discussed at 2018 WGCATCH meeting. An intersessional work plan was developed with the objective to produce working documents with a detailed analysis of the following aspects (Annex 7):

1) Evaluate the overall importance of the foreign landings for each stock (e.g. spatially, temporal and technical proportion of the landings of the stock);
2) Liaison with counterpart from the landing country to document sampling and estimation procedures for foreign landings. Describe current sampling and estimations procedures and how are the data used;
3) Describe how the foreign landings sampling data are dealt with (e.g. bilateral agreement, who is responsible for submitting the data, informal sharing, etc.).

4) Critical review of the current situation and outline potential improvements to cover foreign landings and the usage of the collected for estimation procedures.

From the list of case studies, WGCATCH received WD from 13 case studies (Annex 8), which were presented and discussed in subgroup. The objectives of the subgroup were:

1) List the shortcomings and issues of the current sampling, estimation procedures and how the data are used (Annex 9);
2) Describe and develop tools to evaluate and assess the importance of the foreign landings by national vessels and in relation to the wider stock (Annex 9);
3) Set up criteria to define the need to address landings abroad (Annex 9);
4) Develop best practices for sampling and estimation and data uploads (Annex 9).

5.1.3 ToR a.3.) Length and age frequency quality indicators for data-limited stocks. Analyse the outcomes of the "Data Quality and Quantity Information" questionnaires on 2016 data on Data Limited Stocks and define best practice and guidelines on data request and data provision for frequency data (age and length)

Preliminary analyses and summaries were produced on the outcomes of the "Data Quality and Quantity Information" questionnaires issued on the 2017 ICES Fisheries data call on Data Limited Stocks (DLS). Summary plots were produced on the data provided for each DLS, under each stock assessment working group (See Annex 10 for results).

The preliminary results highlighted the current diversity of thresholds used across countries when submitting data for DLS. WGCATCH started discussing the use of specific thresholds, however the main conclusion being, that it is not possible to come up with a single universal rule. Thresholds depend on a variety of things e.g. proportion of the domainvs.total and the use of data. Furthermore, concerns were expressed about the diversity of threshold being used within a single stock and how that affects use of data.

Another main conclusion was that a big part of this issue is to heighten the awareness of low sampling levels, relevance of low sampling levels and thresholds amongst data submitters and stocks assessors. Therefore, one of main output of this work will be to develop tools for both data submitters and stock assessors, i.e. graphics and quality flags, which are available during data submission and data compilation. WGCATCH agreed on the usefulness of the "Data Quality and Quantity Information" questionnaires as input to these tools and reviewed the templates. To some extent, the tables could be replaced by combining information already available in InterCatch and the RDB and the subgroup started to develop tools based on these. Some shortcomings were identified in these sources of data. Numbers of samples and length/age measurements are not mandatory in InterCatch, but if filled it would be an easy way to get an overview of low sampling levels. RBD data lack the link to InterCatch fleets, see recommendations Annex 2, and Non-EU members do not submit data to RDB.

All of the above work was hindered by the fact that none of the analysed cases was complete, many combinations of country and assessment working groups were missing.

To finalize the development of tools for national data submitters and stock coordinators and guidelines in 2019, WGCATCH needs the full characterization of a subset of stocks, where stock coordinators are active members of WGCATCH. For these stocks, the revised questionnaire will be included in the ICES Fisheries data call 2019, inputs and outputs from InterCatch and the RDB will be requested before 2018 meeting.

The following stocks were selected, WGBFAS: fle.27.22–23, ple.27.24–32, tur.27.22–32, dab.27.22–33, WGNSSK: sol.27.4, WGHANSA: pil.27.8abd.

5.2 ToR b) Review developments in sampling and estimation practices of catch, effort, length and age distributions and other biological parameters of small-scale fisheries

WGCATCH continues to review developments for collection of transversal variables and biological data in small-scale fisheries (SSF) with the objective to improve data quality. Based on the responses of a questionnaire on SSF data standardization/harmonization and quality sent to the participants and completed intersessionally by 21 countries/country regions (Annex 12), the SSF subgroup work for this year's meeting focused on: 1) summarise the methodologies used by each MS to calculate SSF fishing effort and the difficulties to apply the standard methodology (see Report of the 2nd Workshop on Transversal Variables. Nicosia, Cyprus. 22–26 February 2016[1]) and 2) evaluate the quality of SSF transversal data (e.g. landings, effort) and develop a list of data quality indicators and quality checking methodologies.

The subgroup continued to document and review the different programs and projects currently in development on new technologies to monitor SSF. It also discussed the details and the structure for a scientific manuscript that will detail and review the work completed by WGCATCH since 2015 on this specific topic.

Intersessional work was done in the elaboration of an abstract and participation for the 9th 2018 International Fisheries Observer and Monitoring Conference *(IFOMC, 11–15 June 2018, Vigo, Spain)* summarizing the work completed by WGCATCH during the 2015–2017 period. The 2018 WGCATCH SSF subgroup work began with this presentation, so all the participants were aware about where we stand and the expected next steps.

The following presentations took place during the WGCATCH 2018 meeting:

- **Sébastien Demanèche**: 2015–2017 WGCATCH work completed. Where we stand and expect next steps. IFOMC WGCATCH SSF subgroup presentation.
- **Estanis Mugerza:** EU FishPi[2] project. First outputs from WP5 on SSF monitoring.
- **Charis Charilaou:** EU STREAM project. First outputs from WP3 on sampling optimization and WP5 on SSF monitoring.
- **Uwe Krumme:** Smartphone application for data collection: Improving data on fishing effort of small-scale fisheries.

[1] https://publications.europa.eu/en/publication-detail/-/publication/8c5583fa-c360-11e6-a6db-01aa75ed71a1/language-en

- **Włodzimierz Grygiel:** Small-scale (coastal) fisheries in Poland (the Baltic Sea); structure, definitions, limitations.

The presentations were followed by a plenary discussion of the practical and theoretical aspects involved. A summary of the presentations and discussions can be found in Annex 11.

A working document (WD) on "A new approach to estimate landings and fishing effort of small-scale fisheries by re-evaluating declarative data from the Ifremer exhaustive activity calendar survey. Application to the French Mediterranean vessels" can be found in Annex 11. The WD illustrates the issue of data incompleteness and proposes a methodology to re-evaluate/re-assess them, based on the available declarative data scaled to the annual fishing activity calendar exhaustive survey.

5.2.1 ToR b.1) Compile information on how different labs calculate effort for small-scale fleets and passive gears

In 2017, WGCATCH reviewed and discussed the data needed and methodology for calculation of fishing effort estimates, as agreed in the Nicosia meeting, with particular focus on SSF and passive gears. It was concluded that, to accurately estimate the effort, it is required to have the following information: **gear-soaking time**' (especially for passive gears)**, 'Vessel fishing days' and 'Gear dimension' (length of nets, number of pots, etc.).** The **effort calculation** should be preferentially calculated on a "**day by day" basis" rather than on a "trip by trip" basis.** In order to confirm and/or complete these conclusions and to draw up detailed compilation on how different labs calculate effort for SSF and passive gears, a specific question was raised in the 2018 WGCATCH SSF subgroup questionnaire: Q8. *Summarise the methodology used for calculating fishing effort estimates for SSF and passive gears. Is it in line with the methodology developed during the 2nd DCF workshop on transversal variables (Nicosia, 2016)? If not, what are the main concern/difficulties you meet to apply it?*

Most of the countries responded to this question, while two did not respond, and one country mentioned that there is no specific methodology in used for SSF fishing effort estimates calculation.

Overall, from the countries that responded to this question, eight apply methodology developed during the 2nd workshop on transversal Variables ("Nicosia methodology"), while six answered that they partially follow it. Key elements from these answers are that four countries mentioned that they applied the following assumptions: **1 trip = 1 day at sea = 1 fishing day** to calculate the fishing effort estimates. Three countries apply a bigger assumption: **1 sales note = 1 trip = 1 day at sea = 1 fishing day**. Finally, several countries pointed out concerns or difficulties faced in order to be in line with the "Nicosia methodology" which reflect concern shared by most of the countries regarding the 2017 discussions. Those difficulties and concerns are listed in Annex 13.

In conclusion, the questionnaire showed that most countries calculate SSF fishing effort on a "day by day" basis, instead of a "trip by trip" as recommended by the Nicosia methodology which confirm the conclusions drawn in 2017. In addition, "24h period definition" for SSF days at sea calculation could not be applied in most of the countries. Fishing effort estimates calculation methodology should be adapted considering the fact that the SSF generally have a daily activity and, consequently, for most cases it could be assumed that: 1 Trip is equivalent to 1 Day at Sea also equivalent to 1 Fishing Day, as far as no other data contradicts this hypothesis. Finally, difficulties have been highlighted in many countries *(in particular for the ones using sales note or landings declaration to follow SSF)* to obtain the gear information *(including the gear dimension)*. For these countries, this information should be assessed by sampling survey.

5.2.2 ToR b.2) Evaluate the quality of SSF data and cross check between declarative data and register data

The other questions concentrate on the coverage/completeness and the accuracy/reliability of data collected in a census approach with the additional objective to establish a first overview of the quality indicators and checking methodologies in place in MS.

The first outputs were to finalize the work done during previous meetings producing tables summarizing the different data collection methods (for transversal and biological variables) currently applied in EU countries for small-scale fleets. The results of this work could be found in Annex 14.

Second outputs of the questionnaires were to compile quantitative information on the declarative data available in the different countries for SSF. These data provided a detailed and complete knowledge, that we started developing during previous meetings, on the structure of EU SSF by country, particularly presenting the vessel length distribution in a more precise vessel length ranges.

Based on these data, it is also possible to develop analytical tools to assess the coverage/completeness of fishing activity data collected via a census approach. The first indicator is to compare the number of vessels registered in official national fishing fleet register *(cf. EU fleet register)* against the number of vessels with at least one declarative data available. While the second set of indicators concentrated on vessels with declarative data and it investigated the completeness of their data regarding the number of trips they declared.

During the 2018 WGCATCH meeting, various graphical outputs were produced comparing the declarative and register data for each country *(See Annex 14 for the analyses and output plots. See WGACTCH GitHub here for the R script)*. These first graphs give a lot of material to deal with in order to assess data quality and especially the coverage/completeness of declarative data available through the control regulation *(known as declarative data)*. Due to lack of time, it was not possible to discuss extensively the development of data quality checks methodologies on this basis, but it is planned to further discuss it during 2019 WGCATCH meeting with the objective to develop risk assessment methodology. For example, will be discussed if the level of risk regarding the different type of indicators calculated could be determined/assessed *(e.g. define patterns of indicators, which present low, medium or high risk of incomplete data issues).*

Important differences were found between official EU fleet registered number of vessels and real active vessels identified in the different sampling programmes. This is an important issue especially when official number of vessels are used for raising to provide different type of estimates (catch, effort, etc.).

The need to improve the different sampling programmes to analyse the completeness was also highlighted.

Some additional information about the way the different MS assess or not the coverage/completeness of SSF data available have been also compiled from the questionnaires and are presented in Annex 14. It has been concluded that few countries address this issue when the WGCATCH SSF subgroup advise the usefulness of such tools to identify potential issues and to overcome problems with reliability and completeness of SSF data collected and encourage MS to develop such tools.

5.2.3 ToR b.3) Using case studies, develop a list of quality indicators for sampling and estimation of small-scale fleets

In 2017, the SSF subgroup started to develop a list of quality indicators for sampling and estimation of SSF. Questions 5–7 of the questionnaire focused on documentation and evaluation of the quality and completeness of declarative data (detailed analysis of the answers is in Annex 14). Detailed outputs from these questions are available in the Annex 14.

In relation to the question if countries perform cross checks to assess the quality of the control data by means of scientific surveys, six out 18 countries did not perform any checks, assuming the control data are reliable for use. In fact, these were the countries that appraised their official "declarative" data as reliable for scientific use, without data quality checking methodologies. Only one country (Basque country) performed a specific sampling survey to assess the reality/quality of the declarative data collected. The group advised that assessment of the reality/quality of the declarative data collected is an issue that requires particular attention. First step of such data quality checking methodology could be the comparison of the data coming from the biological data onshore or on-board sampling and the available declarative data. The group advised also that there is a link here with the use of innovative/new technologies (*e.g. geolocalization device, remote electronic monitoring (CCTV), new apps for smartphone/tablets, RFID tags …*) which could be a significant opportunity to improve SSF data collection and in particular to assess SSF data quality.

Most of the countries highlighted the persistent incompleteness of data for the SSF (i.e. under 10 m fleet), particularly regarding the gear used (including gear dimension), geospatial data and catch composition. This is link with the fact that for this fleet the only mandatory declarative data required is sale notes which is insufficient and must be completed. The main source of uncertainty in relation to the gear used is for multigear trips, where there are significant difficulties to assign a gear to those trips. Geospatial data are still one of the main gaps for this fleet. In sale notes this information is missing and for logbooks or other declarative forms used for less than 10 m fleet the resolution of the information provided (i.e. ICES division, rectangle) is not enough. The best alternative to improve this information is the use of new technologies adapted to this fleet (See section about new technologies).

The biggest source of uncertainty and poor quality is the catch composition, due the misreporting, miss identification or only main species reported due to exceptions in the regulations. To improve this information WGCATCH recommends countries and institutes to carry out sampling programmes to cross check with declarative data. However, it has to be noted that the main weakness of these sampling programmes is the low coverage due to a high effort needed to cover this fleet due to its specific characteristics (large number of vessels, distribution among ports, etc.).

In relation to the question regarding the appropriateness of control data for scientific purposes (Q.7), most of the countries (11 out of 17) considered the SSF data reliable. However, six countries considered SSF control data inappropriate to scientific use. The main reason is the "catch <30 kg rule" (EU 1224, 2009, e.g. articles 14, 21, 65), where fishermen are only required to declare landings above 50 kg per trip. Countries with a large proportion of SSF vessels in their national fleet may be more sensitive to uncertainties inherent to the control data than other countries. Hence, inappropriateness of control data for scientific use would be an issue compromising the data quality of all EU-SSF vessels. In fact, the proposed reform of the control regulation intends to remove the "30 kg catch" exemption from the legislation, as it has been recognized that the sum of small unreported catches has significant effect to the state of the stocks. WGCATCH supports the removal of this exemption from the legislation, which will improve the quality and reduce the uncertainties of the landings data of the SSF.

5.2.4 ToR b.4) Compile information on the importance of new technologies for the monitoring of small-scale fleets

Most of the SSF activity takes place in coastal areas and there is a need to collect appropriate spatial and temporal data to inform both fisheries management and marine spatial planning. Technical limitations of Vessel Monitoring Systems (VMS) together with exemptions within EU regulations determine that nearly 80% of the 12–15 m fleet segment operates without VMS (EU Special No 08/2017). Therefore, different approaches to monitor much of the sub 15 m fleet are required.

Whilst there are a variety of options for capturing highly spatially resolved data some of which are being implemented in the sub 15 m fleet, there is a need to consider and compare the utility of the range of systems and processes that could be used to capture fishing effort and catch data also.

New technologies are a significant opportunity to improve Small-Scale Fisheries (SSF) monitoring and data collection. WGCATCH 2017 underscored that the utility of such information should not be ignored, and research on these technical instruments must be supported. Member countries should work together in future on extension/improvement of open source applications and development of tools to process such data.

As a first input to this specific feature and to illustrate these aspects, WGCATCH 2016 did a very first review of the different projects today ongoing in the ICES area. In 2017, this information was updated and a presentation of an ongoing study in Basque country has been done. In 2018, WGCATCH meeting another ongoing project related to the use of new technologies focused on the monitoring of the fishing activities of the German SSF in the Baltic Sea. First results of the use of the Smartphone App Mofi (Mobile Fisheries log) were presented by the THUENEN institute in Rostock, Germany (Annex 15).

Under fishPi2 project WP5, one of the deliverables is also the review of available systems/devices used especially at EU level. With this objective in mind, several direct survey/questionnaires were made to manufactures or companies providing these devices but also to scientist using the data collected by them. The outcomes of this deliverable will be evaluated in 2019 WGCATCH meeting.

During 2018 WGCATCH meeting, the subgroup reviewed and discussed the specific section of the new Control Regulation proposal[2] on monitoring the SSF taking the advantage of the new technologies but from a scientific perspective. The group agreed that new technologies could improve the information of this fleet but a case-by-case approach will be needed (taking into account the total length of the vessels, technical difficulties, fishermen feedback, scientist needs etc.). This case-by-case approach could help when making a decision about the potential devices/systems to install in this fleet.

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[2] https://ec.europa.eu/fisheries/cfp/control_en

WGCATCH 2019 will work further on this task to provide some recommendations from the scientific perspective on this issue.

5.2.5 ToR b.5) Discuss the writing of a scientific manuscript that details the SSF work carried out by WGCATCH and draft a work plan to accomplish that task

During its 2018 meeting WGCATCH subgroup on SSF continue to discuss the writing of a scientific manuscript that details the SSF work carried out by WGCATCH and to draft a work plan to accomplish this task. The group reviewed the extended abstract (Annex 15) submitted to the 2018 IFOMC proceedings, discuss the main recommendations/conclusions they want to highlight and elaborate the structure *(main chapters)* for a future scientific manuscript (Annex 15).

5.3 ToR c) Review developments in sampling and estimation of incidental bycatch, including Protected, Endangered and Threatened Species (PETS) and rare fish species

WGCATCH continues to collaborate with WGBYC in order to improve fishery-dependent on-board sampling of PETS (Protected, Endangered and Threatened Species) during at-sea sampling of commercial fisheries. Bram Couperus is the liaison for WGBYC in coordinating with WGCATCH. The group review the main outcomes and achievements of the joint WK on the Sampling of Protected species (WKPETSAMP). One of the ToRs was not achieved due to time constraints. The group discussed the possibility to organize a second workshop as a follow up of WKPETSAMP. This was the original idea when WGCATCH proposed a joint workshop on PETS sampling: one workshop in 2018 on design, followed by a workshop in 2019 on the analysis of data collected in the at sea sampling programs and the pilot studies under the DCF. However, the yearly questionnaire on PETS sampling under the DCF reveals that National protocols and databases has not yet been adjusted by most countries. Also, most pilot studies on environmental impact as proposed by the Member States in the National Work plans generally not designed as at sea observer programs that target protected species. Only Sweden, Denmark and the UK are known to have such a pilot studies carried out. It is therefore to be expected that there are many data available for a workshop on analysis of the data.

There are two other issues that need to be addressed by both groups. Firstly, ToR D of WKPETSAMP to provide evidence of preparation of guidelines for at-sea sampling programs, listing best practices and relevant parameters for PETS sampling for specific fisheries has only been addressed briefly and still needs to be fulfilled. Secondly, the proposed fields on sampling of protected species for the RDBES require the preparation of definitions (See Annex 16 presentation for details). These tasks may be dealt with in an intersessional meeting or at WGBYC with some members of WGCATCH.

The ToRs for such a session would be:

1) Prepare of guidelines for at-sea sampling programs, listing best practices and relevant parameters for PETS sampling for specific fisheries.
2) Prepare definitions for the fields on the at sea sampling of protected species in the RDBES, explore the necessity of additional fields for other monitoring than at sea sampling, propose and define fields for of these sampling schemes if required.

WGBYC has recommended WGCATCH to maintain together with WGBYC the inventory of existing sampling programs that currently provide data on PETS bycatch at national level, specifically the DCF at-sea catch sampling programs. The group agreed to do this. Thus, the inventory (meta-database) will be updated twice a year during the meetings of WGBYC and WGCATCH. Collection or preparation of new input for the inventory may take place intersessional.

5.4 ToR e) Review and suggest developments of the Regional Database (RDB) from a design-based sampling and estimation perspective

The data model for sampling data in the new Regional Database and Estimation System (RDBES) has been reviewed by the RDB subgroup under WGCATCH intersessional in 2018. The outcome has been communicated directly from individual members to ICES DataCentre.

During WGCATCH 2018 meeting, the following topics were presented in relation to the RDB (abstracts and following discussion can be found in Annex 17):

- RDBES for WGCATCH 2018
  - Presentation of the underlying concept and progress so far achieved in the development of the data model of the new Regional Data Base and Estimation System (RDBES). The future role of WGCATCH in relation to the new RDBES.
- Small-scale Fisheries in the RDBES, WP5 in fishPi2
  - Presentation on a proposal for CL and CE tables adapted to host SSF catch and effort data coming from a census and from sampling estimates.
- Accommodating incidental bycatch in the new RDBES – Bram Couperus, Sara Königson and Nuno Prista

WGCATCH discussed its role in the new RDBES, see Annex 18.

Based on the discussion following the presentation of small-scale fisheries from fishPi2, WGCATCH suggest that the RDBES core group also focus on the revision of the formats for commercial landings statistics (CL) and effort statistics (CE), see recommendation (Annex 2).

During the 2018 meeting, WGCATCH worked with and developed tools for data from the RDB in two subgroups, DLS and foreign landings. The groups found it difficult to link the result to other ICES groups work and therefore suggest two new reference table to be maintained in ICES vocabulary, one for ICES stocks and one with assessment working group fleets (InterCatch fleets), see recommendations (Annex 2). The tables will be needed for estimation of commercial catch figures in the new RDBES as well, since fleets and stocks are some of the main domain of interest for AWG's.

5.5 ToR f) Liaise with other ICES groups (e.g. WGBIOP, WGRFS, PGDATA and SSGIEOM), RCMs/RCGs, the LM and research projects that deal with commercial catch data

Previous to the meeting, WGCATCH chairs requested a presentation from the chairs of WGBIOP and PGDATA. Accordingly, the following presentations took place during the WGCATCH 2018 meeting:

- **Laurent Dubroca** (on behalf of chair of PGDATA): Planning group on Data needs for Assessment and Advice (February 2018, Nantes, France).
- **Uwe Krumme** (on behalf of the chairs of WGBIOP)**:** Working Group on Biological Parameters (October 2018, Gent, Belgium).

The presentations were followed by plenary discussions on improvements of communication and increased interaction and liaison between WGCATCH and these EGs. Summaries of the presentations can be found in Annex 18.

5.6 ToR g) Collaborate in the advisory process, liaising with assessment groups and benchmarks on commercial catch issues

The accuracy of commercial catch data depends on the quantity and quality of the sampling and estimation carried by at national level and stock coordination level. As EG responsible for the quality of commercial catches, WGCATCH as the objective for 2017–2019 of strengthening its collaboration in the advisory process, namely the benchmarks. The main vehicle considered to achieve this goal is to include the workshops on sampling design and estimation of commercial catches (WKSDECC) on the benchmark. The WKSDECC are planned annually depending on ICES needs (e.g. the list of stocks to be benchmarked on year+2) and the availability of participants from the core countries fishing the stocks and have a set of pre-established generic ToRs (see Annex 5). Their goal is to ensure progress in the documentation of the present and historical sampling design and estimation procedures that underlies the commercial catch estimates provided for assessment (WGCATCH ToR a), providing a collaborative environment for joint discussion and conclusion on important biases and imprecisions that affect estimates of commercial catches. In 2019, to increase and ensure the collaboration throughout the benchmark process, WGCATCH proposed to include WKSDECC ToRs in the WKCeltic 2020, benchmark on the Celtic Sea haddock, cod and whiting. This benchmark will include three meetings: 1) Data evaluation; 2) Data compilation; 3) Assessment benchmark. In the first meeting the goal is to review, document sampling and estimation procedures, and provide general guidelines for commercial data compilation at the regional level (i.e. stock).

5.7 Routine ToRs

5.7.1 Identify research needs, amend work-plan and propose new workshops, training courses and study-groups, reviewing their outcomes

WGCATCH discussed current research needs in plenary. The work lines previously affirmed for 2017–2019 (ICES, 2017) remain valid. To fulfil its goals, WGCATCH has identified a need for intersessional WKs that ensure intersessional progress and training in areas of relevance for WGCATCH, RDBES development and ACOM/SCICOM in general. The outcomes of these will be reviewed annually during the WGCATCH meeting. The following workshops and training courses are proposed for 2019: 1) Workshop on Optimization of Biological Sampling (WKBIOPTIM3), 2) Intersessional meeting on Sampling of bycatch and PET species under EU-MAP programmes and directed bycatch studies (WKPETSAMP2).

In 2017, WGCATCH proposed a workshop on methods for developing fishery-dependent indices of abundance for use in stock assessments (WKCPUE) to be held in 2018. The workshop was accepted by ICES, but never held. WGCATCH agreed it is important to continue the development and standardisation of commercial cpue/lpue dataseries in ICES, but also recognise that the group do not have the necessary expertise to lead this work. Therefore, a recommendation for continuing this work is put forward to ACOM, see recommendations Annex 2.

5.7.2 Respond to recommendations to WGCATCH from ICES expert groups, RCM/RCGs, Liaison Meetings and other end-users of commercial catch data

WGCATCH received ten recommendations. Prior to the meeting, the chairs of some of the EGs issuing the recommendations were contacted for clarifications. The recommendations were then discussed during the meeting and a response issued. The responses to the recommendations can be found in Annex 20.

5.7.3 Ensure, where appropriate, that systems are in place to quality assure the products of WGCATCH

The working group did not produce any data outputs, the main output from WGCATCH being the current report and its annexes. Additional outputs from WGCATCH work can be found in the reports, scripts and working documents produced by intersessional workshops WGCATCH spanned in 2017. All ToRs were fully discussed directly in plenary or in subgroups and then in plenary. The final draft of the report was provided to all participants of WGCATCH meeting for scrutiny and error checking. WGCATCH chairs made every effort to ensure that the content of the report was accurate and reflects the opinions of the WG. Sufficient time was given to all participants to review the different report sections and the final draft.

5.7.4 Other: WGCATCH repository

The WGCATCH repository (http://www.ices.dk/community/groups/SiteAssets/WGCATCH-publications.aspx) is a public resource on commercial catch documents and reports maintained by WGCATCH members. The content of the repository has a clear emphasis on references needed to implement statistically sound sampling and estimation of commercial catch data used by ICES Assessment Groups, each reference cited being accompanied by a short summary that details its content and relevance. The repository *does not* aim to be an exhaustive inventory of references on catch sampling and estimation; rather, it highlights only the core literature sources in the field of commercial catches, i.e. those more routinely used and cited by WGCATCH and, most importantly, those more relevant to new participants in the EG and other national staff interested in statistically sound sampling and estimation methods. As such, the WGCATCH repository avoids literature overload and acts as an important instrument in linking participants to the history of WGCATCH and some preceding EGs, avoiding duplication of work already done and speeding up integration of new WGCATCH members in the EG work.

During the WGCATCH 2018 meeting, discussions were carried out on what are the best ways to communicate and publish the existent and new guidelines and best practices produced by the various Workshops, planning groups and working groups, related with commercial sampling, in the last years. Numerous reports have been produced, but it has been acknowledged that is difficult to find the guidelines/best-practice produced. It was decided, that there is a need to have them extracted from the reports and organized in the WGCATCH repository, by themes. An intersessional subgroup will be responsible to carry out this work. The subgroup will liaise with PGDATA during the process for inspiration and to ensure consistency within ICES.

6 Revisions to the work plan and justification

No significant changes were made to the ToRs and work plan approved by ACOM/SCICOM for WGCATCH work during 2017–2019. Detailed ToRs and work plan for 2019 are presented in Annex 3.

7 Next meetings

The WGCATCH meeting for 2019 will be held in Gdańsk, Poland, between the 4th and 8th of November 2019. Venue and dates of WGCATCH meeting in 2020 will be decided during next year's meeting.

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Annex 2: Recommendations

Recommendation	Adressed to
WGCATCH informs RCGs of the best practice and guidelines developed on foreign landings (Annex 9, WGCATCH report 2018) and suggests them to discuss it and implement it.	RCGs through PGDATA
WGCATCH recommends RCGs to promote the development of pilot studies that evaluate biases of non-sampling, low sampling or non-representative sampling of foreign landings of major stocks. The need for these studies comes from best practice defined in Annex 9 (WGCATCH report 2018). The studies should be conducted by means of statistically sound sampling schemes.	RCGs through PGDATA
WGCATCH recommends ICES to organise a workshop on standardisation of cpue/lpue. The derivation of commercial cpue/lpue dataseries in the ICES community generally does not follow best practice. In many cases, the dataseries are used as relative abundance indices to inform stock assessment and advice without standardisation to remove, as far as possible, temporal and spatial variation due to factors other than fish abundance. Additionally, procedures used to derive cpue/lpue indices are often poorly documented in ICES stock annexes and working documents. WGCATCH developed guidelines on what should be documented and considered when commercial fishery cpue/lpue indices are developed and used in stock assessment (WGCATCH, 2016, Chapter 5.2)	ACOM
WGCATCH recommends that stock landings and discards by year, area and country are made easily available so that: a) countries can evaluate the importance of their foreign landings relative to stock landings without having to go through the all the Assessment Woking Groups (AWG) tables, and b) data submitters can evaluate the importance of their data limited stock (DLS) strata relative to the stock they are providing data for. WGCATCH notes that for many of the AWG these data are on InterCatch so it should be easy to access through simple web services.	SC-RDB and ICES Data Centre
The stock relation currently used in the Regional Database (RDB) is not up to date, which is misleading and causes errors when using it, e.g. the stock names do not follow the present naming convention in ICES and some stocks are missing e.g. her.27.28. WGCATCH recommends that the automatically generated stock fields in the commercial landing statistics (CL) and commercial sample (CS) to be removed from extractions of data until the issue is resolved.	SC-RDB and ICES Data Centre
WGCATCH recommends that ICES maintain an updated stock relation (species (scientific name), area, time and stock) in the vocabulary. This relation is essential to linking work to the AWG's, developing stock overviews based on data in the Regional Database (RDB) and will be crucial to estimation, when the new Regional Database and Estimation System (RDBES) is fully operational.	SC-RDB and ICES Data Centre
WGCATCH recommends that ICES creates a couple of standardized and documented formats for extraction of data from the Regional Database (RDB) to be used by all groups (EGs, RCGs), both for detailed and aggregated data as specified in the RDB data policy. This will ensure that tools developed in one group can be re-used by other groups.	SC-RDB and ICES Data Centre.

Recommendation	Adressed to
WGCATCH will propose two formats for extraction of data, detailed and aggregated, based on intersessional work in 2019. WGCATCH will consult the relevant RCG subgroups to define the appropriate format.	
WGCATCH recommends that ICES maintain a relation between national fleets (e.g. métier (level 6)) and InterCatch fleets in the vocabulary. This relation is essential to linking RDB work to the AWG's and will be crucial to estimation, when the new Regional Database and Estimation System (RDBES) is fully operational. WGCATCH will propose a format for such a table, based on intersessional work 2019. WGCATCH will ask members to populate the suggested format in 2019.	SC-RDB and ICES Data Centre.
WGCATCH recommends that the group developing the new Regional Database and Estimation System (RDBES) also focus on reviewing the formats for commercial landings statistics (CL) and effort statistics (CE), since there are issues with the present RDB format relating to e.g. effort, small-scale fisheries and inclusion of information relevant to estimation (FishPi2, WKTRANSVERSAL 2)	SC-RDB and ICES Data Centre

Annex 3: ToRs for 2019 WGCATCH meeting

a) Review current and emerging statistical and technical developments in sampling design, estimation, optimization and quality control of commercial catch data, focusing on total catches, length and age distributions and other biological parameters of ICES stocks.

i) Discuss sampling and estimation methods (including new technologies or other data sources), taking into account results from intersessional WKs and training courses.

ii) Best practice guidelines for choosing methods and variables used to expand commercial sampling data:

1) Compilation and documentation of the present methods used

2) Start to develop guidelines for estimators (algorithms, tools for analysing the appropriateness of using the specific estimator: Ratio estimators; estimation of variance (e.g. design based, bootstrap)

iii) Develop best practice and guidelines on data request and data provision for frequency distribution data (age and length).

iv) Review intersessional work done on summarizing documentation of sampling design and estimate and plan how to continue the work.

b) Review developments in sampling and estimation practices of catch, effort, length and age distributions and other biological parameters of stocks targeted by Small-Scale Fisheries (SSF).

i) Discuss and review the main outputs from research projects focusing on SSF sampling and estimation (e.g. FishPi2 and STEAM).

ii) Continue to develop best practice guidelines on SSF data collection, standardize reporting and define quality indicators for sampling and census.

iii) Analyse different options to monitor SSF with new technologies based on end-users needs.

iv) Review the Regional Database and Estimation System (RDBES) core group's suggestion for storing of and estimation with SSF data in the RDBES.

v) Review the new EU-MAP tables and variables in light of the SSF (if available).

vi) Review the progress of the scientific paper.

vii)Review and document sampling effort of biological data on SSF.

c) Review developments in sampling and estimation of incidental bycatch, including Protected, Endangered and Threatened Species (PETS) and rare fish species.

d) Review and suggest developments of the Regional Database (RDB) from a design-based sampling and estimation perspective.

e) Liaise with other ICES groups (e.g. WGBIOP, WGRFS, PGDATA and EOSG), RCGs, Liaison Meetings and research projects that deal with commercial catch data.

f) Collaborate in the advisory process, liaising with stock assessment working groups and benchmarks on commercial catch issues.

g) Identify research needs, amend work-plan and propose new workshops and training courses, reviewing their outcomes.

h) Respond to recommendations to WGCATCH from ICES expert groups, RCGs, Liaison Meetings and other end-users of commercial catch data.

i) Ensure, where appropriate, that systems are in place to quality assure the products of WGCATCH.

Annex 4: WGCATCH proposals for intersessional workshops in 2019

The third Workshop on Optimization of Biological Sampling (WKBIOPTIM 3) chaired by Ana Cláudia Fernandes (Portugal) and Eirini Mantzouni (Greece) will meet in Lysekil, Sweden, 27–31 May 2019 to:

ToR a) R-Toolbox: Finalizing and integrating the different developed scripts, including documentation;

ToR b) Quality Indicators: Discuss and conclude on a combination of indicators to evaluate the quality of data estimated from different sample sizes, according to end-users' needs;

ToR c) Produce guidelines for sampling optimization procedures at national level, taking into account the results obtained in the analysis of previous case studies (WKBIOPTIM and WKBIOPTIM 2) and on the ongoing national experiences.

WKBIOPTIM 3 will report by September to the attention of the EOSG Committee.

Supporting Information

Priority	This workshop is considered to have a high priority for already established and new commercial fishery and survey sampling programmes developed under the EU-MAP. The expectation is that sampling resources (in terms of time and costs) will be saved by the development and implementation of the R-toolbox. The toolbox will be fundamental to increase data provision on data-limited stocks and environmental variables. The basic toolbox was developed by WKBIOPTIM and further improved in WKBIOPTIM 2 by including different biological parameters and sampling procedures in scripts and testing them in a wide range of different scenarios. There is now the need to compile and document all the work developed to make it available in a more accessible format to the national institutes and end-users. WKBIOPTIM 3 proposes to fulfil this goal.

Scientific justification	Statistical sound sampling is a requirement of the new EU-MAUP that now specifies that "where data are to be collected by sampling, Member States shall use statistically sound designs" (COM IMPL DEC 2016/1701). One important component of a "statistically sound design" is that sampling effort is optimized and fit for purpose, i.e. that time and costs spent in sampling can be effectively justified in terms of quality of the information finally provided to end-users. There is an increasing demand to determine MSY reference points for an increasing number of stocks, including many data-limited stocks, and, at the same time, to collect additional environmental and biological information. This makes optimisation of the number of length measurements, age and maturity estimation a priority since these tasks involve costs and time that could alternatively be spent in data collection of other stocks and/or variables. It is important that the national laboratories of MS have common tools to quantify the effects, advantages and disadvantages of different sampling intensities and sampling designs so they can optimise sampling in terms of time and costs savings. Several ICES EG's, including e.g. WKPRECISE 2009, PGCCDBS 2012, PGDATA 2015 and WKCOSTBEN 2016 have pointed out that clustering effects in multistage catch sampling programmes may lead to effective sample sizes much lower than the number of units sampled, e.g. fish caught during one trip or haul often have more similar characteristics then the general population of fish they came from. This effect highlights the likely existence of oversampling in the lower stages of many national catch sampling programmes (e.g. trips, hauls within trips, samples within hauls), where an excessive number of individuals may be being sampled and not accruing significant additional information to estimates provided to end-users. Previous Workshops on Optimization of Biological Sampling (WKBIOPTIM 1 and 2) developed, improved and tested a set of R-scripts (based on the RBD exchange format) producing a range of statistical and graphical outputs to be used for discussion of appropriate levels of biological sampling of different stocks. Data quality indicators of the biological variables under the optimization procedures carried out at the workshops were discussed and a roadmap for future discussions with end-users outlined. Given the positive feedback both from national institutes, RCG's and other WGs it is recommended that a third workshop takes place to produce an R-Package including its documentation and a guide for adequate use of sampling optimization procedures. WKBIOPTIM 1, 2 and 3 are a joint workshops bringing together experts from WGCATCH and WGBIOP and the main results have been brought to further discussion by these two groups.
Resource requirements	The data collection programmes which provide the main input to this group are already underway, and resources are already committed. All EU countries already have the datasets required for analysis available in the RDB format and in the case of using survey data, a function was developed to incorporate information on length stratification for CA table during WKBIOPTIM 2. It is envisioned the inclusion of the input from stock assessors concerning the data from surveys used in stock assessment. Methodologies developed during the WKBIOPTIM series of workshops can be applied to the surveys sampling design. Preparation work on the development and documentation of the R-package will be required prior to the meeting and it is expected that people involved can give the input from case studies presented during previous workshops, or produced afterwards, for the compilation of guidelines with a set of rules for an adequate use of these optimization tools by national institutes. It is expected that work proposed will only be finalised after the workshop physical meeting and more time will be needed before reporting.

Participants	The Workshop is expected to attract wide interest from those involved in WGCATCH and WGBIOP and should include a subset of participants familiar with R-code to the level of "loop coding" and "function building" and a subset of participants experienced in age and reproduction analysis. In view of its relevance to data collection within ICES, the EU-MAP and regional sampling designs, it should include those involved in the annual planning of sampling and laboratory analysis, including the planning of e.g. number of trips to be sampled and number of fish to be measured and aged/sexed. Members of survey groups located under EOSG should also be among the participants.
Secretariat facilities	Some secretarial support will be needed. The WK should take place in 2019. Therefore it will need to be approved by ACOM and SCICOM in early 2019.
Financial	Member States may fund this through their EMFF programme
Linkages to advisory committees	ACOM and SCICOM
Linkages to other committees or groups	WGRFS, WGBIOP, PGDATA, EOSG, Survey WGs (IBTS, IBAS, etc.)
Linkages to other organizations	RCGs

Annex 5: Generic ToR of WKSDECC series

Workshop on Sampling Design and Estimation of Commercial Catches: Stock(s) (WKSDECC No) chaired by Name (Country) and Name (Country), will meet in PLACE, CITY (COUNTRY), from DATE to DATE YEAR, to:

a) Document national sampling designs of commercial catches of **Stock(s)** back to YEAR, commenting on their statistical soundness and the quality of data they can deliver.

b) Document national estimation methods of commercial catches of **Stock(s)** back to YEAR, commenting on their statistical soundness and the quality of estimates they deliver.

c) Produce a WD summarizing the findings, research needs and a roadmap for commonly agreed improvements in sampling and estimation that consider future needs of assessment of this stock.

d) Present outcomes at the next WGCATCH meeting.

WKSDECC No will report by DATE to the attention of ACOM and SCICOM.

Supporting Information

Priority	This workshop is considered to have a high priority for documenting and evaluating the quality of past and current commercial data collection and estimates used by ICES stock assessments.
Scientific justification	The need to documentat of current and historical national sampling designs has been pointed out and promoted by several ICES EGs (e.g. WGCATCH, PGCCDBS, WKPICS, SGPIDS) as a fundamental aspect of the transparency and quality of sampling and estimation of commercial catches routinely carried out by ICES Member Countries and delivered to ICES Assessment Groups. Furthermore it is an important first step for the regional coordination of sampling programmes and discussions on the improvement of the startistical soundness of the sampling programmes that will also ensure that, in future, it will be possible to re-estimate historical data when new methods are developed and/or new end-users needs appear. Similar documentation of current and historical estimation practices is also fundamental for transparency and data quality but has received less attention, with many ICES stocks having estimation practices at present undocumented. This workshop will use STOCK NAME as a case-study for testing the historical documentation of national sampling designs and estimation methods on the stock back to YEAR (ToR xx), and discuss the quality of past data and a road-map for future improvements (ToR c-d). The stock was selected as a case-study because INDICATE MOTIVE.

Resource requirements	Participants are requested to document sampling designs and estimation methods ahead of the meeting according to a supplied format; and to bring to meeting a) historical commercial data on the stock (from Year XX onwards) stored in the latest RDB/RDBES exchange format, b) historical intercatch estimates from that stock (from Year XX onwards). Member countries not participating in the meeting but with a significant share in the fishery will also be requested to provide similar data in similar formats. The relevant Assessment Group will be consulted to identify their future needs of commercial data for assessment purposes.
Participants	The target attendance are participants from member countries involved in the fishery. 8–10 participants are expected to attend. Participants should have prior experience in statistically sound sampling and/or estimation and/or R-scripting.
Secretariat facilities	Some secretarial support will be needed.
Financial	Member States may fund this through their EMFF programme.
Linkages to advisory committees	ACOM and SCICOM
Linkages to other committees or groups	WGCATCH, WGBIOP, PGDATA, Assessment Groups, SC-RDBES
Linkages to other organizations	RCGs

Annex 6: ToR a.1) Abstracts from WGCATCH-related workshops carried out during 2018

Workshop on Optimization of Biological Sampling at Sample Level (WKBIOPTIM), chaired by Ana Cláudia Fernandes, Portugal, and Julie Coad Davies, Denmark, in the IPMA headquarters (Lisbon, Portugal), between 20 and 22 June 2017.

The Workshop on Optimization of Biological Sampling (WKBIOPTIM 2), chaired by Ana Cláudia Fernandes (Portugal) and Maria Teresa Facchini (Italy) was held in Nantes, France, 29–31 May 2018. Fourteen participants from eight countries within the ICES and Mediterranean communities were represented.

This second workshop continued to focus on the practical aspects of optimization of sampling and on the development and improvement of the R-scripts presented in WKBIOPTIM 1. With regards to the sample level analyses, the scripts were reorganized and extended to multiple biological parameters (e.g. age, sex, maturity), for the multi-level analysis, the work was extended to integrate space, time, gear and species in the scenarios and analyses in the context of a concurrent sampling framework. In addition, for this workshop, two other sets of R-scripts were presented and made available for participants to use and test in their own case studies: one related to simulating for ages (number of otoliths selected by length class, with different sampling stratification options: sex, period (month, quarter,..), port, métier at sample level optimization and the other related to developments and updates of the Sampling Design Tool developed in MARE/2014/19 Med & BS project (Deliverable 2.5) (SD Tool v.2) for the multi-level sampling. Concerning the data format, the exchange format of the Regional Database (RDB format) continued to be used as the input data but the intention is to have also the possibility of using e.g. the DATRAS format when using survey data in these analyses. In this workshop, a function to convert that data in the RDB CA table format was prepared and made available for participants to test.

In this workshop, the improvements on the scripts and analyses developed last year were presented, tested and discussed. Participants brought their own case studies along with other suggestions to improve the optimization of sampling, and were separated into two subgroups to work and test the sample level and the multilevel procedures. Work developed in this area of improving the biological sampling at national level both for commercial and survey sampling was also presented and discussed during the workshop. Some code adaptations and work on case studies were only finalised after the workshop.

WKBIOPTIM 2 agreed that the compilation of the scripts and procedures being developed, improved and tested during these workshops should be compiled and documented in a Toolbox (e.g. R-Package) so national institutes can analyse their own data and improve their resources allocation and/or distribution. The group thinks that the main part of the procedures has already been tested in several case studies and it can be adapted from now on to include more suggested improvements. Along with this, a guide for adequate use of sampling optimization procedures should also be prepared since there are some important rules to take into account.

WGCATCH acknowledges the work done by WKBIOPTIM 1 and 2 and the importance on developing R-functions and a Toolbox to be shared and publicised through the appropriate channels (e.g. WGCATCH repository). WGCATCH supports the realisation of the third workshop to fulfil these objectives. It was noted that there is still a need to develop quality indicators for evaluation at the different stages of the sampling process. Future workshops should be developed *to include sensitive analysis to evaluate the impact on the assessment models, simulations for redistribution of sampling effort and cost–benefit analysis.*

Joint WGBYC/WGCATCH Workshop on the Sampling of Protected species (WKPETSAMP) 24–26 April 2018, in Lysekil Sweden, chaired by Bram Couperus (The Netherlands) and Katja Ringdahl (Sweden).

This WK was initiated by the two groups, after the implementation of monitoring protected species in the new DCF. An inventory of existing sampling programmes that currently provide data on PETS bycatch at national level, including both DCF at-sea catch sampling programmes and studies that target primarily PET bycatch has been developed. Target population, the sampling units, sampling frames, stratification schemes and sample selection methods for the different levels of the sampling hierarchy was identified.

It was found that an advantage of directed/dedicated studies was that these are targeted towards fisheries and areas relevant to bycatches of birds and mammals.

A limitation was that in most countries directed studies are limited in time and space. Within Europe, the UK is the exception in running a long-term programme targeted towards the monitoring of protected species bycatch.

Advantages of at-sea catch sampling programmes under the DCF are that they are already running and have a large coverage in time and space and are financed through the European Maritime and Fisheries Fund (EMFF) in EU countries. DCF sampling is mainly aimed at fisheries with large volumes of catch and/or fisheries where discards are of relative importance. This often coincides with fisheries of relevance for bycatches of protected fish species and elasmobranchs.

However, a limitation of DCF at sea sampling programmes is that in most countries, these are not targeted towards small-scale fisheries or fisheries with passive gears, which are known to be of importance for bycatches of birds and mammals. Observers might not be trained adequately for bycatch monitoring (e.g. they might not check for dropouts and have difficulties with species identification). An additional limitation is that observers have to carry out multiple tasks on board and may not always be able to fully observe incidental bycatch, because they are not in the right position at the right time, and may not take account of to what extent the haul was adequately sampled with respect to protected species bycatch.

A limitation of both, directed/dedicated studies and fisheries catch sampling at-sea sampling programmes, was that both struggle to implement true random sampling that is considered optimal for thorough analyses because not all fishermen are cooperating or vessels are too small to take observers on board.

WKPETSAMP was also asked to attempt to identify the precision and accuracy needed by end-users. It appeared that WP3 from the FishPi project [http://www.masts.ac.uk/research/fishpi-project/] set up an overview of these. The group reviewed this work and concluded that the needs are not clearly defined by the end-users. Nevertheless, it was found that there is an overall need among end-users to access the level of bycatch mortality for protected species with a reasonable associated precision level.

Another part of WKPETSAMP's task was to develop criteria to evaluate if at-sea sampling programmes meet end-user needs. For this, it was proposed to carry out risk assessments following the method of WKBYC (ICES, 2013) which was further developed in the fishPi project. These risk assessments were carried out within the fishPi project for most areas in the NE Atlantic, but not for the Baltic, the Mediterranean and the Black Sea. WKPETSAMP has recommended that WGBYC fill this gap. WGBYC has carried out the risk assessment for the Baltic at its last meeting.

ToR C of WKPETSAMP was to define proper mechanism(s) for storage, maintenance and dissemination of monitoring data. The outcome can be summarized as follows: (1) build routine in sampling (parts of) the entire haul and treat any rare item in the catch as an incidental bycatch, (2) proper instructions, training, including protocols for identification of rare catch items, (3) clear indication of species selection in order to be able to distinct real zero's from not having been sampled, (4) adequate design of the database(s) where the information is stored (see Section on the RDBES development).

The last task was to provide evidence of the preparation of guidelines for at-sea sampling programmes, listing best practices and relevant parameters for PETS sampling for specific fisheries. It appeared that, due to time constraints, this ToR has only been addressed briefly. However best practice for at-sea sampling schemes were discussed and that these should encompass survey design, documentation of objectives, design and sampling protocols, staff training, data collection and archiving, systems for monitoring sampling performance and data analysis. The different steps identified by ICES, WKPICS2 (2012) that need to be included when designing and implementing a regional data collection scheme to meet end-user needs were suggested to be relevant to any kind of catch or bycatch sampling programme.

The report of WKPETSAMP was not yet ready due to uncertainty about the place where the inventory of monitoring surveys should be made available: as an annex of the WKPETSAMP report, at the Data Quality Assurance Repository (DQAR) under maintenance of WGBIOP or in the WGHIST database. Currently the ICES DataCentre explores the possibility of a web accessible database.

WGCATCH 2018 acknowledges and supports the work carried out at WKPETSAMP. It was discussed what would be the best route to fulfil ToR D of the workshop to providing guidelines for at-sea sampling programmes, listing best practices and relevant parameters for PETS sampling for specific fisheries. It was also discussed that the proposed fields on sampling of protected species for the RDBES (Section on ToR e)) require the preparation of definitions. It was decided that both tasks could be addressed with an intersessional meeting or at WGBYC meeting with participation of WGCATCH members.

Training course: Statistically sound inference for commercial catch sampling (TCCATCH), instructed by Mary C. Christman (USA) and Jon Helge Vølstad (Norway), in ICES headquarters (Copenhagen), between 18 and 22 June 2018.

This training course was an applied statistical methods course, concerned almost exclusively with the estimation of commercial fishery data used in ICES assessments but is also relevant to member states needs for data reporting. A total of 21 participants from 13 nations completed the course.

The course aimed to provide national staff with the level of expertise required to improve data collection and provision at national and international levels in a way that meets ICES demands for both quantity and quality of catch information, while exponentiating progress towards statistically sound sampling of ICES stocks.
The course examined common problems experienced by national scientists when designing and estimating commercial catch data for assessment. After a brief review of common sampling strategies and estimators used to characterize commercial catches,

the course focused extensively on more complex sampling designs (e.g. stratified multistage cluster designs with equal and unequal probability) and methods for comparing those designs in order to optimize the sampling effort.

Methodologies used to correctly calculate inclusion probabilities, handle missing observations (missingness), for post sampling data usages (e.g. domain estimation), for extracting information from older datasets that have been collected in a statistically rigorous manner or for data-limited stocks, and non-parametric methods for obtaining confidence intervals for estimators were covered. The latter includes modern approaches such as bootstrapping or Monte Carlo simulation and can also be used to assess bias in the estimators such as that due to incorrect specification of inclusion probabilities or for the older datasets obtained without probabilistic sampling. Alternative estimation approaches, such as model-assisted and model-based inference, were reviewed and compared.

WGCATCH acknowledges the importance to carry out courses with the objective to build expertise and capabilities to national laboratories staff. Skills required to improve data collection and estimation procedures, and ultimately meet the ICES demands for quantity and quality data for assessment. Furthermore, WGCATCH endorses the need to develop recurrent training courses on Design and analysis of Statistically Sound Catch Sampling Programmes to offer an opportunity to scientists and national staff to improve their expertise.

RCG Transnational Workshop on the North Sea Sole data compilation (WKTRANSDATA), 19–23 February 2018 in Nantes France, chaired by Laurent Dubroca (Ifremer, France) and Ana Ribeiro Santos (Cefas, UK)**.**

The transnational workshop on the North Sea sole data compilation (WKTRANSDATA) was held in February 2018. This working group was built up under the RCG North Sea authority and was attended by six countries data provider representatives, the North Sea Sole stock assessor and an external statistician. The national procedures to provide InterCatch data were documented and pitfalls highlighted. The main results were (1) the establishment of a common métier list because aggregation done during domain estimation were not homogeneous across countries, and (2) the fact that ratio estimator is the estimation method used by all the countries providing data to this stock (in accordance with their sampling plan, and consequently in accordance with the statistical sound sampling scheme framework), with some slight differences in raising procedures.

WGCATCH 2018 acknowledges and supports the work carried out at WKTRANSDATA. This workshop was the first effort to have national data submitters for a specific stock to document, evaluate the current estimation procedures and agree on standardizations for data compilation at national level, in order to achieve more consistency to the data provided at stock level. This WK links with the WKSDECC series, which WGCATCH developed and supports.

Annex 7: ToR a.2) Work plan for intersessional work on national vessels landings in foreign landings

A work plan was developed early 2018 to carry out intersessional work and prepare working documents to be analysed and summarised during the 2018 meeting. The subgroups were formed by at least one participant from the flag country and one participant from the landing country involved in each case study with the following ToRs:

A short summary of the analyses done by each member country can be found in WGCATCH report (2017) Annex 10, alongside a set of analyses at stock level that was run on 2016 Commercial Landings data (CL) of the RDB. An array of case studies was selected for further analysis during 2017–2018 (Table 1). These case studies are not exhaustive (as data were not available from all countries) and balance the need to characterize the sampling and estimation of landings of national vessel abroad in some major stocks at Marine Region level with national/participant interests as identified in Annex 10.

The aim for this intersessional work is to document the current sampling and estimations procedures for the species/stocks identified and identify possible improvements for the sampling and estimations procedures.

Table 1. Case studies selected for further analysis of the sampling and estimation of landings of national vessels in foreign ports.

Geographical Area	Species (Stock)	Flag Country	Landing Country	Contact person for flag country	Contact person for landing country
Baltic	Cod 24–32	DNK	POL	Kirsten Birch Håkansson	Maciej Adamowicz
	Herring (3a, 22-24, 25–29+32, 30–31)	SWE	DNK	Nuno Prista	Kirsten Birch Håkansson
	Herring (25–29+32, 30–31)	FIN	SWE	Perttu Rantanen	Nuno Prista
	Herring (3a, 22–24)	NOR	DNK	Jon Helge Vølstad	Kirsten Birch Håkansson
	Sprat 22–32	SWE	DNK	Nuno Prista	Kirsten Birch Håkansson
	Sprat 22–32	FIN	SWE	Perttu Rantanen	Nuno Prista
	Sprat 22–32	POL	DNK	Maciej Adamowicz	Kirsten Birch Håkansson
North Sea	Atlantic mackerel (NWAM)	SCT*	NOR	Liz Clarke	Jon Helge Vølstad
	Herring (4a, 3a and 7d)	DEU	NLD	Julia Wischnewski	Ruben Verkempynck
	Herring (4a, 3a and 7d)	DNK	DEU	Kirsten Birch Håkansson	Julia
	Herring (4a, 3a and 7d)	SWE	DNK	Nuno Prista	Kirsten Birch Håkansson
	Herring (4a, 3a and 7d)	SCT*	NOR	Liz Clarke	Jon Helge Vølstad
	Herring (4a, 3a and 7d)	ENG	NLD	Ana Ribeiro Santos	Ruben Verkempynck
	Plaice (PLE 4 + Skat)	ENG	NLD	Ana Ribeiro Santos	Ruben Verkempynck
	Northern shrimp (*Pandalus* 4.a)	DNK	NOR	Kirsten Birch Håkansson	Jon Helge Vølstad
	Northern shrimp (*Pandalus* 4.a)	EST*	NOR	??	Jon Helge Vølstad

Geographical Area	Species (Stock)	Flag Country	Landing Country	Contact person for flag country	Contact person for landing country
	Plaice (PLE 4 + Skat)	BEL	NLD	Sofie Vandemaele	Ruben Verkempynck
	Sandeel All SAs)	SWE	DNK	Nuno Prista	Kirsten Birch Håkansson
	Sea bass (Sea bass 4b–c, 7a, 7d–h)	NLD	BEL	Ruben Verkempynck	Sofie Vandemaele
	Sea bass (Sea bass 4b–c, 7a, 7d–h)	NLD	FRA*	Ruben Verkempynck	Laurent Druboca
North Atlantic	Atlantic mackerel (NWAM)	SCT*	NOR	Liz Clarke Liz Clarke	Jon Helge Vølstad
	Atlantic mackerel (NWAM)	PRT	ESP	Ana Claudia Fernandes	José Rodriguez
	Atlantic mackerel (NWAM)	DNK	NOR	Kirsten Birch Håkansson	Jon Helge Vølstad
	Blue Whiting (WHB 1–9, 12, 14)	SCT*	DNK	Liz Clarke	Kirsten Birch Håkansson
	Blue Whiting (WHB 1–9, 12, 14)	NOR	DNK	Jon Helge Vølstad	Kirsten Birch Håkansson
	Boarfish (BOF 6–8)	DNK	IRL	Kirsten Birch Håkansson	Hans Gerritsen
	Boarfish (BOF 6–8)	ENG	NLD	Ana Ribeiro Santos	Ruben Verkempynck
	Boarfish (BOF 6–8)	IRL	FRA*	Hans Gerritsen	Laurent Dubroca
	Hake (Northern and Southern stocks)	ESP	ESP	José Rodriguez	

*** Country not represented at the meeting.**

The following tasks have to be done before WGCATCH meeting

1) Complete the templates in the landings from national and foreign landings for the stocks identified in Table 1 for the period 2014–2016.

2) Assess and evaluate the proportion of the foreign landings by national vessels, in relation to the national landings and international landings/TAC. Is it a big proportion of total landings of the stock? Is the proportion from specific domains (areas, gears etc.)? Do the landing patterns changes during the time period?

3) For the identified stock shortly describe which sources of information (logbook, sales slips, etc.) are available about foreign vessels landing into your county and national vessels landing abroad; and the completeness of these.

4) Liaison with your counterpart from the landing country (e.g. DNK to contact Poland in relation to the Baltic cod) to exchange information on the sampling for that component of the landings (Do they sample foreign vessels in their national ports? If yes, inventory of the sampling, number of samples, length and age data collected? Consider the sampling site. Sometimes landings might be in another country, but the sampling site is in the flagged country.

5) Description of sampling protocol for foreign landings, if existing. How are the data collected and then shared with the flagged country? How are foreign samples dealt with by Member States:

   5.1) Informal sharing

   5.2) Formal sharing agreements (in data calls)

   5.3) Are sharing of e.g. sales slips and logbook data a part of the sharing. If yes, which information

   5.4) Are the samples supplied by foreign MS included in the national estimation

   5.5) Uploaded / used as 'national samples' to databases, such as InterCatch or RDB

   5.6) Are samples used in stock assessments?

   5.7) Are estimates for this component derived separately from those of the fleet that lands in national ports?

6) Critical review and outline potential improvements to cover the foreign landings and the usage of the data collected for estimation procedures.

The landing country was responsible for seeking information on how those vessels are sampled. Contact the contact person in the landings country.

Annex 8: ToR a.2) Summary analyses of foreign landings from each member country

Following the work plan delineated above, WGCATCH received 13 case studies working documents, with exploratory analyses on the proportion of foreign landings by national vessels in relation to their spatial, temporal and technical (e.g. métier) distribution.

For several countries that provided an analytical overview for their landings abroad, this was the first opportunity to critically evaluate the importance of landings abroad by flag countries, and most importantly to evaluate the current sampling, data sharing and estimation procedures in place.

The following section presents the working documents produced by each member country for the case studies identified in Annex 7, Table 1. Sweden presented preliminary results on its case studies but did not provide a formal working document for this report. A more complete analysis of the Swedish case studies is currently planned for an upcoming AWG.

English foreign landings of plaice North Sea (ple.27.4), herring (her.27.3a47d) and mackerel (mac.nea)

By Ana Ribeiro Santos, Cefas, UK-England

Background

In the 2017 WGCATCH meeting, three stocks were identified as having large landings abroad, by English registered vessels. These stocks were: mackerel North Sea (mac-nsea), herring North Sea (her.27.3a47d) and plaice North Sea (ple.27.4). Intersessional work was carried out to assess and evaluate the proportion of the foreign landings by national vessels, in relation to the national landings and international landings/TAC, analyse the sampling protocol for foreign landings and how the data are used for the estimation and various data calls.

Data used

RDB data were used to analyse the landings and effort data. Since only EU countries submit data to RDB, ICES landings estimates were used for the total landings of each stock.

Landings

Overall, in 2016 landings from English flagged vessel occurred in Belgium, Denmark, France, Ireland, the Netherlands and other devolved administrations (Scotland, Northern Ireland, Guernsey, Jersey and Isle of Man. 30% of the total landings from English vessels are in the Netherlands, 9% are in other devolved administrations, 6% in Norway, 2% in Ireland and 1% in France, Spain and Germany. The vast majority of the landings in the Netherlands are from Dutch owned vessels on the UK register.

The species with highest landings abroad are mackerel (mac.27.nsea 135 171 t), herring (19 317 t) and plaice North Sea into the Netherlands. Most of the mackerel are fished in the Northern North Sea (ICES 4.a) and area 7. Herring is also mostly caught in the North Sea and 7.d and cod is mostly fished in ICES areas 1 and 2.

From the three stocks considered in this analysis, landings of her-47d3 and mac-nea by English vessels varied between 0.1% and 2.4% of the total stock landings. On the other hand, plaice North Sea landings by English fleet ranged between 13% and 18%. In the last five years, there has been a decrease on the contribution of the English vessels for this stock (Table 1, Figure 1).

Figure 1 shows that for the three stocks considered most of the English landings are abroad, specifically into the Netherlands.

When we compare the landings from RDB and total landings for each stock provided by ICES advice sheets, is shown that the annual RDB landings of her47d3 and mac-nea are considerably lower than the total landings reported by ICES (Figure 2).

Year	Stock	English vessels landings (tonnes)	ICES stock landings (tonnes)	% Eng. land
2013	her-47d3	391	498,501	0.1
2014	her-47d3	752	507,485	0.1
2015	her-47d3	3,164	481,611	0.7
2016	her-47d3	3,641	559,926	0.7
2017	her-47d3	2,492	491,693	0.5
2013	mac-nea	1,889	933,165	0.2
2014	mac-nea	2,792	1,394,456	0.2
2015	mac-nea	32,270	1,208,988	2.7
2016	mac-nea	23,414	1,094,066	2.1
2017	mac-nea	27,846	1,155,944	2.4
2013	ple-nsea	14,532	78,905	18.4
2014	ple-nsea	13,061	70,847	18.4
2015	ple-nsea	13,104	74,963	17.5
2016	ple-nsea	13,482	81,059	16.6
2017	ple-nsea	8,799	65,442	13.4

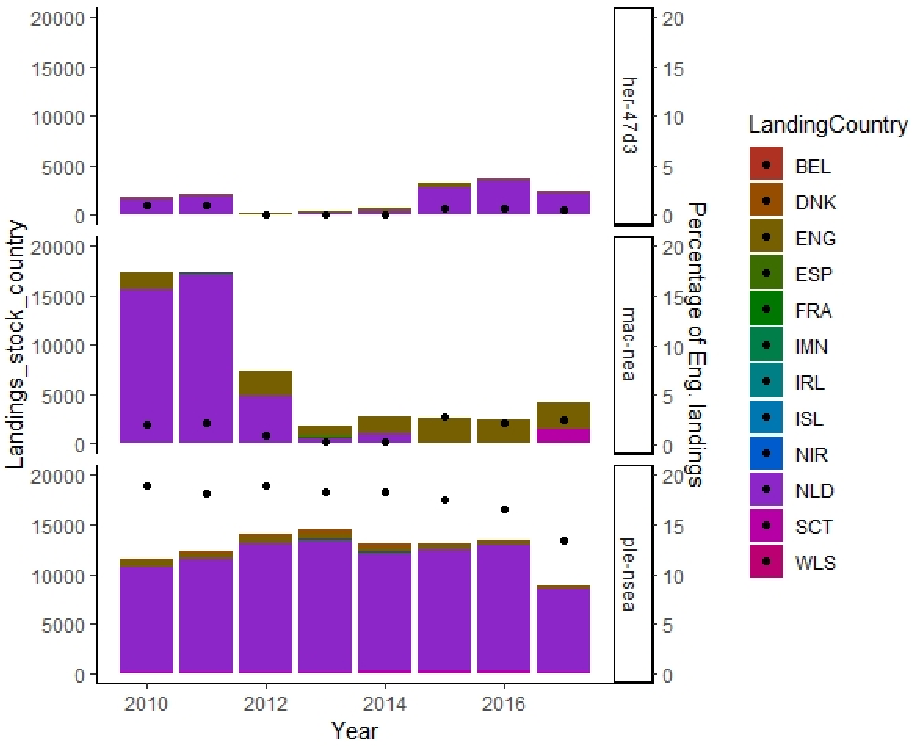


Figure 1. Annual landings of English vessels for each stock, by landing country (bars) and percentage of English landings in relation to the total landings of the stock (dots).

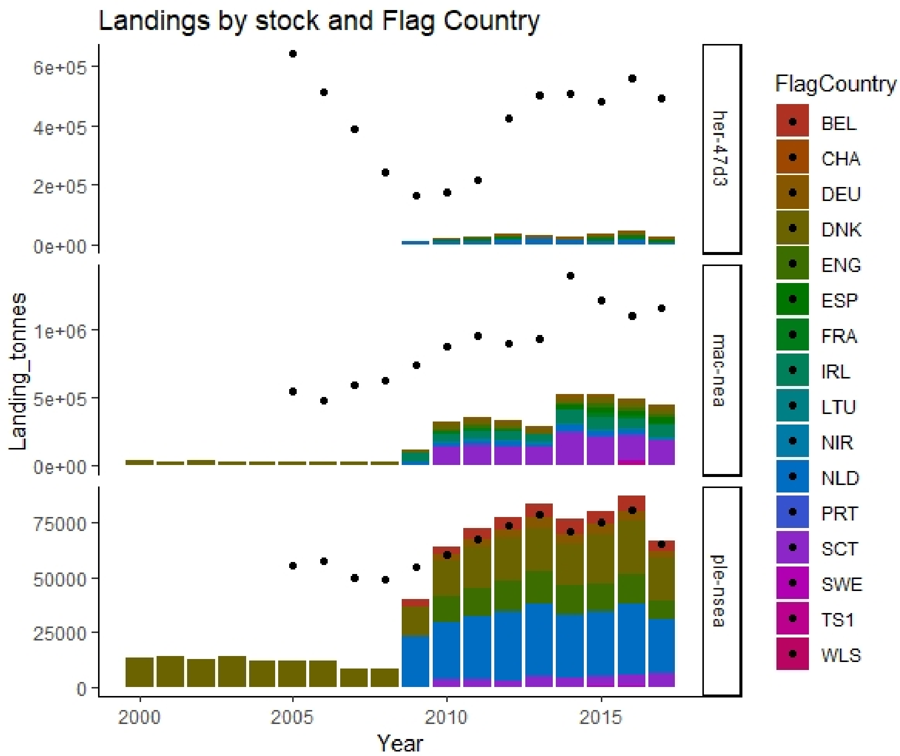


Figure 2. RDB Landings by flag country, for each stock by year (bars) and Total landings for each stock (dots), based on ICES advice sheets.

Landings by gear type

Herring and mackerel landings from English vessels are from pelagic trawls (OTM, PTM), while plaice is mainly fished by beam trawls and demersal trawls (Figure 3).

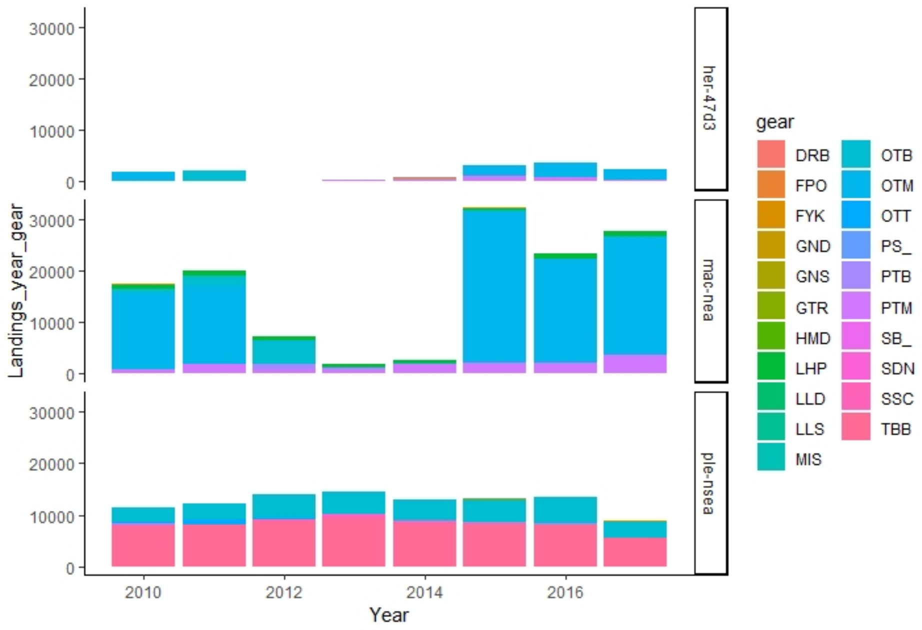


Figure 3. Annual landings by stock and gear type.

Spatial distribution of landings

According to the RDB data, English landings for herring and plaice are taken from 27.7d and 24.4.c respectively, which corresponds to the ICES areas where most the landings are from.

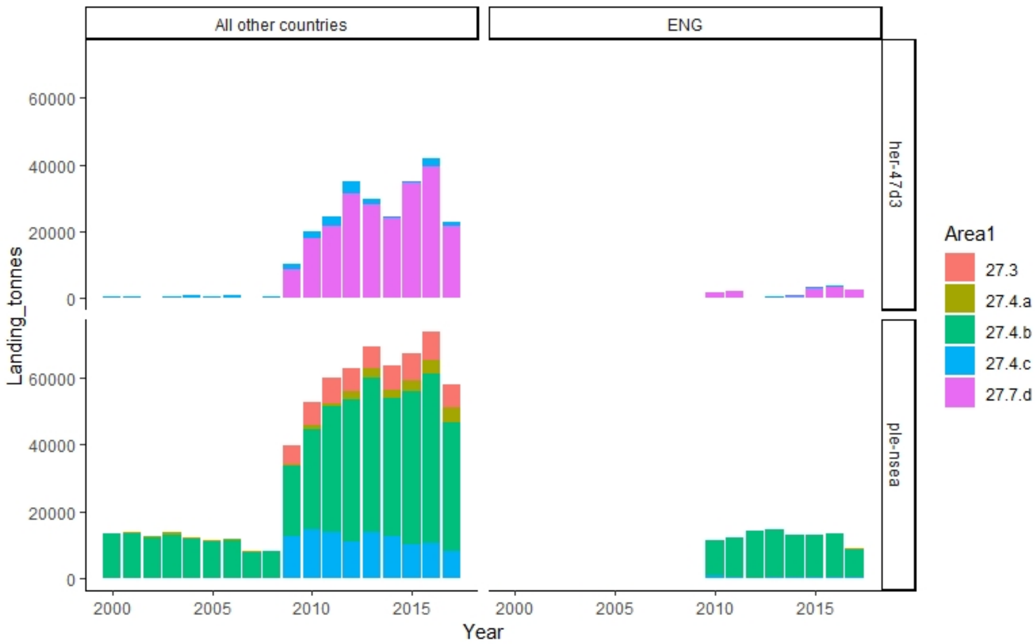


Figure 4. Landings by area by England and all other countries (source: RDB database).

Sampling

England has a bi-lateral agreement with the Netherlands, since 2000, where landings and discards by UK-NLD vessels fishing on UK register, landing for first sale in NLD, to be included within NLD National plan. Length and age of discards and landings, in accordance with NLD National plan. Levels and coverage of sampling to be as agreed at the annual RCMs NS&EA and NA. According with the agreement NLD is responsible for submitting the data to the respective end-users and to UK.

The vessels landings abroad are not sampled under the English National plan. However, according to colleagues from NLD, they do collect biological (length and age) under the NLD market landings sampling scheme for demersal species, as well as catch at sea sampling for pelagic species. For the demersal sampling programme on the market, the UK vessels followed the NLD sampling procedures in relation to the vessel selection. The markets are randomly assigned to weeks/days according to auction day, and the vessels are selected from an informal list of fishing vessels that they know are "friendly" and cooperate, but it is also an opportunistic process in the sense that it could be that they meet a new ship owner at the auction or that they encounter a ship they have never sampled before, etc. and that they decide to sample that.

The English National on and off shore sampling programmes do collect length data are collected for plaice North Sea landing into England. However, this stock is predominately sampled from netters (GNS and GTR) and demersal trawls (OTB), targeting *Nephrops* and demersal species (flatfish or gadoids).

Estimation

Currently, the English estimation procedure of biological and discards for these stocks follow the same as the other stocks, i.e. landings and effort data from all English vessels landing in the UK and elsewhere are included for the raising procedure, despite the fact we do not have any samples from the vessels landing abroad.

On the Netherlands side, the pelagic biological data collected from foreign vessels are used, by raising those samples to a dummy catch value (e.g. 100 kg), since the total landings from UK vessels targeting pelagics and landings into NLD is unknown. However, for demersal, it was not a common practice so far to raise the samples, so unfortunately it was not effectively used.

For mac-nea and her-47d3 stocks the English vessels contribute very little for the overall landings for these stocks (0.1%–2% of the total landings). On the other hand, for the North Sea plaice, English vessels contribute with around 18% of the total landings of the stock, and most of these landings are abroad (NLD). Despite being sampled by the NLD National plan, and biological being collected, these data are not currently used in the Netherlands or English estimation procedures.

Main conclusions

England has access to the information of foreign vessels landings in the UK. However, no foreign vessels are sampled under the English NP.

Despite a bilateral agreement in place between the UK-England and the Netherlands for data collection, there is no procedure for data sharing.

Although England NP includes these vessels in the sampling plans, they sit in unsampled strata. For logistical and financial reasons, the English programmes only cover vessels landing into England. As a consequence, only a small component of the English removals of plaice NS is sampled, leaving English beam trawlers and large demersal trawlers unsampled. Despite these fleets being sampled by the NLD, the data are not used in the estimation, which could be a source of bias in the estimations for this stock, as English flag vessels landings account for 20% of the stock.

Bilateral agreements can lack in detailed procedures about how the data are collected and shared with the flagged country or used by the landing country. Data sharing and estimation procedures bilateral agreements should also be specified. It is the responsibility of the countries involved to agree and develop the programme and data sharing procedures.

Under the EU new regulation, bilateral agreements will be obsolete because regional sampling plans should account for foreign. However, until the regional plans are agreed, is important to maintain the bilateral agreements and data should be sufficient representative of the landings and discards.

Portuguese foreign landings of North Atlantic mackerel (mac.27.nea)

By Ana Claudia Fernandes and Rita Vasconcelos (IPMA, Portugal)

Background

In WGCATCH 2017 (Annex 10 in the report), an array of case studies was selected for further analysis in WGCATCH 2018. In the case of Portugal, mac.27.nea was identified as one of the stocks for which foreign landings may represent an important part of the national stock.

Data used

Data used in the compilation of this document were provided by the Portuguese administration and it comprises all the landings from Portuguese vessels in all areas and countries for the 2014–2016 periods.

Landings

In summary, Portuguese vessels land in 15 countries other than Portugal (total 169 941 t in 2014–2016) representing 31% of total landings by Portuguese vessels (total 555 323 t in 2014–2016). Landings referring to area 27 (Northeast Atlantic) are landed in two countries (Spain with the highest foreign landings by Portuguese vessels in Europe, total 54 800 t in 2014–2016; and Germany, total 4534 t in 2014–2016). Concerning area 27, the most landed species abroad are mackerel *Scomber scombrus,* and horse mackerel, *Trachurus trachurus* (from 27.9.a and 27.8.c, landed in Spain), and blue shark *Prionace glauca* (from 27.10.a.2, landed in Spain). For these three, only the latter is covered by the Portuguese sampling work plan (at-sea sampling).

Mackerel landings from Portuguese vessels occur mainly in Spain (Figure 1). The fishing areas of those vessels are ICES areas 27.9.a and 27.8.c. and they account for near 90% of Portuguese landings for this species (Figure 2).

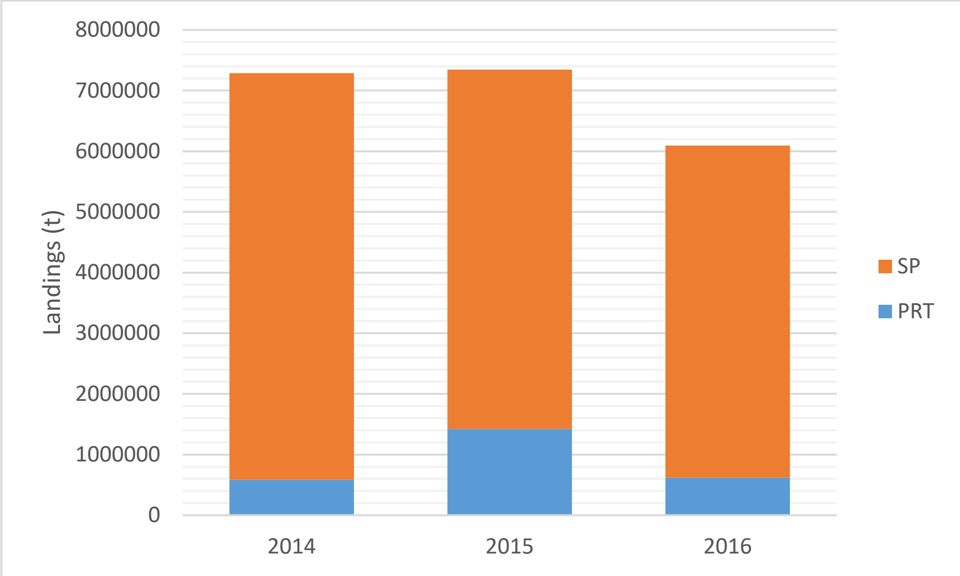


Figure 1. Landings of mackerel from Portuguese vessels in Spain and in Portugal.

In what concerns the Portuguese vessels landing in Spain, Figure 2 shows that the main area covered by these vessels for fishing mackerel is the ICES area 27.8.c.

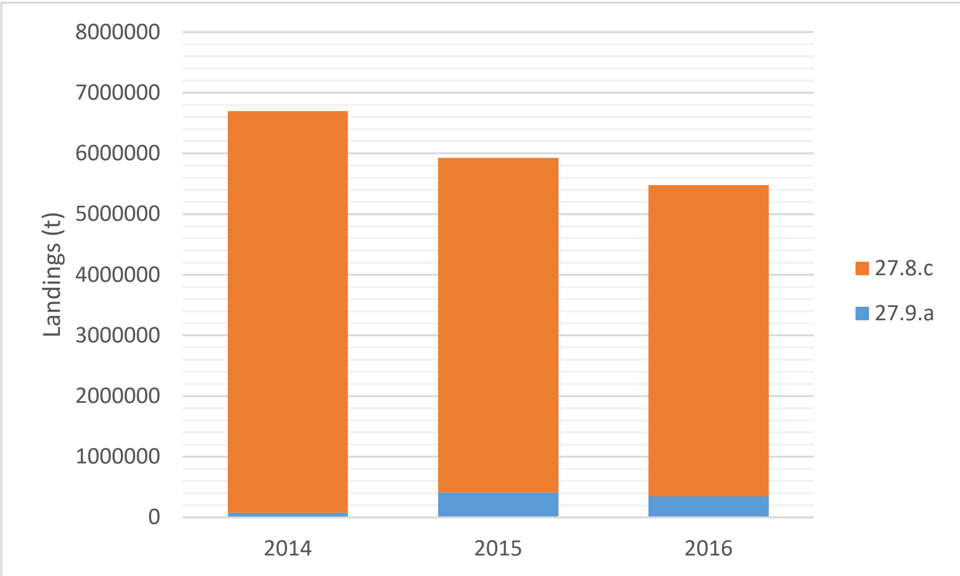


Figure 2. ICES area distribution of the foreign landings of mackerel in Spain.

Sampling

The Portuguese national program is responsible for sampling fleets landing in Portuguese ports from ICES area 27.9.a and it is performed both by at-market and at-sea sampling. The percentage of foreign landings of mackerel from 27.9.a was 11%, 22% and 36% respectively in 2014, 2015 and 2016. These percentages are the non-sampled fraction of the Portuguese fleet landings and they have not been taking into account for national assessment purposes. If vessels licenses are considered to be associated to fishing areas, one may infer that species and lengths compositions of foreign landings could be similar to national landings.

Regarding foreign landings from Portuguese vessels operating in ICES area 27.8.c, they constitute a low percentage when compared with the Spanish landings from that area. The Spanish sampling program includes the at-sea and at-market sampling in this area. Taking into account that Portuguese vessels have their fishing licenses according to the fishing area where they operate, which is the same of the Spanish vessels, again, one could infer that they both follow the same pattern in terms of species and length composition of landings. Therefore, sampling of mackerel landings from Portuguese vessels in Spain may not be necessary.

In addition, the Northeast Atlantic stock of mackerel (mac.27.nea) is exploited by Portugal and Spain in areas 27.8.c and 27.9.a, and by many other countries in other parts of area 27. The landings in areas 27.8.c and 27.9.a represent only 3% of the total landings of the stock (area 27).

The existing data can be analysed to validate if sampling of Spanish vessels is representative of landings (species composition and length) in 27.9.a/27.8.c, by investigating if both fleets carry the same métiers. One way to do that would be to compare vessel/gear characteristics and logbook spatial data for vessels and sampling data from the two countries.

It can be discussed if these analyses are relevant considering the low percentage of Iberian landings from the stock, the national priorities and the end-user needs.

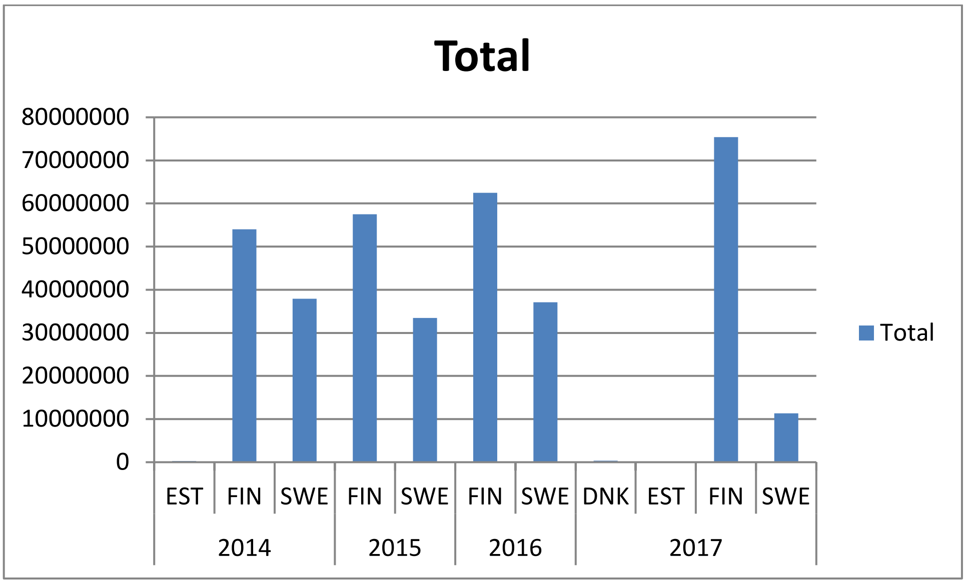
Finnish foreign landings of sprat (spr.27.22-32) and herring (her.27.3031)

By Pertu Rantanen, Finland

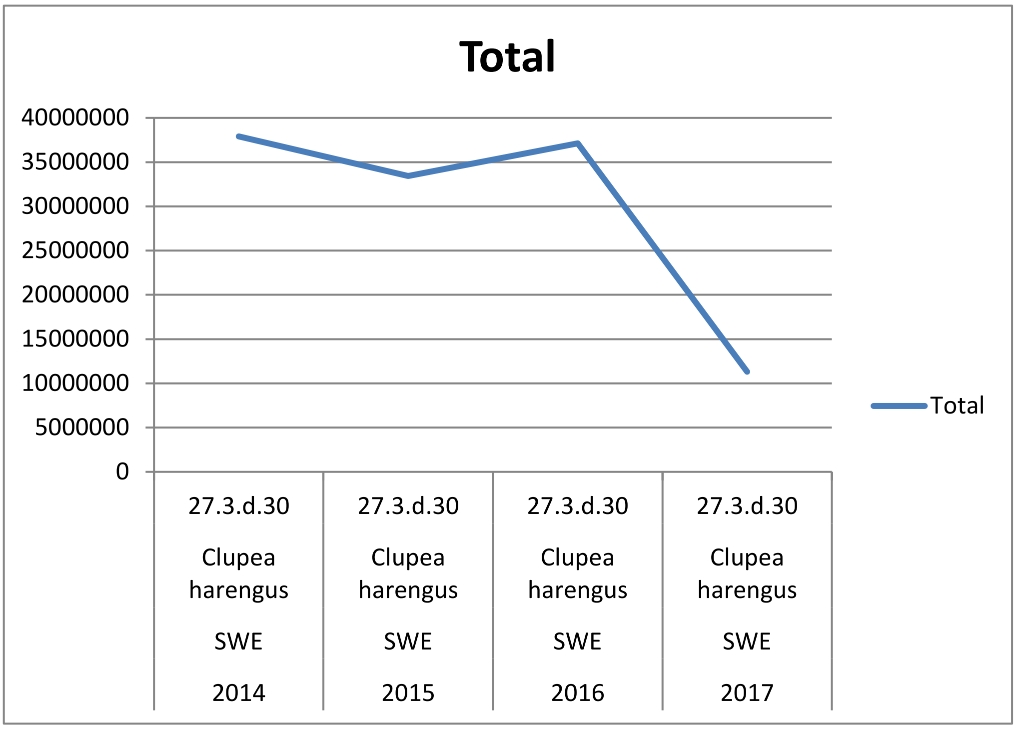
Background

Finland as a flag country is responsible for analyses of the herring ICES SD 30 stock. The proportion of herring foreign landings realised (2014–2017) by Finland in the Swedish ports have been quite stable from 2014 to 2016 (around 35 million kilos and 40% of total landings). 2017 the landings were dropped to 11 million kg, which is 12% of total herring landing fished by the Finnish fleet. A new fish fodder manufacturing plant started in Kaskinen, Finland 2017.

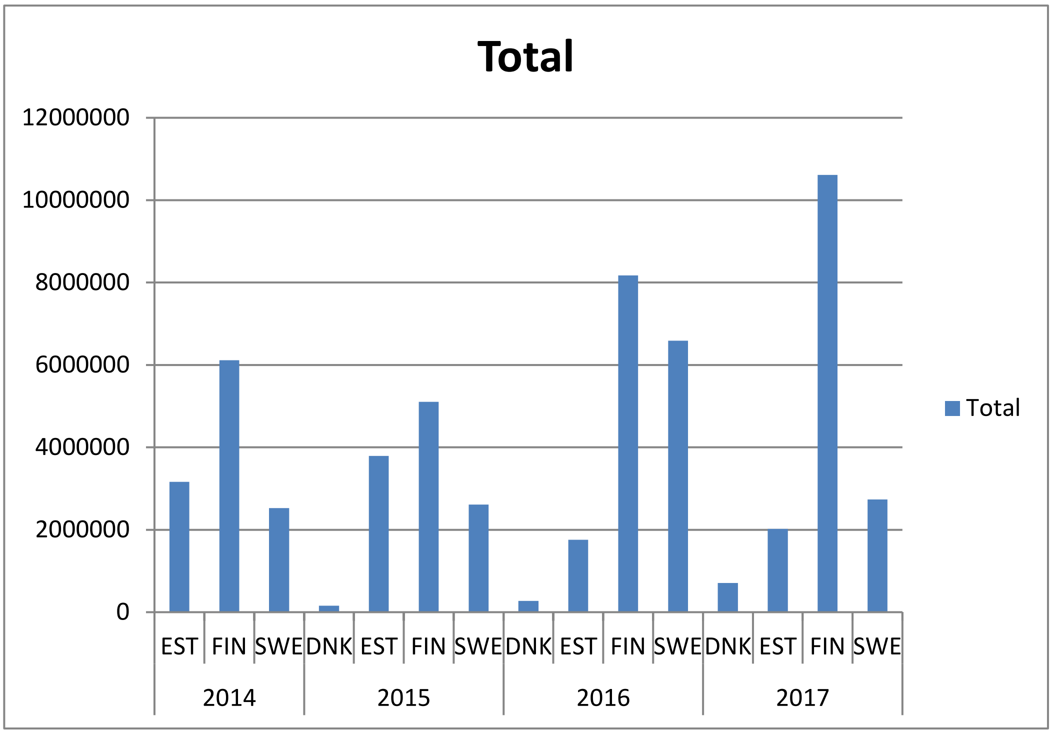
FIN Fleet Total Landings herSD30 by country:



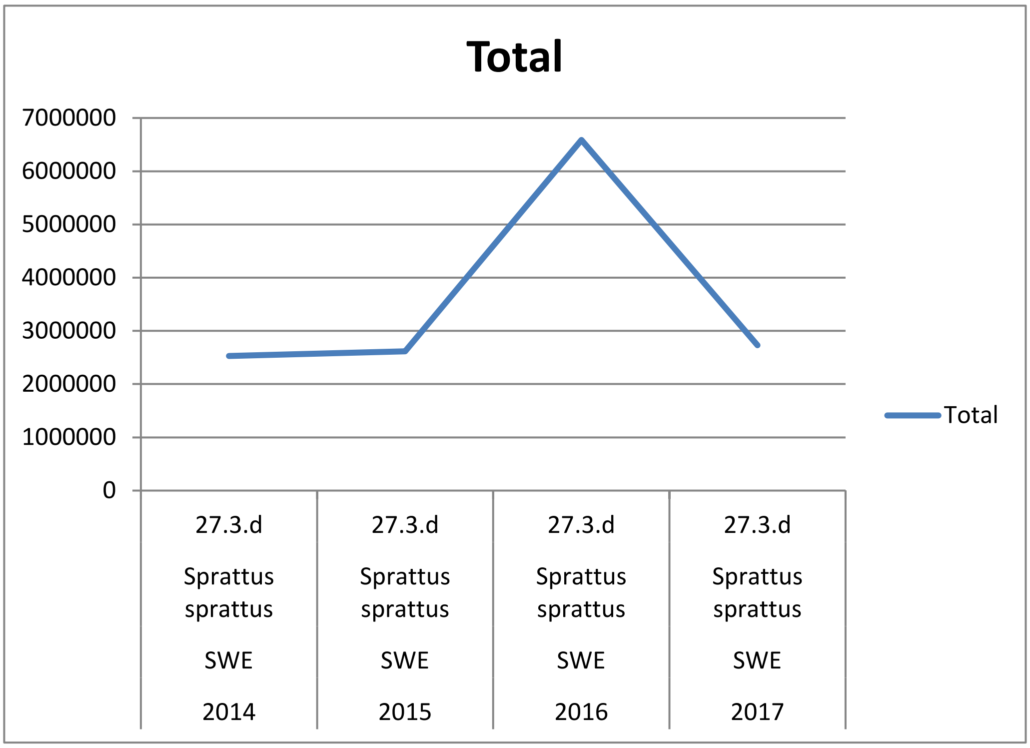
HerSD30 landings to Sweden (2014–2017) (kg)



Sprat (SD 22–32) (kg) FIN Fleet Total Landings by country:



Sprat (SD 22-32) FIN Fleet Landings to Sweden:



Task No. 3. For the identified stock shortly describe which sources of information (log-book, sales slips, etc.) are available about foreign vessels landing into your county and national vessels landing abroad, and the completeness of these.

Logbook data and sales slips are available on national vessels landing abroad.

Task No. 4. Liaison with your counterpart from the landing country (e.g. DNK to contact Poland in relation to the Baltic cod) to exchange information on the sampling for that component of the landings (Do they sample foreign vessels in their national ports? If yes, inventory of the sampling, number of samples, length and age data collected? Consider the sampling site. Sometimes landings might be in another country, but the sampling site is in the flagged country.

Finland and Sweden have bilateral agreement on sampling HerSD30 FIN foreign landings to Swedish ports (Volume and length data). SLU Aqua (SWE) is responsible to collect length samples from herring.27.3031. There is some level of detail on the number of fish and samples measured. The data are then transmitted to Finland, who is responsible for incorporating the data into the Finnish dataset and delivering the data to the relevant ICES working groups. The estimation procedures follows the Finnish procedures.

Although the bilateral agreement is outlined with some level of detail, there is a need to share the details on the sampling procedures and how those data are shared.

Polish foreign landings of sprat (spr.27.22-32)

By Maciej Adamowicz, Poland

Background

Poland as a flag country is responsible for analyses of the sprat ICES SD 22–32 stock landings in the Danish ports. The proportion of Baltic sprat foreign landings realised (2014–2016) by Poland in the Danish ports, in relation to the total sprat national landings and international landings/TAC was as follow:

Sprattus sprattus SD 22-32	Polish foreign (DNK) landings/Total sprat national landings	Polish foreign (DNK) landings/EU TAC
2014	12%	3%
2015	28%	9%
2016	18%	5%

The Polish landings of Baltic sprat in the Danish ports originated mostly from catches with pelagic trawls, used principally in the ICES SD 24, 25 and 26 and in a minor proportion in the ICES SD 27, 28 and 29. The landings pattern of sprat was nearly the same over 2014–2016.

Task No. 3. For the identified stock shortly describe which sources of information (logbook, sales slips, etc.) are available about foreign vessels landing into your county and national vessels landing abroad, and the completeness of these.

The logbooks were available for the identification of Baltic sprat landings made by both foreign vessels in the Polish ports and the Polish vessels in the Danish ports.

Sampling

The bilateral agreement between Poland and Denmark, concerning sampling of Baltic sprat landings in the Danish ports was signed on 24.06.2013. While sprat in the Baltic Sea is managed as a single stock and that the stock is well covered concerning biological samples, vessel fishing under the Polish register, which land for first sale in Denmark, will be sampled as a part of the Polish National Programme under the requirements of the DCF.

The improvements to cover the foreign landings in the national ports is limited by accessibility of prompt information about expected timing of arrival of the vessels. It is a plan in Poland to use the ongoing SMS notification system, maintained by the Polish Fisheries Monitoring Center (under the Ministry of Marine Economy and Inland Navigation). This plan is based on the rule, that every fishing vessel, if intend to land fish in the Polish ports, must to inform the above-mentioned institution via SMS.

Dutch foreign landings of sea bass

By Ruben Verkempynck

Data used

Logbook data from NL fishing vessels are available in the national database (Visstat); five years of data (2013 to 2017) were extracted from this database holding all the logbooks of vessels operating under NL flags. Only trips where equal to and more than 1 kg of sea bass were caught are in this dataset.

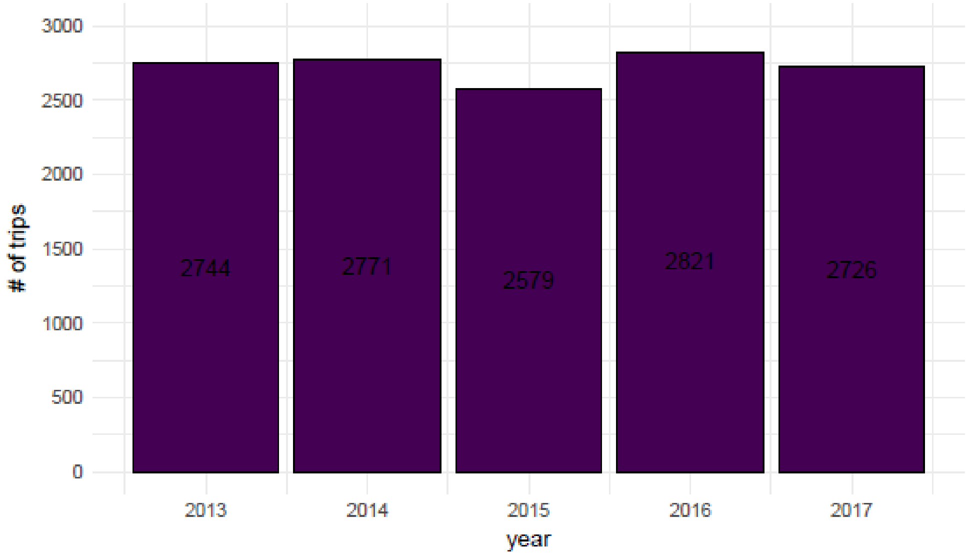
Each line in the dataset is a record in the logbook, reporting sea bass catches per 24 hours at sea.

Landings

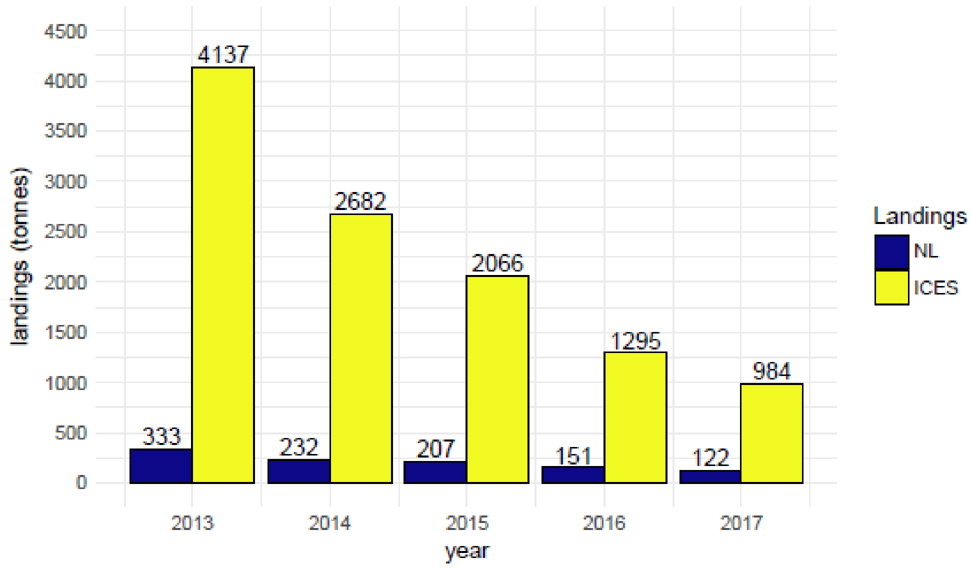
Over the period 2013 to 2017, 13 641 trips caught sea bass, on average 2728.2 trips per year.

NL caught between 333 178 and 122 298 kg of sea bass. These catches almost halved over the time period in the dataset. National and international landings for this stock have gone down in recent years due to management measures.

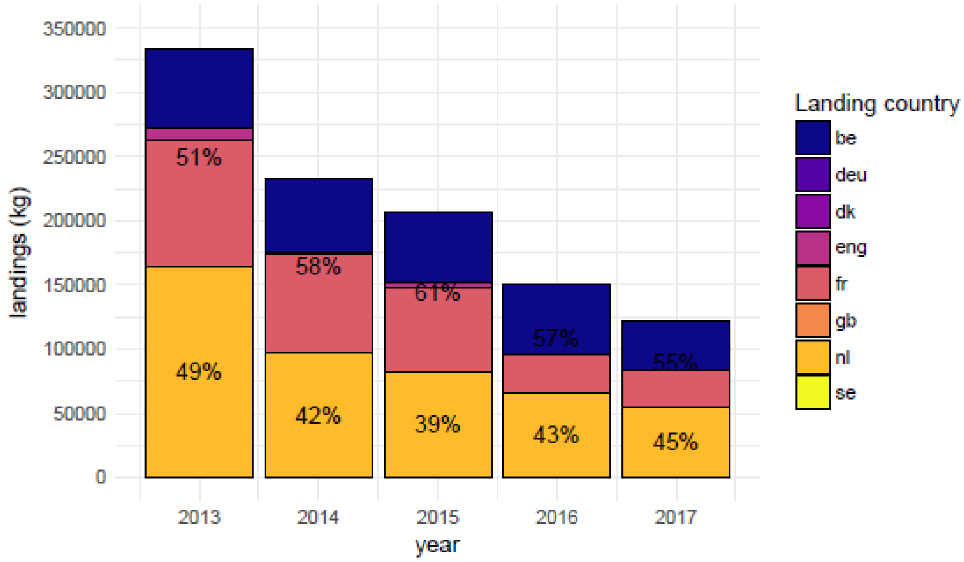
The proportion of NL landings in relation to the national landings has remained stable (around 10.16%).



Number of trips per year of NL fishing vessels catching seabass

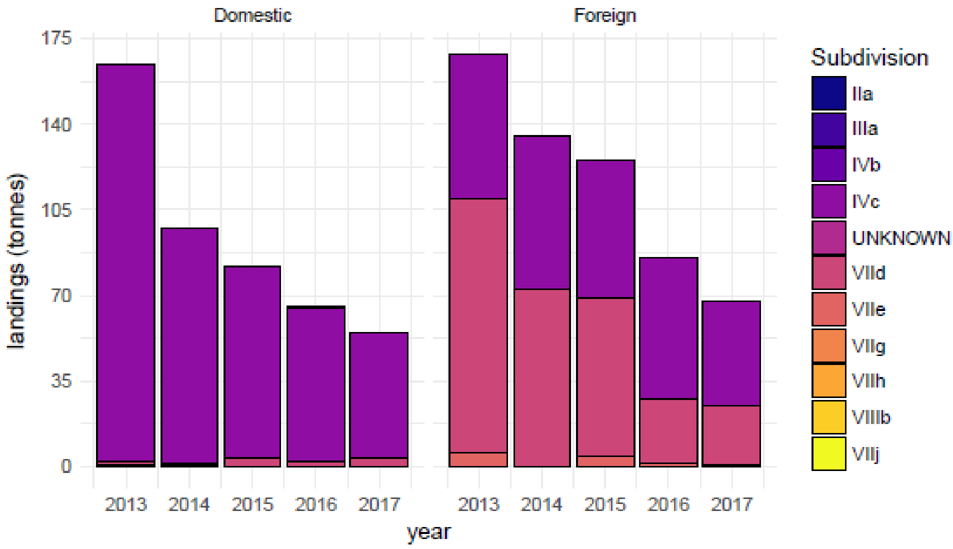


Landings reported to ICES and NL commercial landings per year



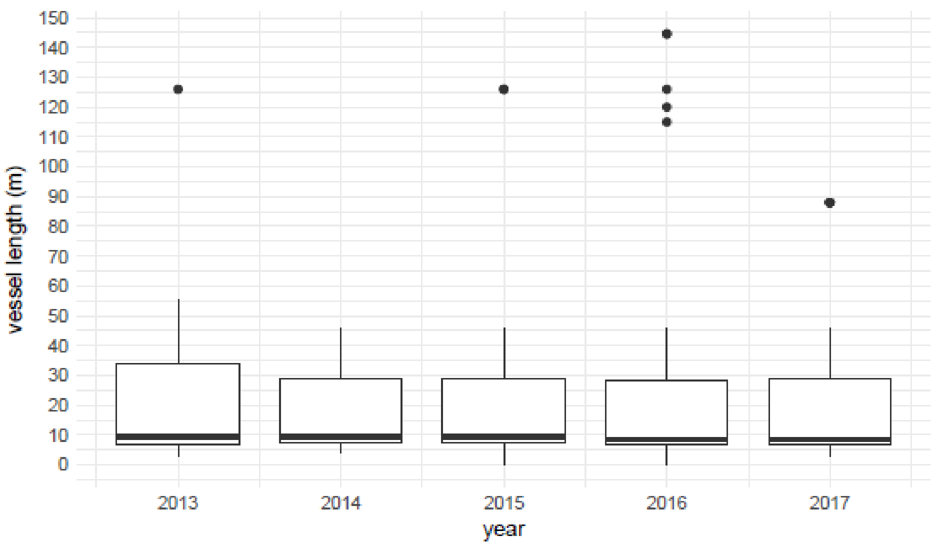
NL commercial landings per landing country per year

Over the last five years, on average 56.2% of the NL landings are landed in foreign ports, mainly in France and Belgium. On average, the proportion of NL catches landed in foreign ports is 6% of total landings of the stock.



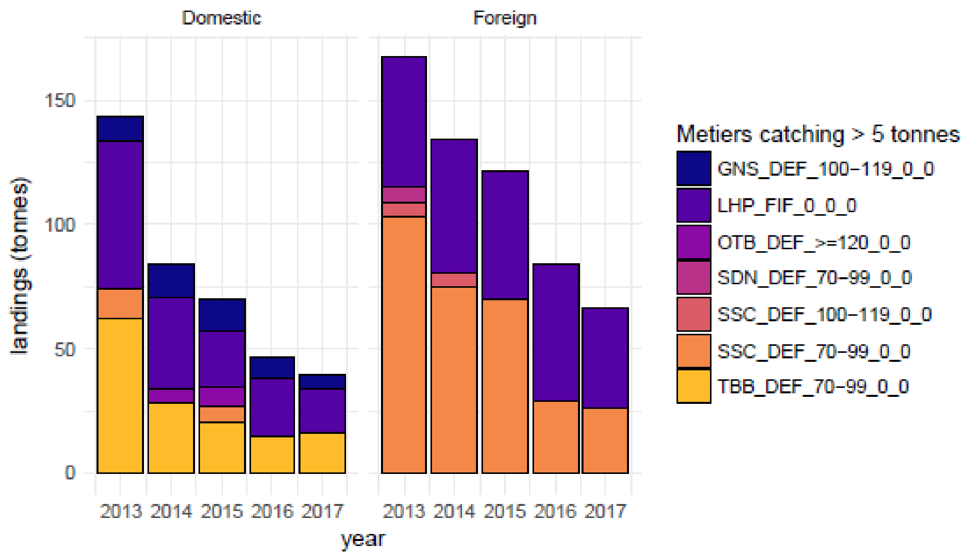
Domestic and foreign NL commercial landings per subdivision (origin) per year

The proportion landings landed in foreign ports are mainly from subdivisions 7.d and 4.c, whereas catches landed in NL are predominately from 4.c.



Boxplots of vessel lengths of NL fishing vessels catching seabass

Mostly fishing vessels with a vessel length around 9 m caught sea bass. The vessel length of fishing vessels that caught sea bass ranges from 0 to 144.6 m.



Domestic and foreign NL commercial landings per metier per year

Main métiers catching sea bass are LHP_FIF_0_0_0, SSC_DEF_70-99_0_0, and, TBB_DEF_70-99_0_0.

The proportion landings landed in foreign ports are mainly from métiers SSC_DEF_70-99_0_0 and LHP_FIF_0_0_0. Whereas catches landed in NL are mainly from LHP_FIF_0_0_0 and TBB_DEF_7099_0_0.

Table 8-1. Proportion of sea bass catches per métier for the time period in the dataset.

Métier	2013	2014	2015	2016	2017
FPO_CRU_10-30_0_0	0.02	0.05	0.00	0.00	0.01
FPO_CRU_100-119_0_0	0.00	0.00	NA	0.04	NA
FPO_CRU_120-219_0_0	NA	0.02	NA	0.01	0.00
FPO_CRU_50-70_0_0	0.06	0.01	0.02	0.00	NA
FPO_CRU_90-99_0_0	0.01	0.00	NA	0.16	NA
FPO_CRU_UND_0_0	0.02	0.06	0.06	0.07	0.24
FYK_CAT_10-30_0_0	0.00	0.01	0.10	0.10	0.10
FYK_CAT_50-70_0_0	NA	NA	NA	NA	0.00
FYK_CAT_90-99_0_0	NA	NA	NA	NA	0.00
FYK_CAT_UND_0_0	0.01	0.03	0.02	0.01	0.07
GND_DEF_100-119_0_0	NA	NA	NA	NA	0.05
GNS_DEF_>=220_0_0	NA	NA	NA	NA	0.00
GNS_DEF_10-30_0_0	0.07	0.09	0.15	0.41	0.02
GNS_DEF_100-119_0_0	3.02	5.68	6.32	5.55	4.90
GNS_DEF_120-219_0_0	1.26	0.65	0.50	2.01	1.67
GNS_DEF_50-70_0_0	0.01	0.01	0.00	0.17	NA
GNS_DEF_90-99_0_0	0.24	0.11	0.05	0.39	0.23
GNS_DEF_UND_0_0	0.06	0.22	0.22	0.27	2.32
GTN_UND_100-119_0_0	NA	NA	0.01	NA	NA
GTN_UND_UND_0_0	NA	NA	NA	NA	0.00
GTR_DEF_10-30_0_0	NA	NA	0.03	NA	NA

Métier	2013	2014	2015	2016	2017
GTR_DEF_100-119_0_0	NA	NA	0.46	0.01	NA
GTR_DEF_120-219_0_0	0.00	0.01	0.09	0.06	0.00
GTR_DEF_UND_0_0	NA	NA	NA	0.00	NA
LHM_FIF_0_0_0	NA	NA	0.02	0.08	NA
LHP_FIF_0_0_0	33.56	38.88	35.64	52.30	47.40
LLS_DEF_>=220_0_0	NA	NA	NA	0.04	NA
LLS_DEF_10-30_0_0	0.00	NA	NA	NA	NA
LLS_DEF_UND_0_0	NA	NA	NA	0.09	0.07
LNB_UND_100-119_0_0	NA	NA	NA	0.56	NA
LTL_UND_UND_0_0	NA	NA	NA	0.70	NA
MIS_UND_UND_0_0	0.02	NA	NA	NA	NA
OTB_DEF_>=120_0_0	0.14	2.32	3.52	0.15	0.12
OTB_DEF_100-119_0_0	0.01	0.15	0.01	0.01	NA
OTB_DEF_16-31_0_0	0.00	NA	NA	NA	NA
OTB_DEF_70-99_0_0	1.57	0.59	0.49	0.35	0.45
OTB_DEF_UND_0_0	NA	NA	NA	NA	0.00
OTM_SPF_16-31_0_0	NA	0.01	NA	0.01	3.00
OTM_SPF_32-69_0_0	0.07	NA	1.33	1.40	0.10
OTM_SPF_UND_0_0	NA	NA	NA	NA	0.02
PS_SPF_<16_0_0	0.02	NA	0.16	NA	NA
PS_SPF_100-119_0_0	0.65	0.50	0.16	2.72	1.14
PS_SPF_32-69_0_0	NA	NA	NA	0.01	0.01
PS_SPF_70-99_0_0	0.27	0.58	0.86	1.10	0.12
PS_SPF_UND_0_0	NA	0.01	0.04	NA	0.09
PTB_DEF_100-119_0_0	0.00	NA	NA	NA	NA
PTM_SPF_100-119_0_0	NA	0.03	NA	NA	NA
PTM_SPF_32-54_0_0	0.02	NA	NA	NA	NA
PTM_SPF_32-69_0_0	0.28	NA	NA	NA	NA
SDN_DEF_100-119_0_0	0.01	NA	NA	NA	NA
SDN_DEF_70-99_0_0	1.91	NA	NA	NA	NA
SSC_DEF_>=120_0_0	NA	0.12	0.00	0.01	0.05
SSC_DEF_100-119_0_0	2.87	3.82	2.20	0.51	0.68
SSC_DEF_70-99_0_0	34.55	33.77	37.19	20.20	23.33
TBB_DEF_100-119_0_0	NA	0.02	NA	NA	NA
TBB_DEF_16-31_0_0	0.66	0.01	0.45	0.51	0.37
TBB_DEF_70-99_0_0	18.60	12.25	9.88	9.92	13.41
TBB_DEF_UND_0_0	NA	NA	NA	0.10	NA

This coincides with the many (58) different métiers that caught sea bass.

For the identified stock shortly describe which sources of information (logbook, sales slips, etc.) are available about foreign vessels landing into your country and national vessels landing abroad, and the completeness of these.

For sea bass, logbook records are available for the landings of NL fishing vessels landing in foreign ports. However, for landings of foreign vessels in NL ports, no data are (made) available to NL.

The logbook records contain information about the daily catches. Mainly small-scale fisheries (SSF) catch sea bass and that brings along several concerns about the completeness of these data because several exemptions and conditions in the Control Regulation exist for the SSF. These exemptions and conditions result in incomplete landings data in the logbooks and sales notes for SSF:

- There is no obligation to register the catch (and discards) in the logbook if they are below 50 kg.
- Sales notes of fish products landed by vessels below 10 m, or for landings not exceeding 50 kg of live weight equivalent by species, are also exempted in the cases where the MS has installed an acceptable sampling system.

Sampling

NL has carries out onshore and at-sea sampling programmes. NL vessel landings in the Netherlands are sampled for ages (mind that it is only four individuals every three years). These landings mainly originate in 4.c, therefore these samples might miss represent the main origin (subdivision) of the NL sea bass catches, i.e. 7.d. Since the foreign landings are not sampled and these originate in a different subdivisions (7.d and 4.c).

There is a catch sampling programme (at sea) for the passive gears in 27.4.a.b.c and 27.7.d so gears under 15 m are covered. Landings from passive gears are covered in a market sampling programme. Demersal fisheries (mostly 15 m–45 m) are covered by a market sampling programme in 27.4.b.c and 27.7.d, and an at-sea discard sampling programme covering 27.4.b.c. Pelagic fisheries are covered in a catch sampling programme (onshore and at sea).

The passive gear métiers are included in a catch monitoring programme, but sampling rate is relatively low for those métiers. Some UK demersal fishing vessels are part of a reference fleet (for monitoring landings and discards at sea), additionally, these fishing vessels are randomly picked and sampled in ports (for market sampling). There is no NL sampling of BE fishing vessels in the NL ports.

Currently there is no informal or formal agreement for collecting data or data sharing of foreign landings of sea bass.

Analysis of foreign landings and methodologies used to assess their coverage and completeness under the IEO sampling programme, for the hake stocks

By Jose Rodríguez and Jose Luis Cebrían

Background – Evaluating foreign landings in relation to national landings

Total landings by Spanish vessels varied between 209 000 tons and 216 000 tons during the three years analysed, showing a stable situation along this period in general and by most of the variables analysed.

Landing country

By landing country, Spain receives most part of the total landings (94.9%). Ireland, with 4.27%, is the second landing country (**Figure 1**), followed by UK and France, in this case contributing with minor percentages of 0.5% and 0.2%, respectively. Landing activity in Portugal, which is a neighbour country, is almost negligible with only 295 tons received (0.05%) and showing no activity in two of the three years analysed.

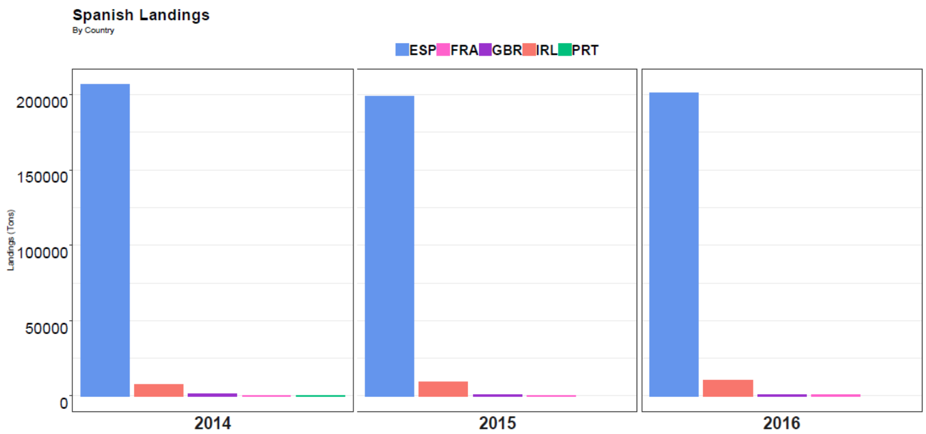


Figure 1. Total landings of Spanish vessels by landing country and year.

ICES divisions

Considering the ICES Divisions, most part of the landings comes from Iberian divisions 27.8.c and 27.9.a (**Figure 2**). Spanish fleet operates through a certain number of ICES divisions, almost of all them in the European Western North Atlantic waters from 27.6.a to southern boundaries of 27.9.a. Nevertheless, majority of this well distributed activity is low, with only landings in 27.7.j and 27.8.a being worth to comment when compared to the rest of divisions above Iberian area. In both divisions most part of catches are being landed in Spain. To highlight, landings from Division 27.7.j in Ireland.

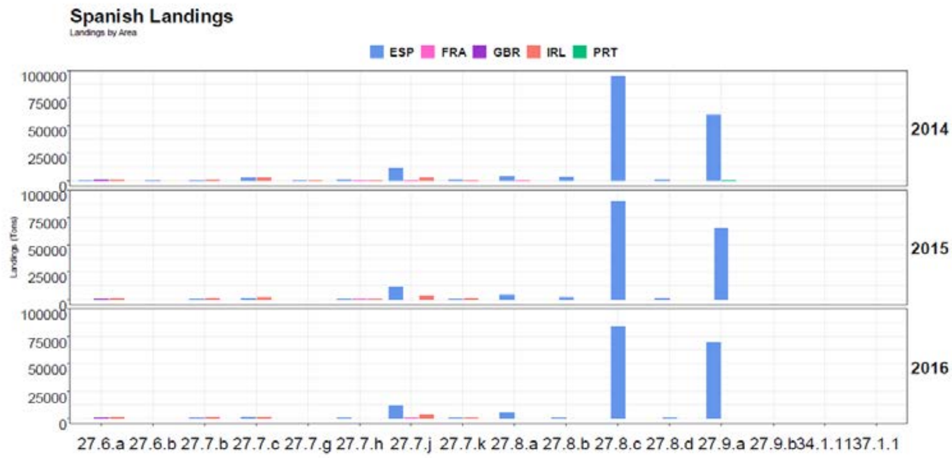


Figure 2. Total landings by ICES Division, landing country and year.

Gear

The most relevant gear in terms of landings is the purse-seine (PS), which account for the 43.3% of the total landings, all of them into Spain (**Figure 3**). After it, bottom otter trawl (OTB), pair bottom otter trawl (PTB) and longlines (LLS) are, by this order, the main gears.

Concerning the foreign landings, LLS and OTB are basically responsible for all the landings abroad, mainly Ireland in both cases.

Dynamics seems to be quite stable along the three years.

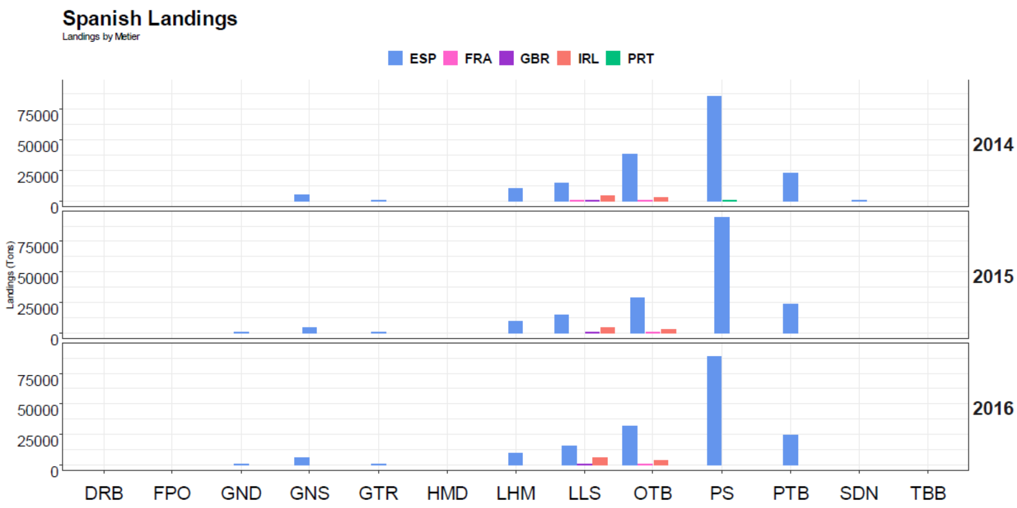


Figure 3. Total landings by gear, landing country and year.

Species

Checking for the landings patterns showed by the main species landed by the Spanish fleet, the top ten species that account for the 86% of the landings, only hake, monkfish and megrim have meaningful landings abroad (**Figure 4**).

For most part of species, landings abroad are directly negligible compared to their landings in Spain. In fact, considering just abroad landings, *Merluccius merluccius,* Lophiidae and *Lepidorhombus* spp. account for the 82.6% of the total landings abroad of all species.

The series of data 2014–2016 is complete based on Spanish logbook and sales notes data from the Spanish fleet of Atlantic European waters received from the National administration. The data included in this analysis exclude Spanish fleet operating in the Basque Country.

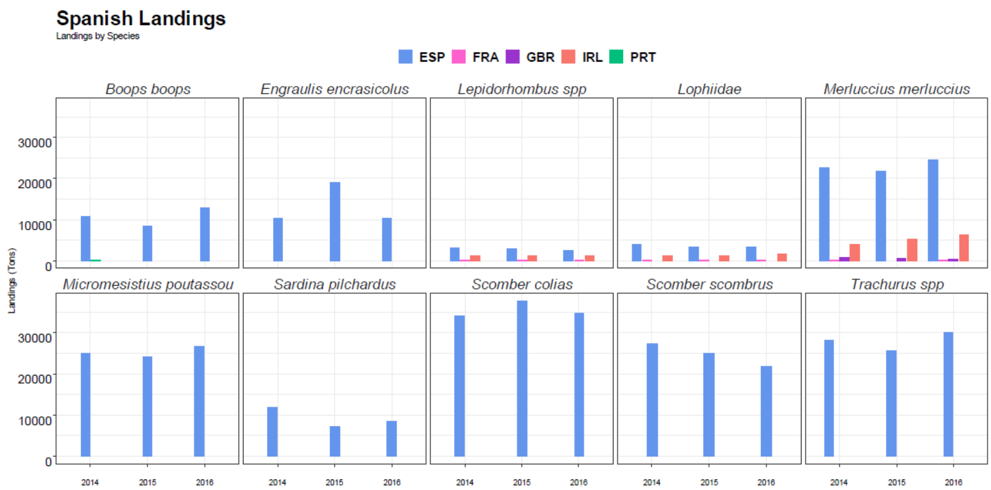


Figure 4. Total landings by species, landing country and year.

Sampling trips landing abroad: relevance of the sales location for the on-shore programme

As seen before, some trips of vessels fishing on the Spanish register which operate in EU waters under ICES areas land into different countries, mostly in Ireland.

Regarding the on-shore sampling programmes, this should mean, in principle, that we cannot sample those landings on-shore unless this task is transferred to the scientific institute operating in those foreign countries.

IEO crosschecks logbook and sales notes information to identify these trips. This is part of our routine analysis to check sampling trips against official data. Analysing 2016 data, the last year in the series requested by WGCATCH, there are 662 trips landing abroad from the total 505 944 trips done by the Spanish fleet.

An analysis of those foreign trips shows that most of these landings are transported to Spain for first point of sale; being there where they are accessible for sampling. The majority (>90%) of the trips landing abroad were arriving to Spanish auctions for the first sale, being transported by trucks. Burela and Vigo account for 440 of these trips (66.9%), while the rest is distributed along seven locations (**Figure 5**). No information about the site for the first sale could be found for the remaining 40 trips (6% of trips abroad), meaning they could be sold abroad (IEO does not have access to foreign sales notes) or IEO could not identify those trips through the crosscheck process between logbooks and sales notes.

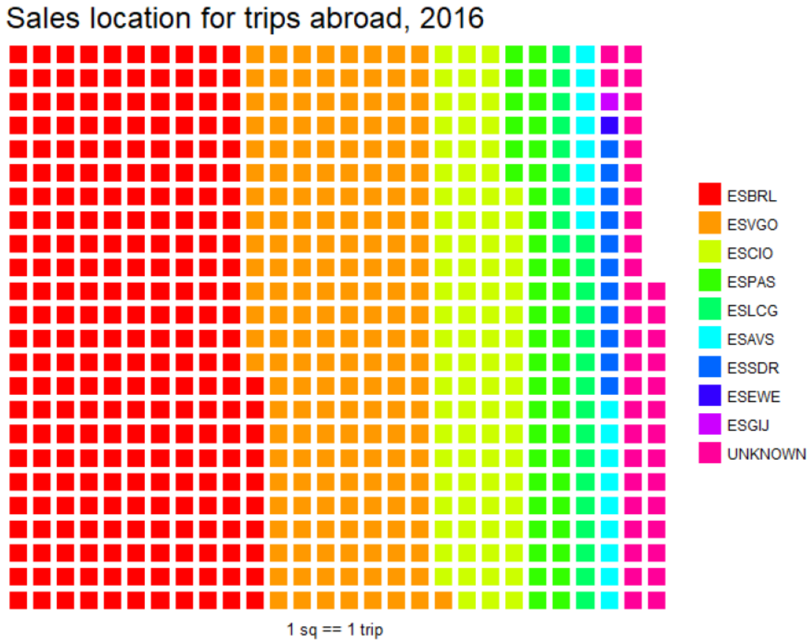


Figure 5. Sales location for trips landing abroad in 2016.

fishPi project (EU MARE/2014/19) already identified this problem and advised for clear distinction between landing sites and sites where the landings are accessible for sampling. In the data format that the project used to work the following field was included:

> onShoreSampLoc: The location in which an on-shore observer would be able to access the landed fraction of the catch from the trip

The project recommended to use the sales notes as the sale location is often the best means of identifying a suitable on-shore sampling location. This field is useful to indicate the country responsible for the sampling, which is fundamental to organize a regional sampling program. In fact, in one of the case studies (CS4, hake) stratification by country was developed using the country extracted from this field. It was showed that this information provided the same number of total countries (compared to the field where the country where landings took place was placed) but with different allocation of trips.

Coverage of the IEO sampling programme for landings abroad: OTB_DEF_70-99_0_0_0

1) Coverage of trips

For this analysis, the OTB_DEF_70-99_0_0_0 fleet has been selected. This fleet lands mostly in Spain and Ireland, with some trips also happening in France.

Table 1 provides the coverage of trips by landing port covered by the IEO on-shore sampling team in Vigo. The percentage of coverage for landings abroad is higher than the coverage for national landings in Vigo.

METIER_DCF	LANDING_PORT	COUNTRY	TRIPS	SAMPLED TRIPS	COVERAGE
OTB_DEF_70-99_0_0	Vigo	Spain	121	15	12,40
OTB_DEF_70-99_0_0	Castletownbere	Ireland	157	29	18,47
OTB_DEF_70-99_0_0	Douarnenez	France	27	4	14,81
OTB_DEF_70-99_0_0	Killybegs	Ireland	1	0	0,00

Table 1. Coverage of trips sampled from OTB_DEF_70-99_0_0 in Vigo. Includes trips landed abroad and arrived by truck.

2) Coverage of species

Determining the location where landings are accessible for sampling is a key issue. Those trips, as part of the specific métiers determined, are part of the pool of trips showing a similar pattern no matter the place where landings occurred. Nevertheless, a most specific analysis can be done to have a clear determination of the completeness of these trips before arriving to national sales locations, thus determining if relevant components of these trips were missing.

A crosscheck of the logbook data, sales notes and data obtained from sampling trips is used to assess the differences for the subset of sampled trips. Cpues calculated for each of these sources allow determining the completion of the data, identifying species missing and/or identifying bias in the sampling information.

In our case study, based on the sampled trips in 2016, general cpues seem to be on line for the different sources. There is no clear lack of landings, which can be interpreted in the sense that trips arriving by truck seems to be complete. Compared to sampling data, cpue for monkfish is slightly lower in the official data reported for those trips, while for megrims cpue from logbook and sales notes are slightly larger than quantity observed by the samplers on-shore. This kind of comparative analysis could be proposed to be implemented in a routinely basis for foreign landings.

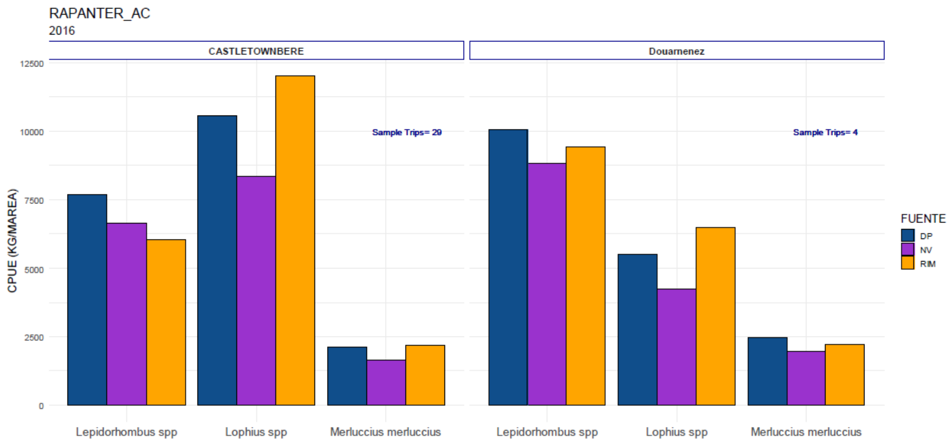


Figure 6. Comparative analysis of CPUEs from logbooks, sales notes and scientific sampler.

Conclusions

A. Spanish IEO case

Overall, Spanish vessels landings abroad have small contributions of landing abroad compared to landings in Spain. The main gears landings abroad are LLS and OTB, landing mainly hake, monkfish and megrims. The majority of those landings re in Ireland, from ICES Division 27.7.j.

Landings show a stable situation along the three years period in general and by most of the variables analysed.

The Spanish IEO on-shore sampling programme covers the activity of main métiers showing activity abroad (trucks). Although the landings are abroad, they are shipped to Spain where they are available for sampling. The completeness of these trips was confirmed, using a cpue analysis, which confirmed that the trips landing abroad are complete when they are sampled in Spanish ports.

B. General recommendations

The key factor for on-shore sampling is not the landing location but the location where landings are accessible for sampling. This being relevant to national and foreign landings.

Identification of trips through routine crosschecking of logbook data and sales notes relevant to identify suitable locations for sampling. Crosscheck of logbook data, sales notes and sampling data to asses on the completeness of the trips, assess on the quality of data received, potential bias and representativeness of the sampling data.

Landings of boarfish (boc.27.6-8) by Irish vessels in foreign ports

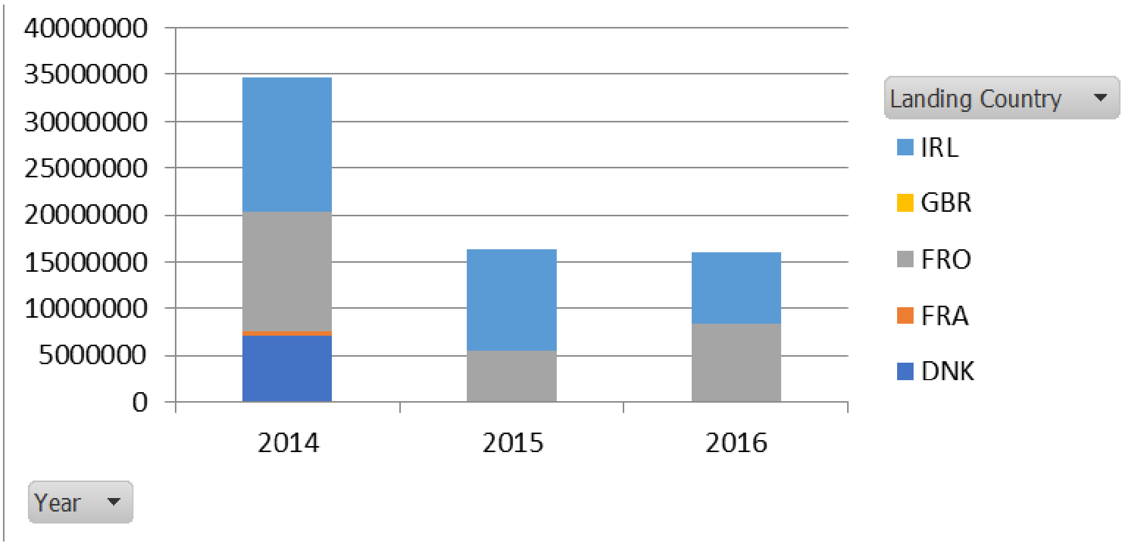
By Hans Gerritsen, Marine Institute, Ireland

Background

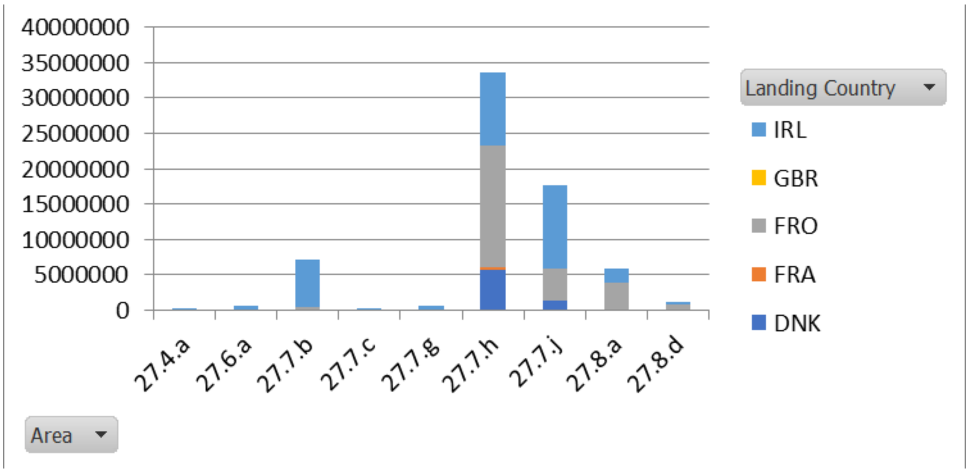
Ireland has nearly 75% of the quota share for boarfish in subareas 6,7,8, most of the remaining quota are allocated to Denmark.

Landings by Irish vessels into foreign ports

Around half of the boarfish catches by Irish vessels are landed abroad, currently mainly into the Faroes but before 2014 also into Denmark.

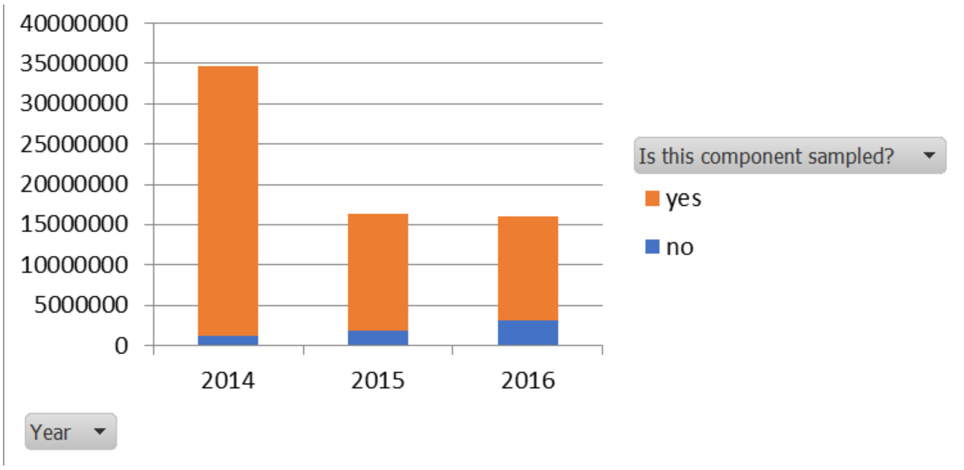


The landings into foreign ports are not notably different from the landings into Ireland in respect to the area or gear (nearly all landings are from midwater trawls).



The catches that are landed abroad are sampled through self-sampling: a frozen sample is made available on return to the home port.

The vast majority of the catch components (defined as year/quarter/area/gear) are sampled.



Landings by foreign vessels into Irish ports

The Marine Institute does not have full access to the logbook or sales data of foreign vessels landing into Irish ports. Many of these landings are reported in bulk, i.e. without vessel-specific information.

Foreign landings of boarfish are generally not sampled; however, they form a small proportion of the total stock landings.

Conclusion

This stock appears to be well sampled; the country responsible for the vast majority of landings (Ireland) samples nearly all components of the landings.

Danish case studies

Kirsten Birch Håkansson, DTU Aqua

Denmark was involved in 13 of the case studies selected; three of them are presented below; Danish landing of cod.27.24–32 into Poland, Danish landings of her.27.3a47d into Germany and Polish landings of spr.27.22–32 into Denmark.

Data sources

Foreign vessels landing into Denmark

Sales slips from foreign vessel landing into Denmark are available, but the completeness of logbooks from these vessels depends very much on country, see Figure 1.

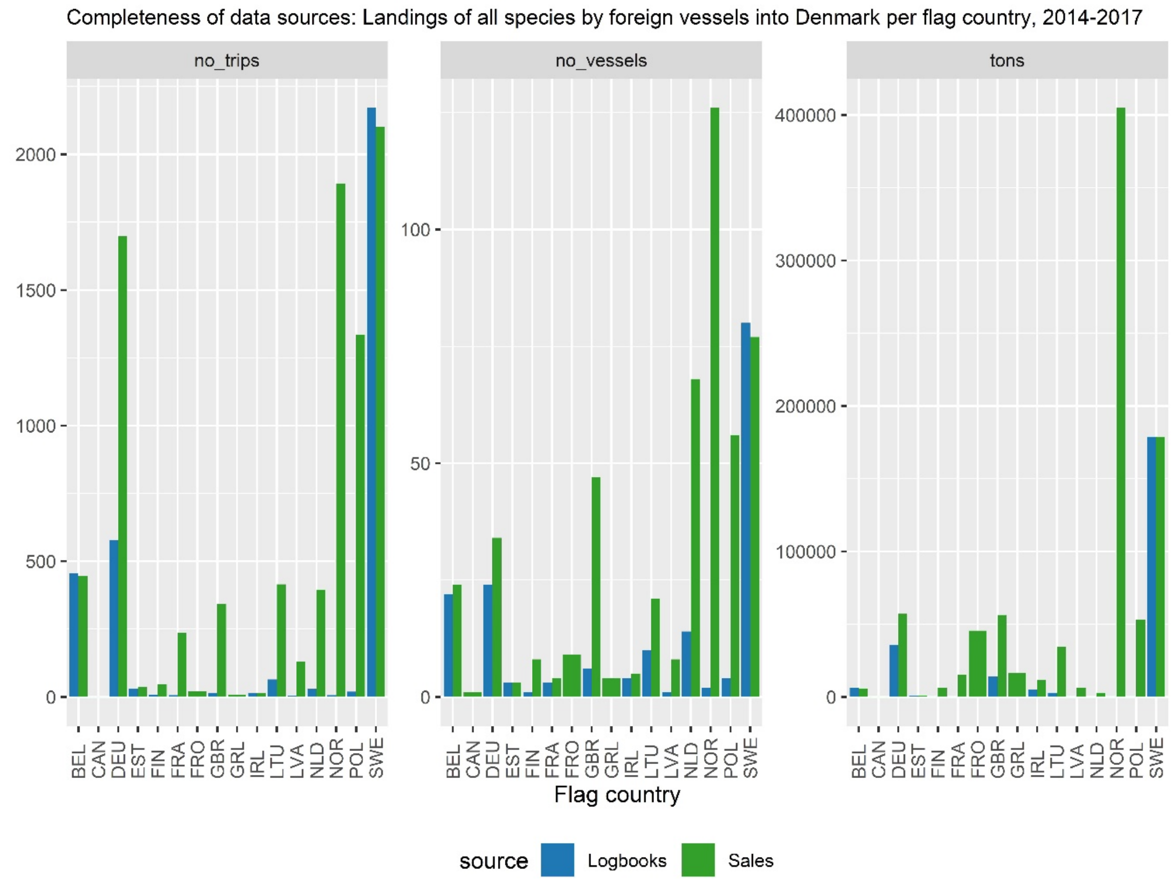


Figure 1. Completeness of data source (logbooks and sale slips) from all vessels landing into Denmark 2014–2017. Number of trips (left), Number of vessels (middle) and tons (right).

National vessels landing abroad

Logbook and sale slips are available from all vessels landing abroad.

Danish landings of cod (cod.27.24-32) into Poland

Importance

Overall the Danish landings of cod from the Eastern Baltic (cod.27.24–32) are important, around a quarter of the total landings are caught by Denmark. Further, around a third of the Danish landings are landed in Poland, so the Danish landings of cod.27.24–35 into Poland accounts for a relatively big part of the stock, see Table 1. The relative proportion of cod.27.24–32 landed in Poland is very stable over the years.

Table 1 Danish landing (tons) of cod from the Eastern Baltic per landing country and year. Source Danish data.

Landing country	2014	2015	2016	2014–2016
DNK	3,631	5,950	3,834	13,416
POL	1,931	2,954	2,600	7,485
SWE	339	466	283	1,088
Total	5,901	9,371	6,717	21,989
Pct. Landed in POL	33%	32%	39%	34%

Component of stock landed in Poland

The landings into Poland predominantly come from areas and ICES rectangles different from the ones landed into Denmark. The pattern is that nearly all landings from the east (area 27.3.d.26) are going to Poland, see Figure 2. That pattern is relative stable over the years, but the landing from area 27.3.d.26 are becoming more and more important over recent years, see Table 2.

The relative distributions of landings per quarter and gear are very similar for landings into Poland and Denmark and all strata landed in Poland are also landed in Denmark, see Figure 3.

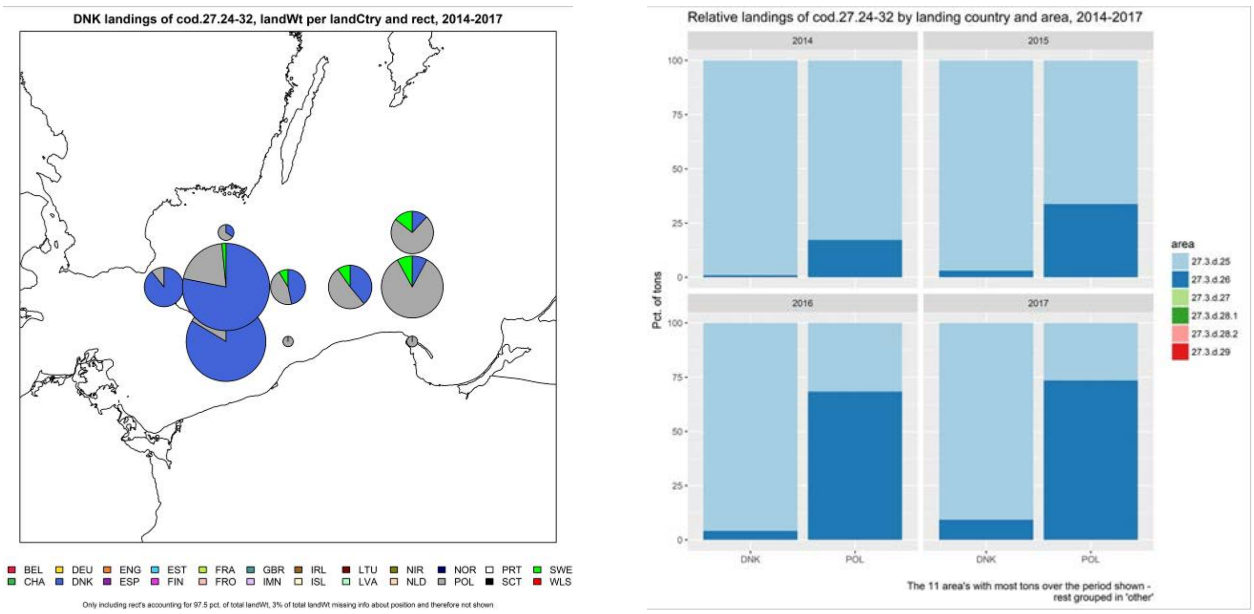


Figure 2. Danish landings of cod.27.22–32 per landing country and ICES rectangle in the period 2014–2017 (left, Denmark = green and Poland = grey). Relative distribution of landings per year, landing country and area (right).

Table 2. Danish landings (tons) of cod from the Eastern Baltic per area, landing country and year. Source Danish data.

Area	Landing country	2014	2015	2016	2017	2014–2017
27.3.d.25	**DNK**	3601	5767	3678	2346	15 392
27.3.d.25	**POL**	1599	1957	823	774	5153
27.3.d.25	**SWE**	306	239	137	79	761
27.3.d.26	**DNK**	30	184	157	238	609
27.3.d.26	**POL**	332	997	1777	2139	5245
27.3.d.26	**SWE**	33	227	141	309	710
27.3.d.27	**SWE**	0	0	5	0	5
Total		5901	9371	6718	5885	27 875

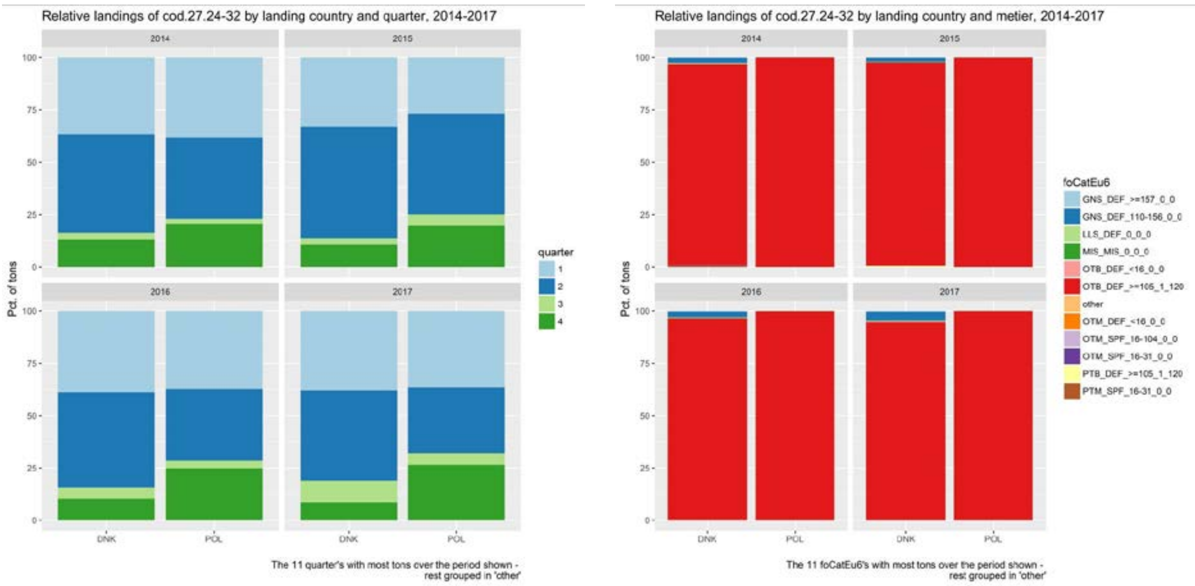


Figure 3. Relative distribution of Danish landings per year, landing country and quarter (left). Relative distribution of landings per year, landing country and gear (métier level 6) (right).

Sampling

The cod.27.24–32 landed in Poland are not sampled by either Denmark or Poland. Landing into Denmark are sampled.

No bilateral agreement exist for this stock.

Estimation for stock assessment

If samples from landings into Denmark covers the same strata (quarter, area and fleet) as the landings into Poland, then these are used for estimating figures for stock assessment. If not, then only landings are submitted.

Conclusion

The cod from the Eastern Baltic landed into Poland seems to come from the same part of the stock as the part being landed in Denmark, when looking at time and gear. The difference being the area. Nearly all Danish landing from area 27.3.d.26 are landed in Poland and these are currently not sampled. Further, it is very unlikely to sample landings from area 27.3.d.26 in Denmark due to small amount of landings being landed. At a national level, this leads to a big part of the stock not being sampled (area 27.3.d.26).

Looking at the spatial distribution of landings per vessel flag country it seems likely that other countries sample area 27.3.d.26, Figure 4, but the un-sampled Danish landings still makes up a good portion of the international landings. This part has increased over the years as the Danish fishery is moving more and more into area 27.3.d.26.

It is important that Denmark samples this component, both in a national and international perspective.

How to sample?

Poland do not sample landing locations, but select trips a la the way most countries do in their at-sea programs, so it is not possible for Poland to sample Danish landings.

Denmark do have an at-sea program where the vessel landing into Poland are a part of the sampling frame, so in principal we could get samples in that program, but we rarely get any trips in area 27.3.d.26, which may be due to high refusal in that part of the fleet. Further, it would complicate the estimation if samples from the at-sea program were going to be combined with samples from the onshore program, unless it is possible to make a clever stratification in the sampling design. [It may be that the vessels landing in Poland never lands in Denmark].

Around 70% of the landings into Poland are sold to Danish buyers in Poland, so the ideas is to set up a sampling scheme where these buyers collects the samples. [Need to check the stability of these buyers. Checked if the landings ends up being sold in Denmark (this is not the case). Need to check if these buyers are getting landings from area 27.3.d.26].

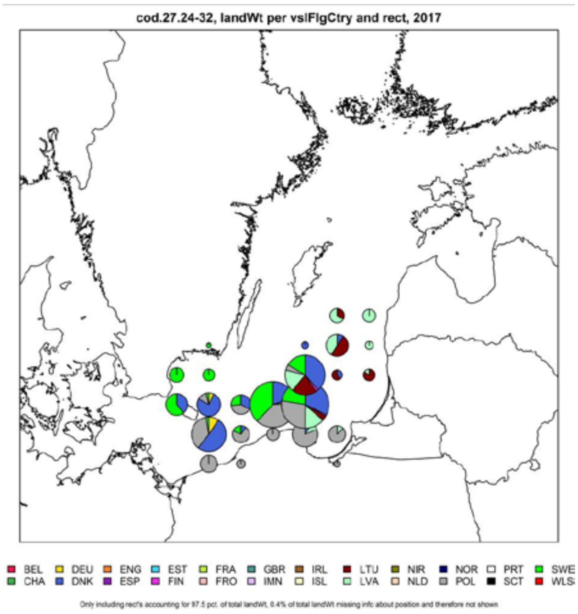


Figure 4. Landings of cod.27.24–32 per ICES rectangle and vessel flag country, 2017. The figure is based on RDB data and therefore only shows landings from EU Member States.

Danish landings of herring (her.27.3a47d) into Germany

Importance

Overall the Danish landings of herring from the North Sea (her.27.3a47d) are important, around a quarter of the landings are landed by Denmark. Further, around a third of the Danish landings are landed in Germany, so the Danish landings of her.27.3a47d into Germany accounts for a relatively big part of the stock, see Table 3. The relative proportion of her.27.3a47d landed in Germany is very stable over the years.

Table 3. Danish landings (tons) of herring from the North Sea per landing country and year. By-catch not included. Source Danish data.

Landing country	2014	2015	2016	2014–2016
DEU	40,050	40,072	38,959	119,081
DNK	62,872	63,608	75,593	202,073
FRA	10	-	-	10
GBR	3,890	1,661	6,091	11,642
IRL	33	166	4	202
NLD	1,143	-	-	1,143
NOR	2,908	101	43	3,051
SWE	338	835	567	1,740
Total	111,244	106,443	121,258	338,944
Pct. landed in DEU	36%	38%	32%	35%

Component of stock landed in Germany

The landings into Germany are coming from the same ICES rectangles as the ones landed into Denmark, see Figure 5. The pattern per ICES rectangle and landing country seems very stable over the period 2014–2017 not shown.

The relative distributions of landings per gear and quarter varies for landings into Germany and Denmark, see Figure 6 and Table 4. In respect to gear, the majority of landings are taken by a single métier, OTM_SPF_32-69_0_0, which lands in both Denmark and Germany, and are being sampled by Denmark. Métiers with bycatch of herring (métiers SPF_16-31) and a lot of minor métiers land only in Denmark. In respect to quarter, landings into Germany are mainly taking place in the last semester, but all quarter are being landed and sampled in Denmark.

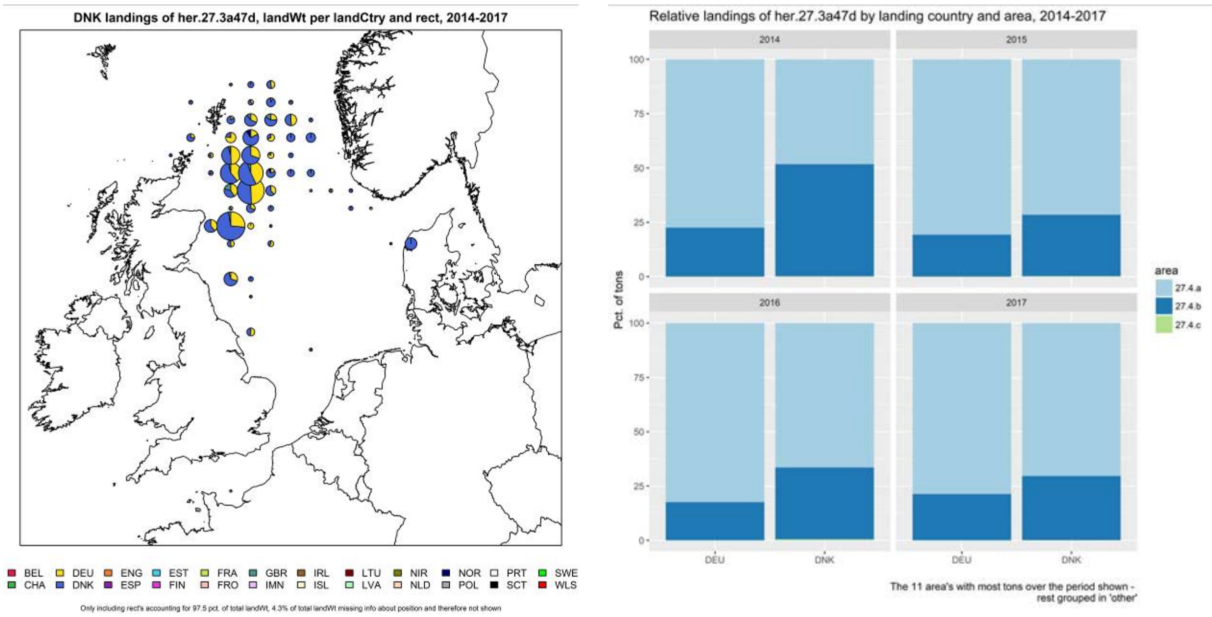


Figure 5. Danish landings of her.27.3a47 per landing country and ICES rectangle in the period 2014–2017 (left, Denmark = green and Germany = yellow). Relative distribution of landings per year, landing country and area (right).

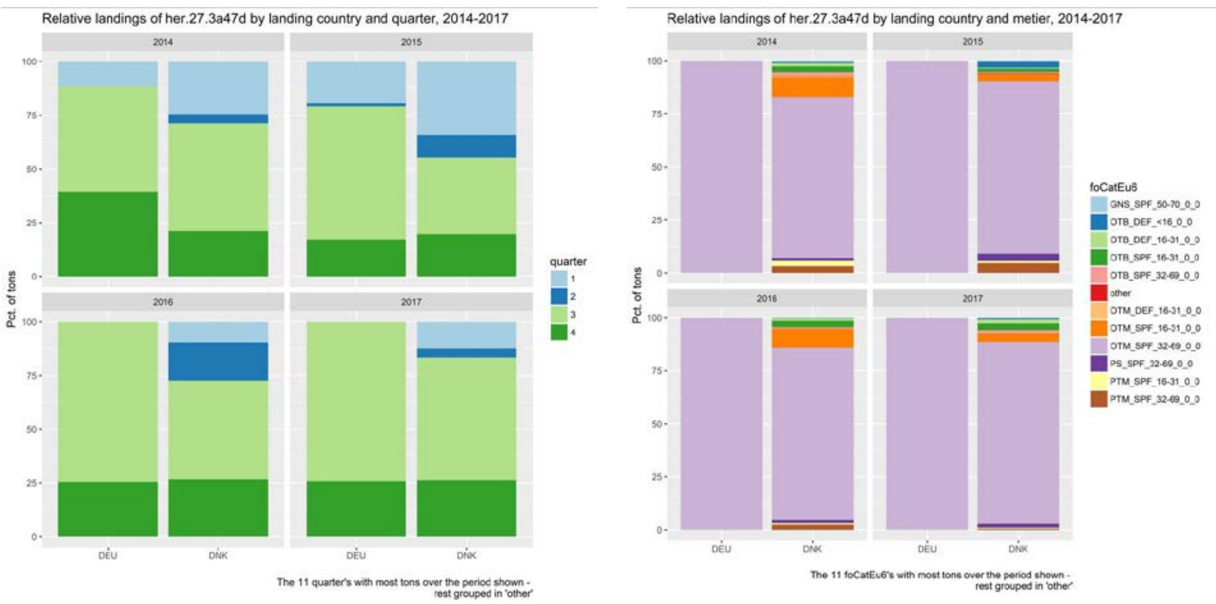


Figure 5. Relative distribution of Danish landings per year, landing country and quarter (left). Relative distribution of landings per year, landing country and gear (métier level 6) (right).

Table 4. Danish landings (tons) of her.27.3a47d per quarter, landing country and year. Source Danish data.

Quarter	Landing country	2014	2015	2016	2017	Total
1	DEU	4668	7749			12417
1	DNK	18708	23839	8151	8496	59194
2	DEU		561			561
2	DNK	1924	4879	15156	2463	24422
3	DEU	19652	24940	29054	28155	101801
3	DNK	29840	23808	33371	37241	124260
4	DEU	15730	6822	9905	9770	42227
4	DNK	12401	11082	18915	14615	57013
Total		102923	103680	114552	100740	421895

Sampling

The her.27.3a47d landed in Germany are not sampled by either Denmark or Germany. Landings into Denmark are sampled.

No bilateral agreement exist for this stock.

Estimation for stock assessment

Samples from the landings into Denmark are used for the part landed into Germany, if these covers the same strata (quarter, area and fleet).

Conclusion

The her.27.3a47d from the North Sea landed into Germany seems to come from the same part of the stock as the part being landed in Denmark, when looking at space, time and gear. There could be differences not apparent from these plot e.g. difference in quality, which should be evaluated.

Further, it is a big portion of the landings not being sample, so it is important to sample this component.

How to sample?

Denmark is in a process of setting up self-sampling schemes for all the part of the fleet targeting small pelagic. Such a scheme would cover these landings.

An alternative: All Danish landing into Germany are sold to the same factory, so it would be possible to set up a sampling scheme where the buyer or German colleagues (already sampling the factory) collects samples.

Polish landings of sprat (spr.27.2232) into Denmark

The story from a Polish perspective is presented in the 'Polish foreign landings of sprat (spr.27.22–32)' case study in this annex.

Sampling

For many years, Denmark has sampled the Polish landings of spr.27.2232 into Denmark, but in 2017, we more or less stopped working up Polish samples at DTU Aqua, see Table 5.

Currently no bilateral agreement is in place for this stock, but in former times, an agreement existed.

Table 5. Number of samples taken by Denmark.

Vessel flag country	Year	Species	Area	Harbour	Sampled trips
POL	2014	SPR	27.3.d.25	DKNEX	4
POL	2014	SPR	27.3.d.26	DKNEX	1
POL	2015	SPR	27.3.d.25	DKNEX	30
POL	2015	SPR	27.3.d.25	DKSKA	1
POL	2015	SPR	27.3.d.26	DKNEX	3
POL	2015	SPR	27.3.d.26	DKSKA	1
POL	2016	SPR	27.3.d.25	DKNEX	16
POL	2016	SPR	27.3.d.25	DKSKA	1
POL	2016	SPR	27.3.d.26	DKNEX	1
POL	2016	SPR	27.3.d.26	DKSKA	1
POL	2016	SPR	27.3.d.28	DKNEX	1
POL	2017	SPR	27.3.d.28	DKSKA	1

Sampling design

The sampling of sprat follows the design specified in Table 6.

Table 6. Description of the Danish sampling design for onshore sampling of sprat.

Institute	DTU Aqua
PSU	Fishing trip
PSU selection	A combination of quota and risk based sampling
Sampling location	Factories receiving landings from the pelagic trawlers
SSU	Subsample of fish from the trip with around 100 fish. Length and weight overall and per length class are recorded for the subsample. The total weight of the landings from the trip is known, but not stored in the national database
SSU selection	Systematic random at the factory and random in the laboratory
TSU	Fish for aging, individual weight and length, around 50 are selected
TSU selection	Systematic random
Sampler	The Danish control selects the PSU and SSU. All further subsampling and measurements is done by DTU Aqua.

Auxiliary information associated with the sample

An overview of auxiliary information collected and stored with the sample can be found in Table 7.

Table 7. Auxiliary information associated with the sample.

Source	Information	Comment
Sale slips	Vessel id	
	Nationality	
	Landing location	
	Landing date	
	Total landed weight of target species	
	Area	The general rule in Denmark is to use the most fished (amount).
Logbook	Logbook number	For ICES square, gear and mesh size, the general rule in Denmark is to use the most fished (amount). (Denmark do not have access to the Polish logbooks electronically, but we often get a 'paper' version of the logbook may be requested during sampling. Further Denmark has access to general notifications e.g. overall catch notification without species information, but with position and gear, these may be used.)
	ICES square	
	Gear	
	Mesh size	
Other	Sampler	Department under the control agency that did the sampling.

Data storing and sharing

The samples are stored in the Danish national database. Until 2014 information about vessel flag country were often not filled in in the Danish national database, which made it difficult to identify samples from other countries. In 2014, this became very easy.

In recent years, Denmark has not sent any data to Poland.

All samples from the commercial fishery stored in the Danish national database are uploaded to the RDB with correct vessel flag country. We do not upload vessel characteristics like e.g. length, since these information are not ready available at DTU Aqua. The latter information can probably be found in the EU vessel register, but we never look.

Estimation for stock assessment

Denmark combines samples from Danish vessels with samples from foreign vessels within the same strata (quarter, subdivision and fleet), when estimating e.g. catch-at-age for stock assessment. Therefore, polish samples are used to estimate Danish figures uploaded to InterCatch.

Conclusion

Potentially this is a vast of sampling effort, since the samples are not shared with the vessel flag county. The samples have been used for estimation of Danish figures, but often the samples are from strata were we don't fish, so the samples will not be used. [This could be evaluated proper with a combination of samples and landings per strata (quarter, area and fleet)].

Further, it may problematic just to include samples from foreign vessels without analysing if is it correct to assume that polish vessels fish on the same stock component as Denmark. Looking at the spatial distribution of the landing per vessel flag country it is apparent that the distribution of Danish and Polish landings differs quite a lot, see Figure 7.

Lastly, Denmark tend to over-sample foreign vessels compared to our own. In 2015 Denmark sampled 59 landings of spr.27.2232, 11 of these came from Danish vessel, 35 from Polish vessels and the rest from other countries (samples sent to Sweden are not included in these figures). Over-sampling may be a wrong term, since it may fit the regional pattern of landing into Denmark very well, but if the samples are not used, then it is a vast of sampling effort.

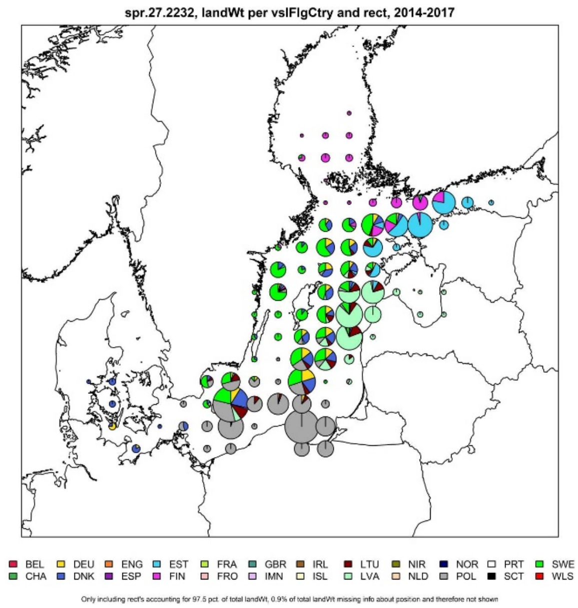


Figure 6. Landings of spr.27.2232 per ICES rectangle and vessel flag country, 2014–2017. The figure is based on RDB data and therefore only shows landings from EU Member States.

Annex 9: ToR a.2) Shortcomings of the current sampling and estimation practices, tools and best practices for foreign landings

During 2018 meeting, WGCATCH reviewed and analysed the working documents produced by ten countries, including 14 stocks. A number of shortcomings were identified, and misspecification or incomplete descriptions of bilateral agreements were found to be a major issue for the sampling, estimation and upload of data from this component. A number of improvements to these agreements was discussed and best practice is proposed.

This section provides:

1) Overview of the shortcomings identified on the current sampling and estimation practices of the foreign landings;

2) List of tools and criteria that can be used to assess the importance of foreign landings at national and stock (regional) levels;

3) List of possible best practices for sampling and estimations for this component of the landings

During the presentations and discussions of the various case studies, several issues and shortcomings were identified on how the foreign landings are being sampled and how the data are being used.

1) List of issues and shortcomings identified in the case studies:

- 1.1) No biological data are collected from foreign vessels, as they are not included in the target population.
- 1.2) Biological data are collected from foreign vessels in the landing country, but the data are not used by any of the countries.
- 1.3) Biological data are collected and used by the landing country, but being wrongly and pooled with no info on sampling design or fleet weighing from the flag country.
- 1.4) Data are used and uploaded by both countries (e.g. RDB), creating duplicated records.
- 1.5) In some cases, sampling from foreign vessels are considered secondary or lesser quality and they are only used when samples from national vessels are not available.
- 1.6) In cases where the data collected from foreign landings are shared with the flag country, these data are pooled with the national data and the same estimation procedures are applied without taking into consideration the sampling design of the landing country.
- 1.7) The existent bilateral agreements are overly vague and lacking on detail on how the data are sampled and how it should be shared with the flag country. These bilateral agreements are normally rollover through the years without evaluation or assessment on how they are performing.

The above list highlights the need for a holistic approach to the foreign landing issues– it is not enough to get a few and/or opportunist samples, even if they are correctly taken–you need to consider aspects like data transfers, uploads to international databases, duplications of data, etc.

2) List of tools and criteria can be used to assess the importance of foreign landings at national and stock levels

Landings abroad are frequently a large component of total landings of a stock and/or of the flag country, and they may be considerably different from landings in own country. They can preclude the representativeness of the sampling plan, because of the difficulties for the country to access to the vessels and landings outside its national territory. Therefore, the general rule should be that analyses are done on this component to evaluate the need to sample them and how to include them in the estimation procedures.

To fully understand and assess the importance of the foreign landings to a stock and/or country, it is essential to run an exploratory analysis of the national landings data and at stock level. During WGCATCH meeting it was developed a set of tools and exploratory analyses that can be used to highlight the importance of the foreign landings. This exploratory data analysis was based on the RDB / Fishframe data format. Two levels of analyses were explored: one at the **regional level**, where a quantification of the foreign landings is provided numerically and graphically. And another at **the national level**, where a set of table and graphical outputs are provided to highlight the importance of foreign landings for a stock, and if needed, to identify the foreign countries where the sampling effort should be directed.

Tools

Analyses and results were generated using the R language and environment for statistical computing (R Core Team 2016). R markdown report was developed with exploratory analyses that can be carried out to assess the importance of foreign landings at regional and national levels. The R code can be found here. The main outputs for the exploratory analyse are presented below.

Exploratory data analyses

The data provided cover 19 years of landings of 16 species for 20 countries on 84 ICES divisions. A summary of the main characteristics of the dataset can be quickly done thanks to the `skim` function. But in the scope of this document, the corresponding chunk is not evaluated.

Regional analyses of foreign landings

Foreign landings can be defined as flows of landing quantity across country. The corresponding flow matrix is computed for the year 2017, by summing the landings by flag country and landed country. The data are filtered on the year 2017 before processing. The figure below is a very useful tool to have an overall picture on the flow of landings between countries for a group of stocks or a particular stock (Figure 1).

When analysing the relevance of foreign landings, there is also a need to identify the trips landed abroad but transported by track and sold in the flag country. It should be checked whether these trips are accessible for sampling by the flag country in the markets. The present analysis using RDB / Fishframe data format did not allow identifying these trips, but an example can be found in the Spanish Case study (Annex 8).

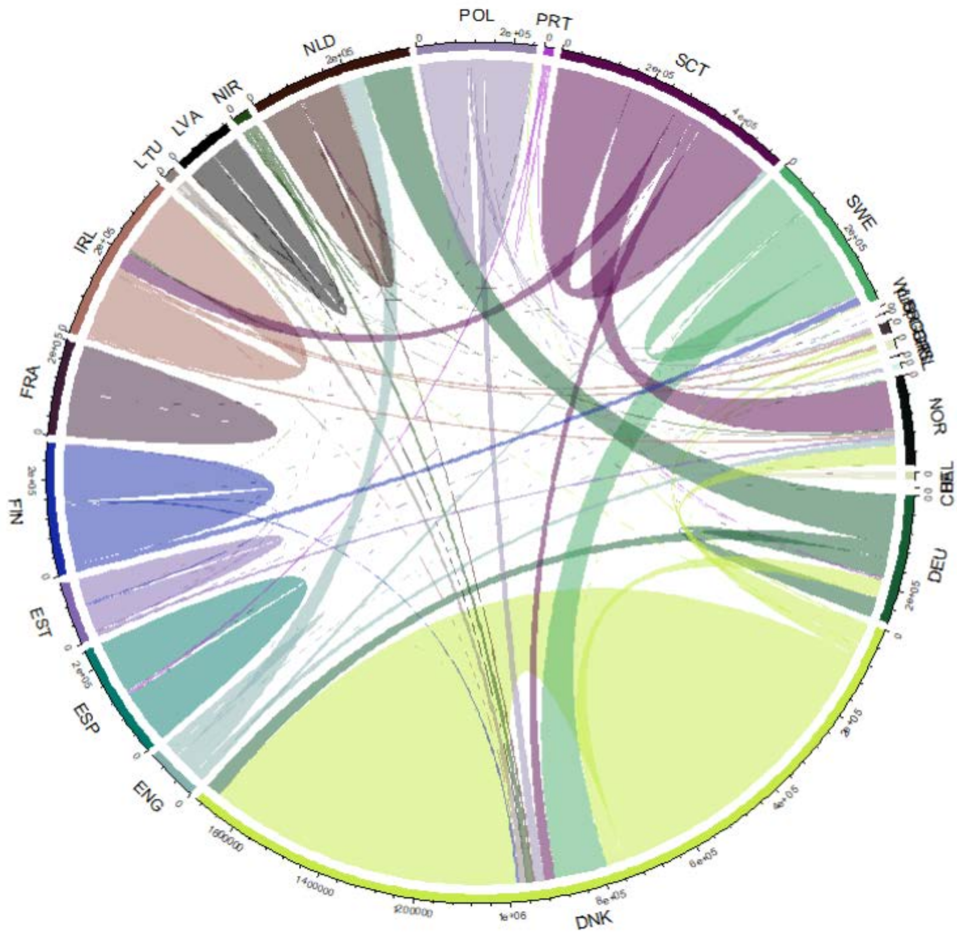


Figure 1. Circular flow chart to identify landings flow across countries.

National analyses of foreign landings

The analyses here focus on the foreign landings for a given stock for a country perspective. The analyses and the outputs developed were used in the case study from Dutch landings of sea bass, at national ports and abroad. The data used was in the RDB/Fishframe format, using 2017 data. The data are prepared for analyses using dplyr functions to summarise the data.

A simple overall picture of the landings profile can indicate the extent of foreign landings from flag country for a particular stock (Figure 1).

To break down to which countries, ICES areas, métiers and quarters the foreign landings are derived. Barplots and maps are possible tools that can be used to evaluate (Figure 2 and 3). These tools will provide information if there are temporal, spatial and technical differences between national and foreign landings that potentially are not covered by the sampling programmes and preclude their representativeness and be source of bias in the estimations for this stock.

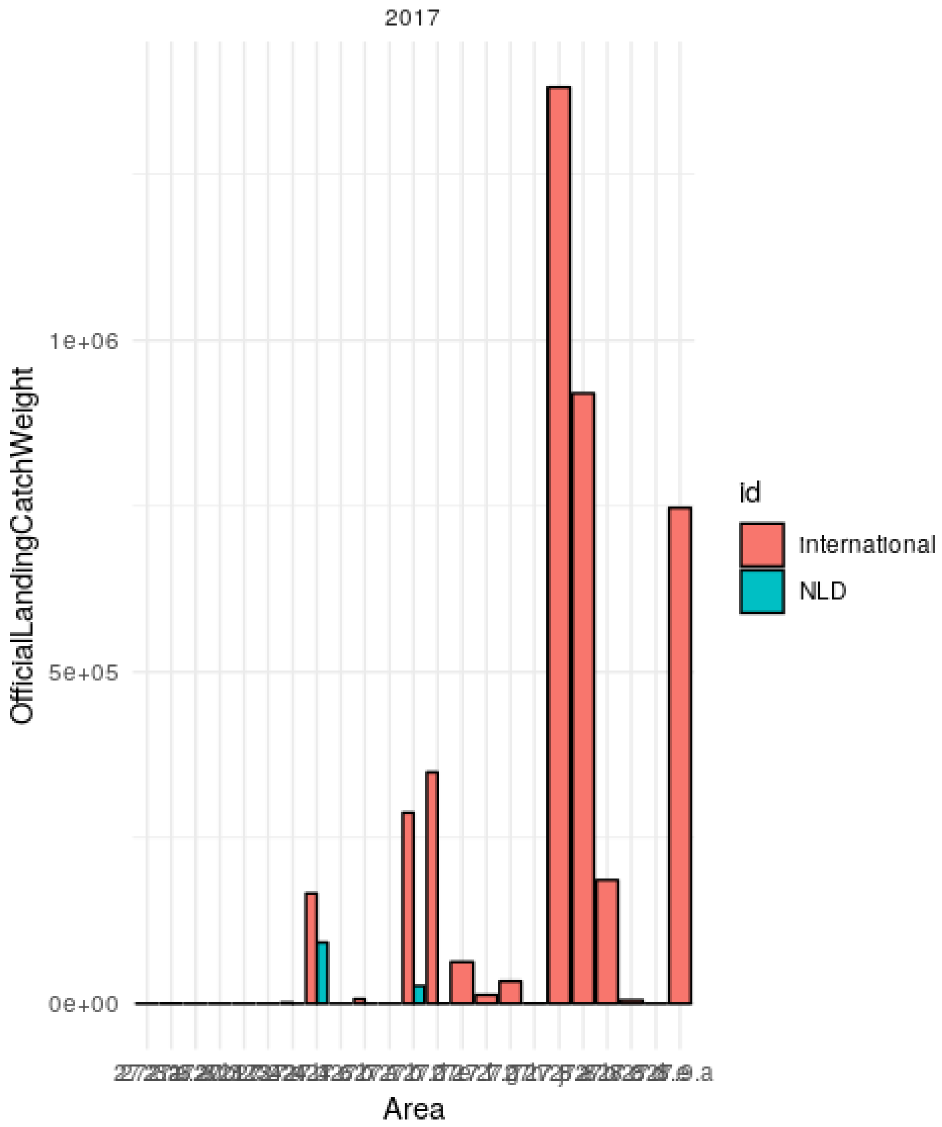


Figure 2. Dutch Sea bass landings abroad and in the Netherlands, by ICES area.

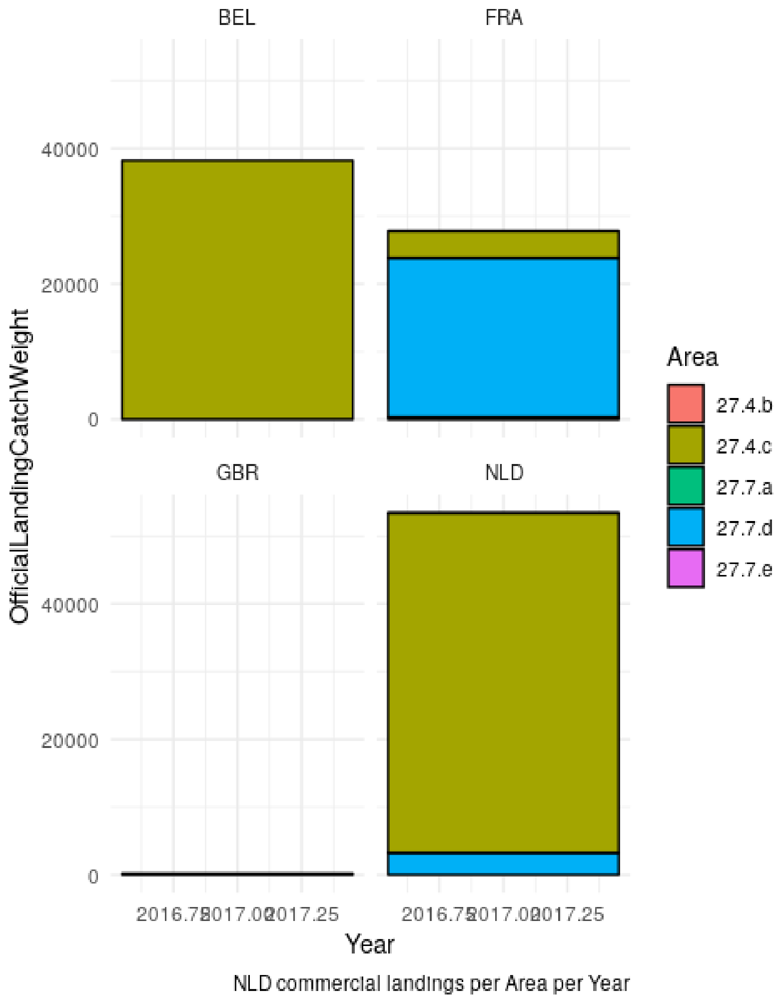


Figure 3. Foreign landings by country and area (2017 only).

The proportion landings landed in foreign ports are mainly from areas 27.4.c and 27.7.d. Whereas most the sea bass landings in NLD are mainly from 27.4.c and 27.7.d.

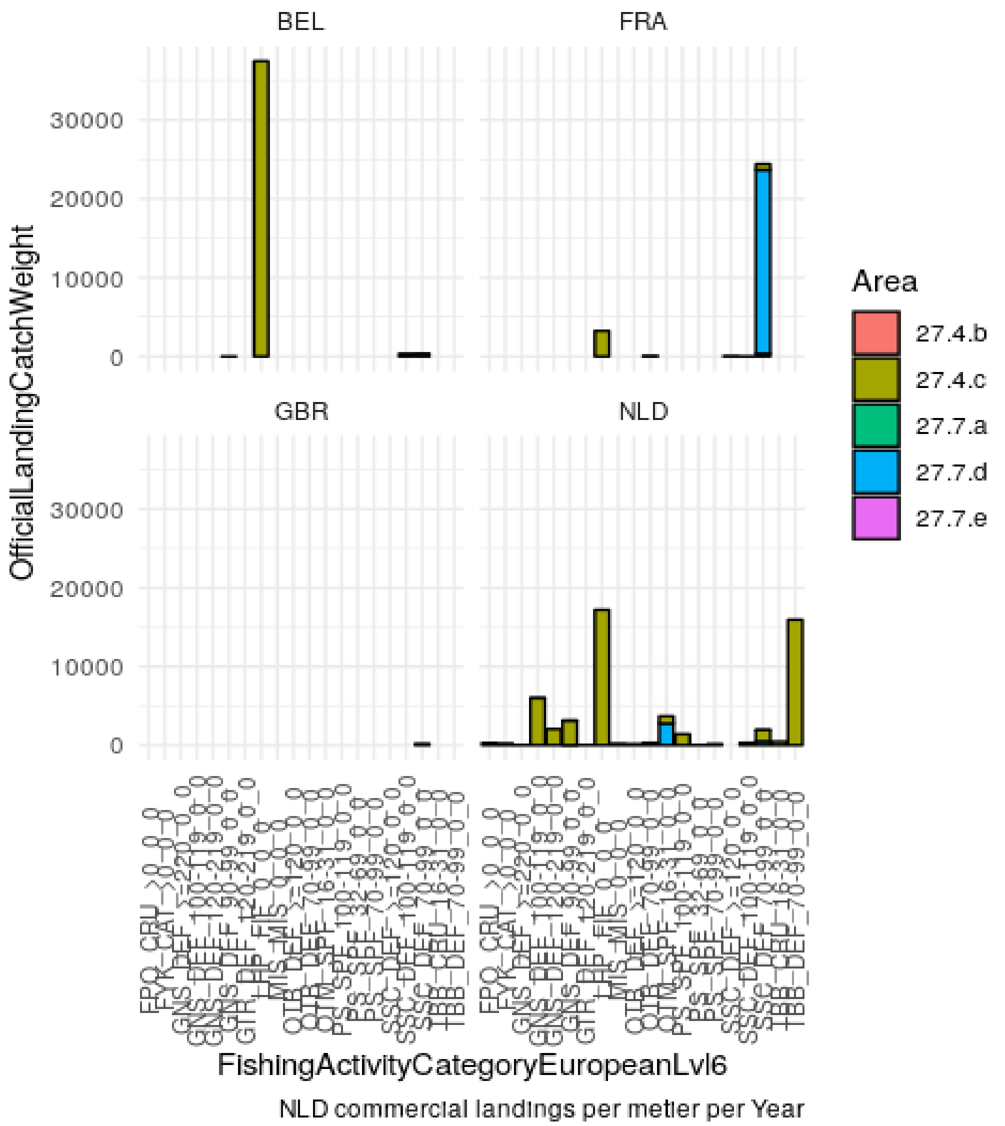
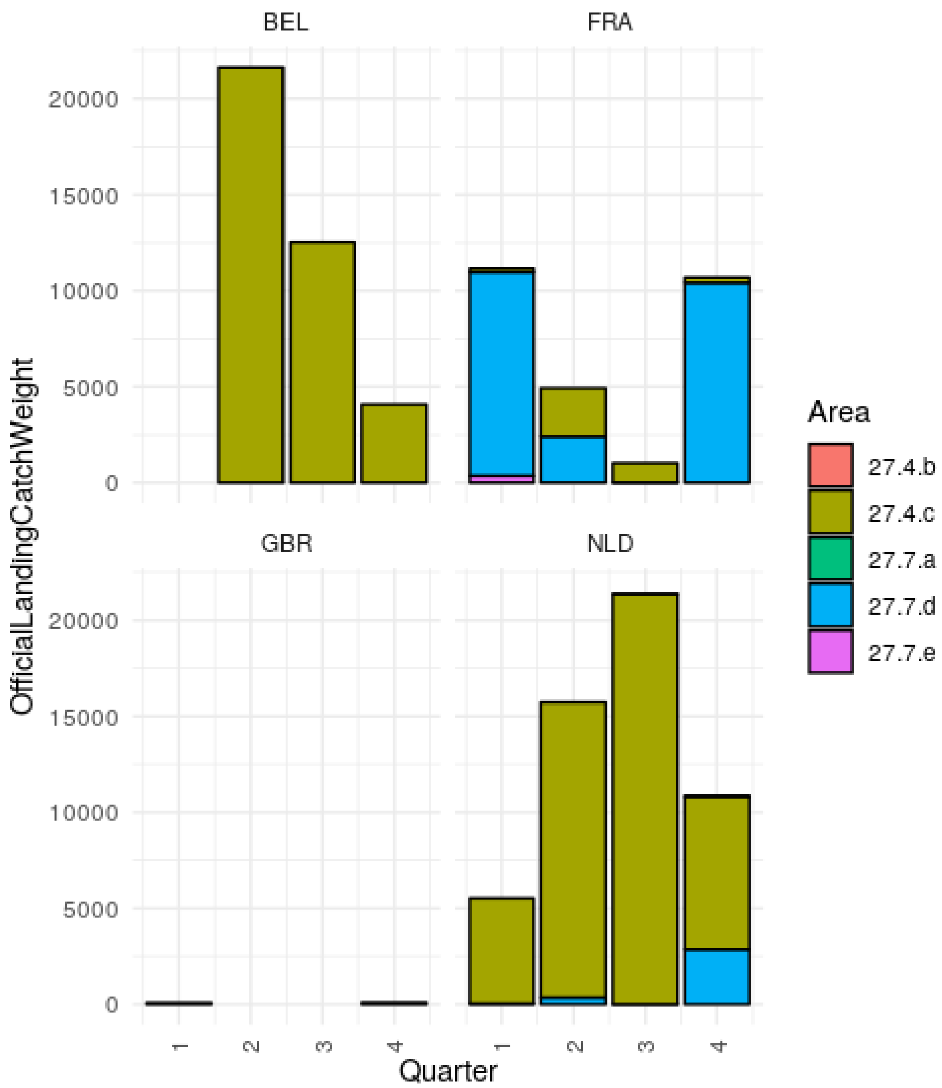


Figure 4. Sea bass Dutch landings by métier and area.

The main métiers catching European sea bass are LHP_FIF_0_0_0, SSC_DEF_70-99_0_0, and, TBB_DEF_70-99_0_0.

The proportion landings landed in foreign ports are mainly from métiers LHP_FIF_0_0_0 and SSC_DEF_70-99_0_0. Whereas catches landed in NLD are mainly from LHP_FIF_0_0_0 and SSC_DEF_70-99_0_0.



NLD commercial landings per metier per Year

Criteria to define the need to address landings abroad in the sampling programmes

1) Definitively, if the proportion of stock your country landed abroad is significant relative to the stock. The non-coverage of a large part of the landings significantly increases the risk of biases in the estimates of landings.

2) Highly advisable, if the proportion of catches from an area (i.e. a subarea of the stock) is significant relative to the total landings of all countries in that area, as the whole stock area should be covered by sampling programmes. Missing components of the stock may lead to bias and unrepresentativeness sampling of the whole stock.

3) Advisable, if the flag vessel(s) fish with different métiers, quarters or rectangles. Even if less important, different gears/métiers may exploit different components of the stock.

4) Advisable, if many countries have a small proportion of catches, is advisable that sampling is distributed across those countries. Under-coverage by multiple countries may also be problematic, as it can lead to bias and unrepresentativeness.

5) No requirement to address the landings abroad, if the landings abroad returned to the flag country and accessibility for sampling is granted.

3) Best practices for sampling, estimation procedures and data sharing/usage

As it is framed, the responsibility of the sampling is on the flag country. This means that by default both landings in foreign ports and discards from trips departed/arriving to foreign ports should be sampled, estimated and uploaded by the flag country. Under this situation, landings and trips ending/departing abroad should be covered by national sampling schemes. If so, they should be properly designed and documented and receive appropriate amounts of sampling effort for the importance of this component. As such, the level of detail of description should be similar to the one used in documenting the sampling of national landings.

Furthermore, to avoid duplication the landing country should not sample the foreign vessels within their sampling schemes as doing it increases the risk of over coverage and it is non-optimal use of resources. Also, the estimation and upload of the data on these vessels should be carried out by the flag country. Doing that will secure the correct non-duplicated data are entered into databases like RDB and InterCatch and used for regional coordination and stock assessment.

However, for practical, logistic and/or resourcing reasons countries do not include vessels departing and/or landing abroad in their target population, or if they are included in the target population those vessels or trips are skipped from being sampled. In some cases, bilateral or regional agreements can be put in place, with the objective to cover this component of the landings. Such agreements are quite frequent among Member States and are documented in EU-MAP National Annual reports. WGCATCH analysed the coverage and data from seven case studies, some of which had bilateral agreements in place. However, a number of inadequacies were identified and misspecification or the lack of detail and procedures of these agreements were found to be a major issue for the quality of sampling, estimation and upload for the foreign landing's component.

Several improvements to these agreements were discussed and best practice are proposed for sampling, data sharing and estimation procedures:

Sampling

- The bilateral agreements should be detailed in terms of the new requirements of statistical sound sampling scheme (4S), i.e. information on PSUs, SSUs, selection methods, sampling effort, etc. And it is essential that the details on sampling programme are shared and agreed between the flag and landing countries.
- The agreements should have a clear periodicity for update, dependent on analysis of on the stability of the fisheries. In principle, they should be updated annually with sampling efforts based on analyses of previous year's results. If periodicities larger than annual are used, it should be the responsibility of the flag country to monitor the activity of its fleet, identify situations of under coverage, and promote adjustments of the sampling effort and methodologies.

Data use, estimation and submission/upload of the data

- It is generally a source of errors and therefore a bad practice that the landing country undertakes any processing and upload of the data, as this may lead to duplication use of the data and bias or erroneous estimations.
- The best practice is that the sampling data and details of sampling programmes are communicated to the flag country and this is responsible for estimation and upload of the data. For that to happen and avoid misreporting, there should be well defined agreed deadlines for data and samples (e.g. otoliths for ageing) transmissions and all elements required of the sampling design and estimation should be communicated to the flag country. Ultimately, it is the responsibility of the flag country to secure the quality of the estimates provided to the various end-users.
- If the responsibility for estimation and submission/upload of the data falls on the landing country, then all necessary fleet information for the planning, estimation should be communicated by the flag country to the landing in the appropriated deadlines.
- More than just the agreement, there should be concrete timelines for a similar follow-up, screening, communication and usage of data.

Pilot studies

- When the proportion of national landings made abroad is large relative to the stock, simple analyses of logbook or sale data may not be sufficient to evaluate the need to sample this component separately. Also, in most cases, it is not enough to just analyse present sampling data since those data were probably collected with problematic sampling designs in the first place. In such cases, a pilot study with a clear 4S scheme should be implemented for the testing of hypothesis and evaluation of the possibility of derogation from sampling. The possibilities for Pilot Studies existing within the EU-MAP can perhaps be explored for such purposes. In some cases, such pilot studies should also address discard patterns of vessels landing abroad as these may also not be similar to those of vessels landing on national ports. The latter is particularly likely where some aspects of landings are known to change (e.g. fleet composition, quarters, métier, and regulations).

Annex 10: ToR a.3) Analysing the DLS questionnaires – preliminary results

Preliminary results from some of the analyses carried out under the ToR a.3 are presented in this annex; some overall and a more specific example with WGBFAS stocks.

Please note, the results are considered very preliminary. Input data were not complete, many combinations of country and assessment working groups were missing, and therefore none of the cases represents the full picture.

Analysis on the DLS questionnaires "Data Quality and Quantity Information"

Input data

The main input data for the analyses were the "Data Quality and Quantity Information" questionnaires sent out with the ICES data call in 2017, populated with information for data limited stocks 2014–2016, in total 62 stocks, see Table 1.

Table 1. Assessment Groups involved in 2017 data call (on 2014–2016 data).

	AFWG	NWWG	WGBFAS	WGBIE	WGCSE	WGDEEP	WGHANSA	WGNSSK	WGWIDE	HAWG	WGEF	Total
Number of DLS stocks	1	5	11	2	8	10	1	9	2	2	11	62

Results

A summary table highlighting the diversity of thresholds used by data submitters was also compiled (Table 2). Raw results from those analyses are displayed by assessment working group in Figures 1 to 9.

These results were presented during WGCATCH 2018 to introduce work on DLS stocks and at the meeting, a few stock coordinators were present. Broadly, this first set of (draft) results evidences the usefulness of the questionnaires and, in particular, some graphical data summaries that can enlighten stock coordinators on the quality of the data they have at hand. It was however noticed that in many countries, including some major players in fisheries of DLS stocks, did not respond to them or did so incompletely. Consequently, albeit evidencing significant quality and quantity limitations in many DLS data used in stock assessments (e.g. cases of information from single trips - or very few fish - being raised to significant volumes, significant heterogeneity in the criteria used by data submitters to decide on the quality/quantity thresholds for data submission), the coverage of the data was in most of the cases very limited and must there be interpreted with extreme caution and knowledge of the underlying datasets.

Table 2. Examples of the diversity of thresholds used by data submitters.

Yes. We reject samples that are not representative, e.g. where the spp is not the target, where there are less than say 60 fish, where there are too many gaps in the length frequency.
Yes. Usually the number of fish per trip has been >= 50. Sometimes it is needed more than one trip to get 50 individuals per trap haul.
Yes. A threshold of >=2 trips and >=4 hauls have generally been applied, however, in a few cases, single trips have been used.
Yes. Data were only used when the number of trips and number of length measurements is assumed to reflect the general fishing pattern. Length measurements were used for raising at a quantity of >10 (stocks with small length range and low landings) or >20 (for stocks with a larger length range and high landings). Gaps in the weight-at-length were filled using same-year length-weight coefficients.
Yes. Only fleets*quarter*stock*area with >25 individuals measured/aged
Yes. Only fleets*quarter*stock*area with >30 individuals measured in >=3 trips were used; Final frequencies were visually inspected and looked reasonable.
Yes. Only fleets*quarter*stock*area with >35 individuals measured/aged
Yes. Only fleets*quarter*stock*area with >5 individuals measured/aged
Yes. If the weight of measured fish in the landings was larger than 70 kg, the amount of discards was considered representative and raised discard weights were provided.
Yes. The length distribution is provided as the amount of length measurements were considered sufficient (…) but was based on only 6 length measurement and thus includes gaps in the length distribution.
Yes. Sampling data were uploaded for métiers with 10+ sampling trips.
Yes. Quarters were aggregated as this is a slow growing fish. Finally length and age samples were merged for OTB DEF and CRU at appropriate mesh sizes
The stock is sampled by size sorting category
No threshold used.

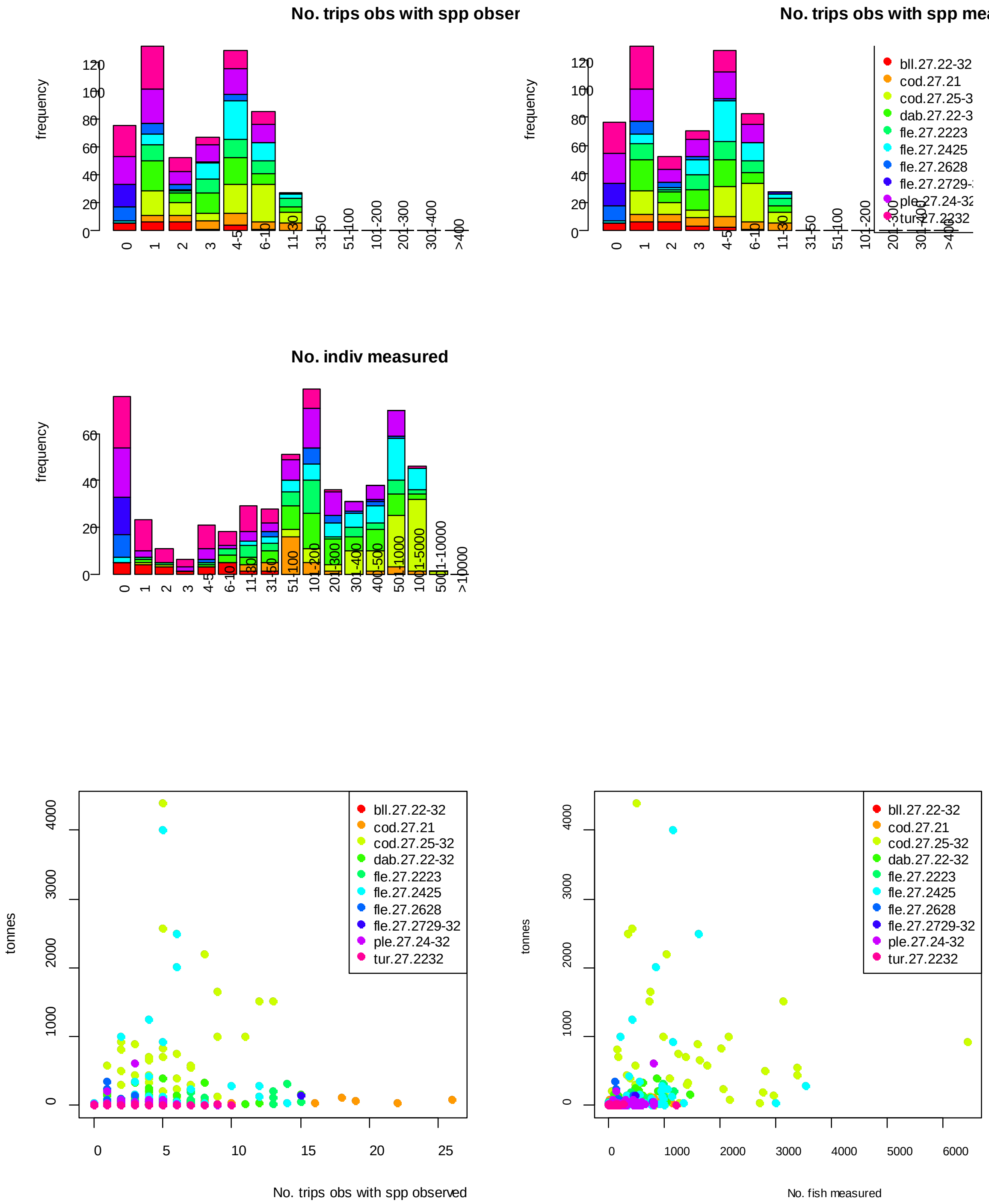


Figure 1. Raw results obtained from analyses of data submitted to WGBFAS. Eleven DLS Stocks were involved and nine countries were requested data on their DLS fisheries. Data were provided by six countries. Coverage of the data may be very limited. Results should not be cited without previous consultation of WGCATCH chairs.

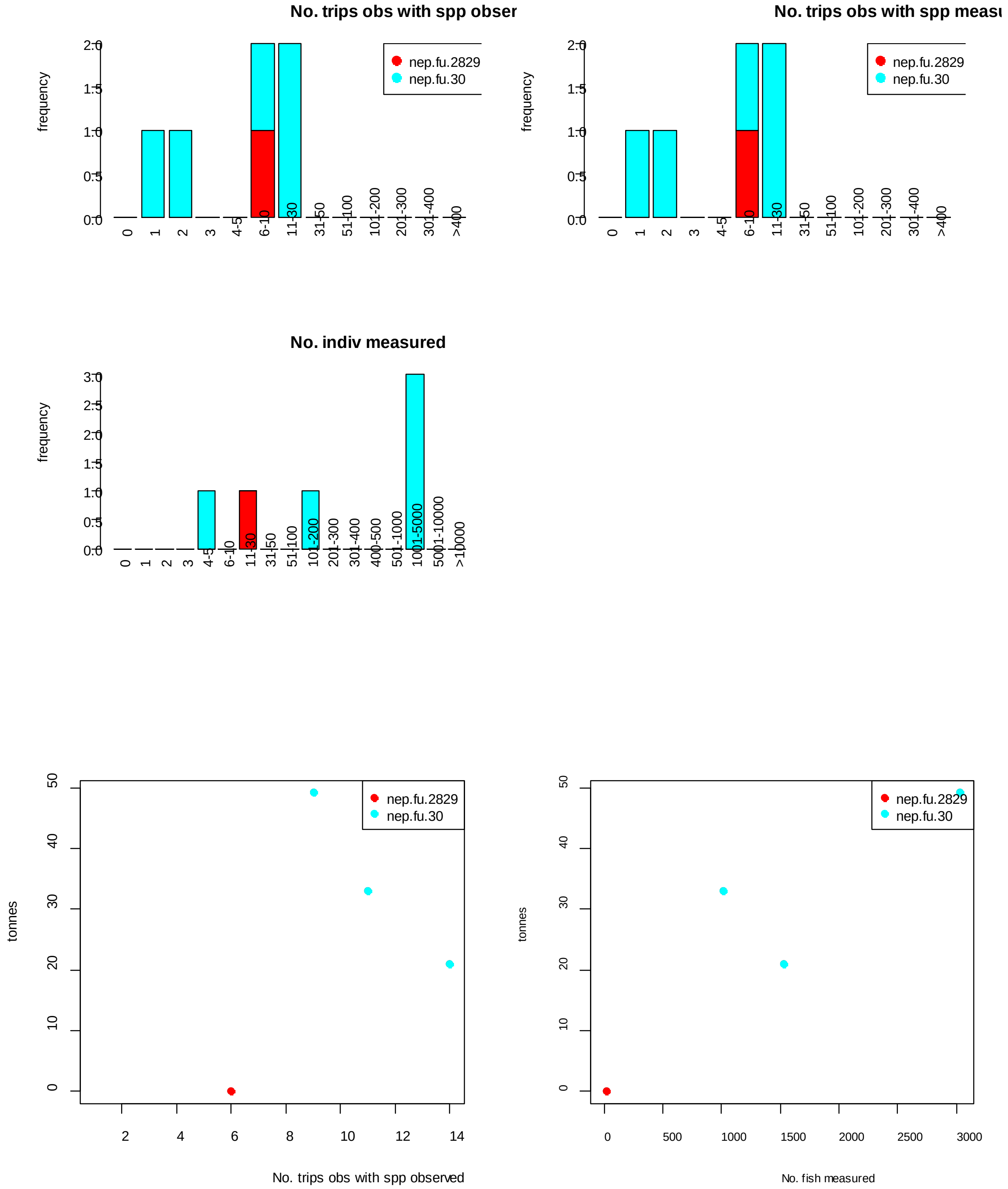


Figure 2. Raw results obtained from analyses of data submitted to WGBIE. Two DLS Stocks were involved and two countries were requested data on their DLS fisheries. Data were provided by two countries. Coverage of the data may be very limited. Results should not be cited without previous consultation of WGCATCH chairs.

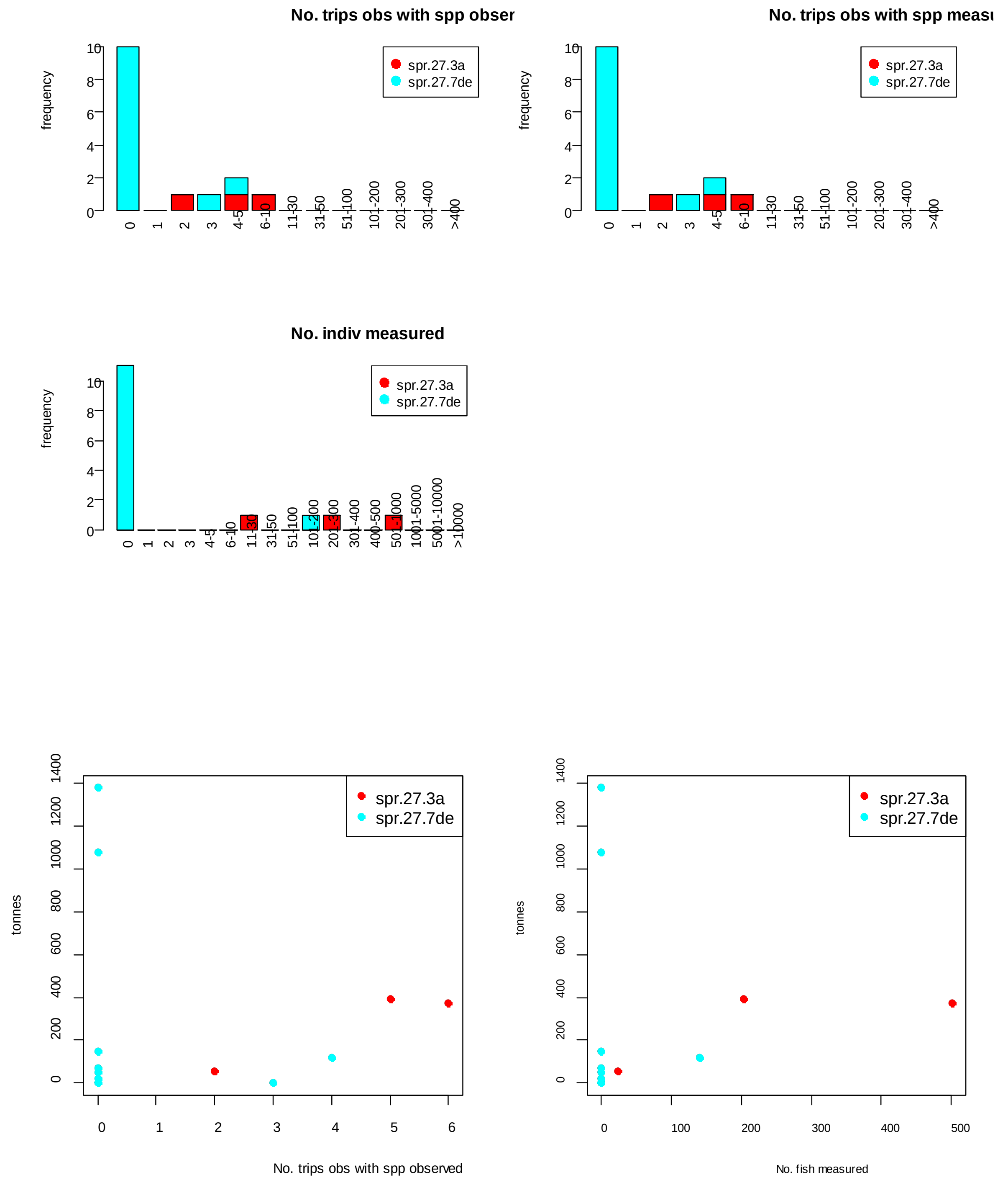


Figure 3. Raw results obtained from analyses of data submitted to HAWG. Two DLS Stocks were involved and eight countries were requested data on their DLS fisheries. Data were provided by only two countries. Coverage of the data may be very limited. Results should not be cited without previous consultation of WGCATCH chairs.

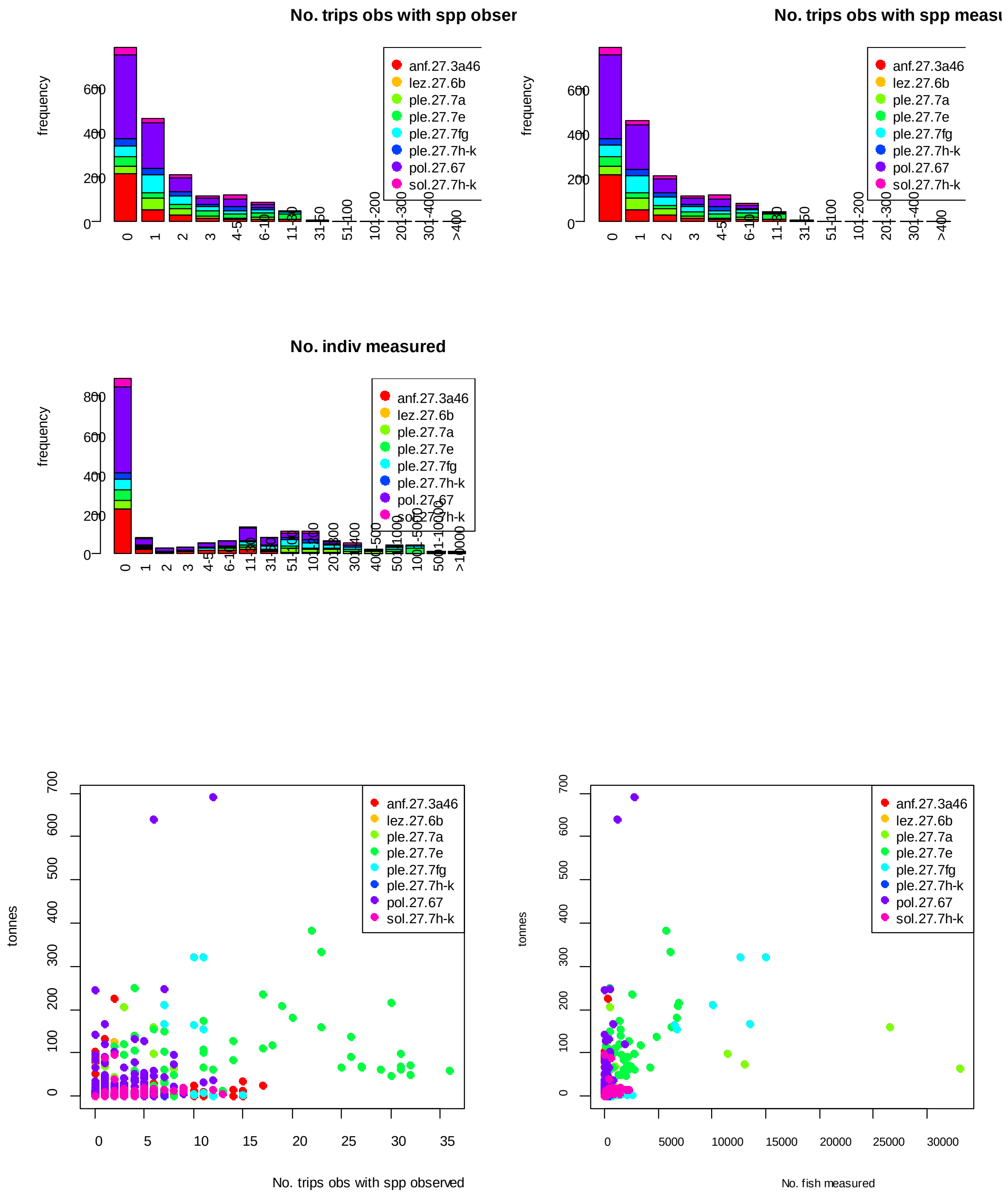


Figure 4. Raw results obtained from analyses of data submitted to WGCSE. Two DLS Stocks were involved and ten countries were requested data on their DLS fisheries. Data were provided by six countries. Coverage of the data may be very limited. Results should not be cited without previous consultation of WGCATCH chairs.

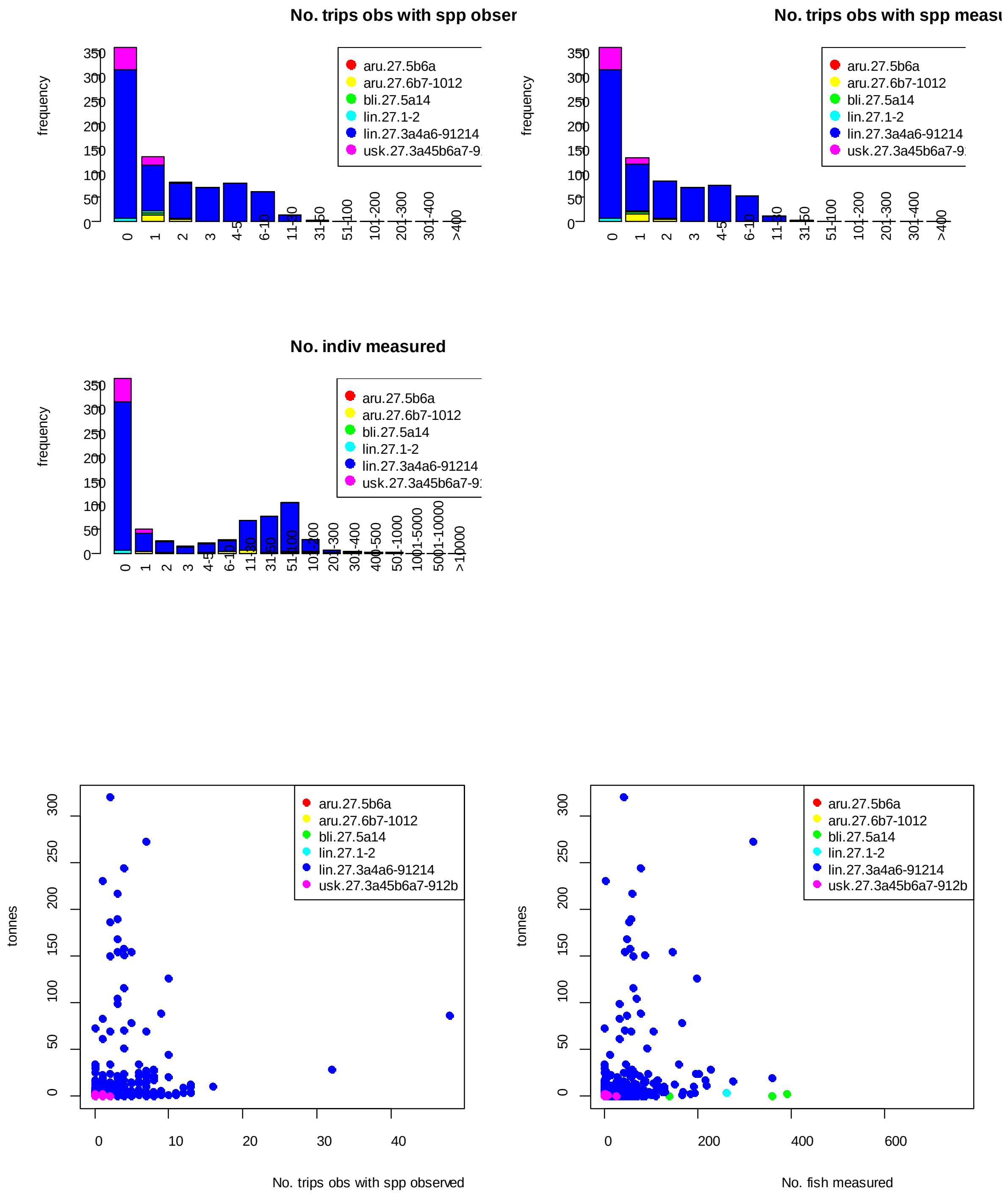


Figure 5. Raw results obtained from analyses of data submitted to WGDEEP. Ten DLS Stocks were involved and 14 countries were requested data on their DLS fisheries. Data were provided by only six countries. Coverage of the data may be very limited. Results should not be cited without previous consultation of WGCATCH chairs.

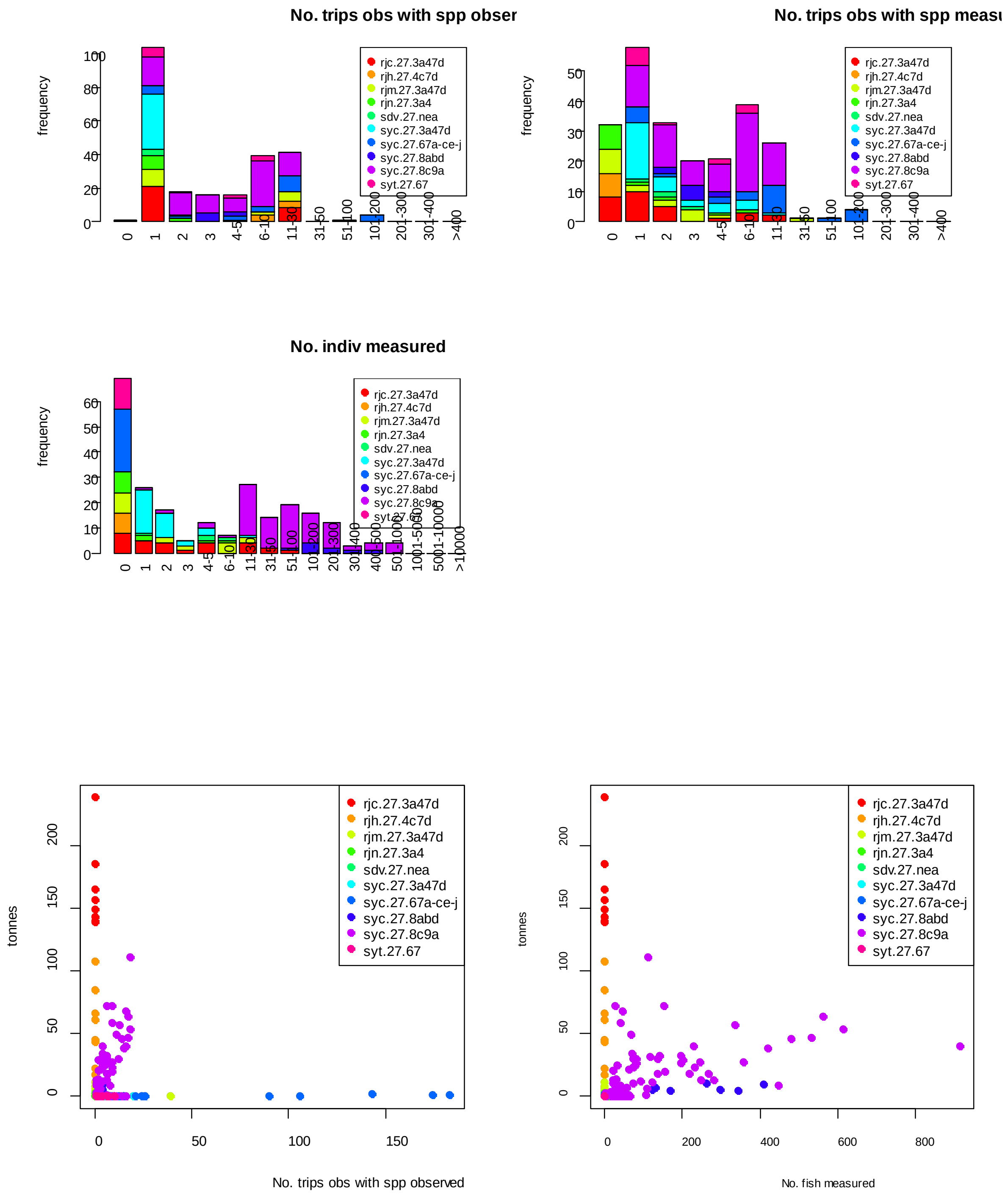


Figure 6. Raw results obtained from analyses of data submitted to WGEF. Eleven DLS Stocks were involved. Data were provided by only six countries. Coverage of the data may be very limited. Results should not be cited without previous consultation of WGCATCH chairs.

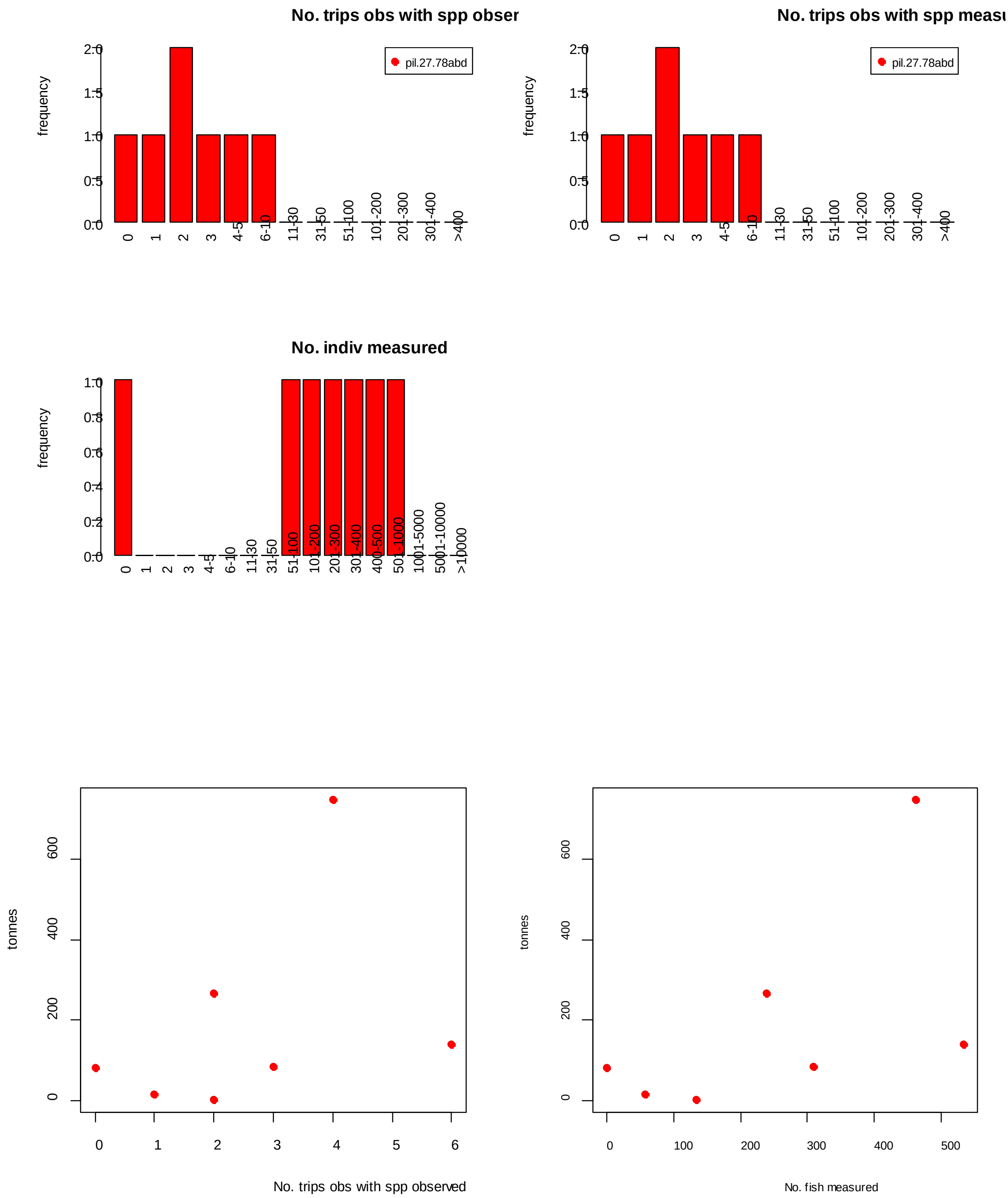


Figure 7. Raw results obtained from analyses of data submitted to WGHANSA. One DLS Stock was involved and five countries were requested data on their DLS fisheries. Data were provided by only two countries. Coverage of the data may be very limited. Results should not be cited without previous consultation of WGCATCH chairs.

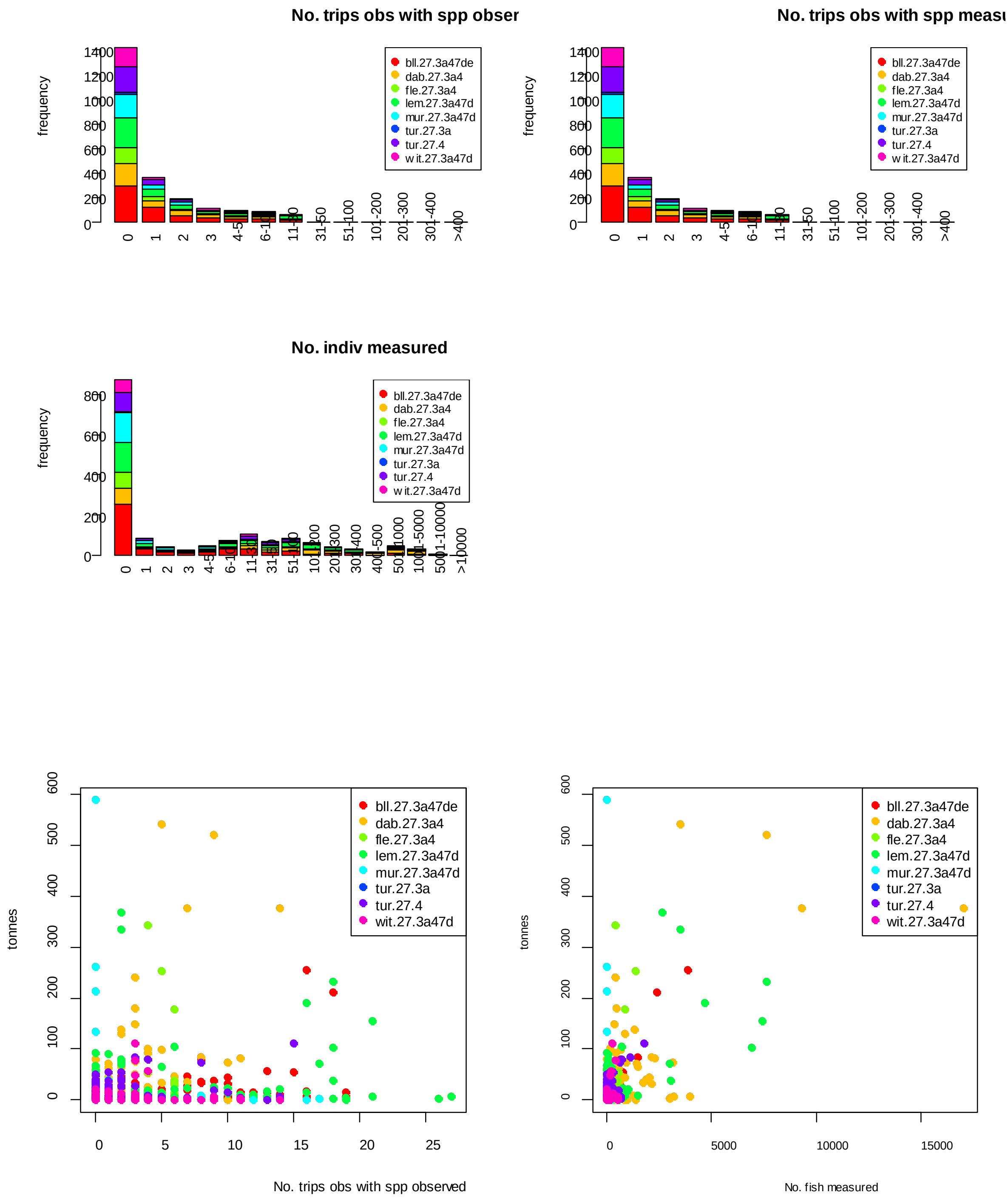


Figure 8. Raw results obtained from analyses of data submitted to WGNSSK. Nine DLS Stocks were involved and ten countries were requested data on their DLS fisheries. Data were provided by only four countries. Coverage of the data may be very limited. Results should not be cited without previous consultation of WGCATCH chairs.

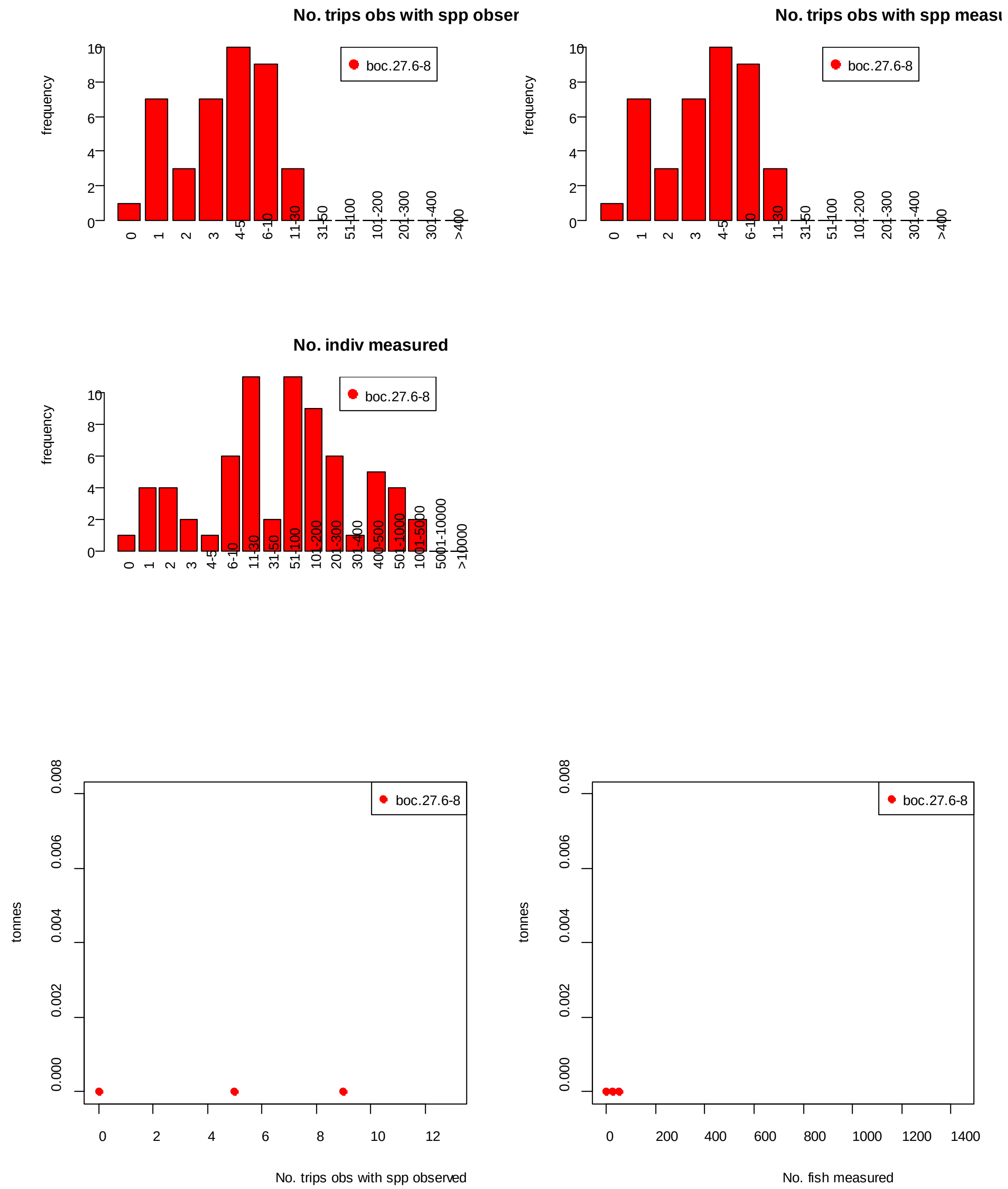


Figure 9. Raw results obtained from analyses of data submitted to WGWIDE. Two DLS Stocks were involved and ten countries were requested data on their DLS fisheries. Data were provided by only two countries. Coverage of the data may be very limited. Results should not be cited without previous consultation of WGCATCH chairs.

WGBFAS case study

Sven Stötera

WGBFAS-Examples

Of the 16 assessed stocks of the Baltic Sea fisheries, nine are categorized as "data-limited stocks (DLS)". These DLS are ranging in data quality and in sampling intensity, where for instance only survey indices and landings can be used for turbot and brill, while plaice (Eastern Baltic) is assessed by an exploratory SAM, which allows the calculation of relative stock size indicators. A questionnaire was sent to the respective data submitter to evaluate the sampling coverage and intensity as well as nationally used thresholds on the data submission.

The questionnaire was not standardized, so MS filled them out in various ways, e.g. by combining different catch categories or areas and using different codes (such as "LAN", "lan", "L" for the landed part of the catch). Also spelling errors (e.g. in the Latin names of the species) occurred, thus preventing an automated evaluation of the information.

Results of the WGCATCH-questionnaires on DLS Data sampling

The general sampling coverage for DLS is low among all MS in the Baltic. Usually the sampling covers only >0.5% of the annual fishing activity (i.e. trips where the DLS stock has been landed against sampled trips of the respective stock). The discarded fraction is sampled less than the landed fraction. The BMS fraction (which only occurs in plaice and cod) is sampled even less. WGCATCH did not evaluate if the current spatio-temporal sampling coverage (in quality and quantity) is sufficient for the respective stock, e.g. for assessment or management purposes. The results should be evaluated by the RCG and forwarded to the stock coordinator and stock assessor of the respective DLS. The information is especially valuable when a stock is undergoing a benchmark.

Results of the WGCATCH-questionnaires on DLS Data submission

It was not possible to compare all responses in the questionnaires as countries filled out the fields in several ways. It became however obvious, that data submitters have different approaches on how and when to submit DLS data (Table 1). Six member countries reported their national threshold practices for the Baltic Sea DLS stocks. Denmark and Latvia do not apply any kind of threshold and are reporting all biological parameters to the respective database. The questionnaire did not ask for an explanation for the different thresholds. No common guidelines or best practices exist for the Baltic Sea region.

Table 1. National data submission thresholds on DLS stocks.

Country	Is there any kind of data quality threshold in place to evaluate if data should be submitted to e.g. databases or stock coordinator?
DEU	All stocks: Data were only used when the number of trips and number of length measurements is assumed to reflect the general fishing pattern. Length measurements were used for raising at a quantity of >10 (stocks with small length range and less landings) or >20 (for stocks with a larger length range and high landings). Gaps in the weight-at-length were filled using same-year length-weight coefficients.
DNK	No
EST	Flounder: Usually the number of fish per trip has been >= 50. Sometimes in the SD 32 it is needed more than 1 trip to get 50 individuals per trap haul.
LTV	No
POL	Turbot: Only fleets (active/passive) *quarter*area with >25 individuals measured/aged
	Flounder: Only fleets (active/passive) *quarter*stock*area with >35 individuals measured/aged
	Plaice: Only fleets(active/passive) *quarter*stock*area with >5 individuals measured/aged
	Cod: Only fleets (active/passive/LLS)*quarter*stock*area with >50 individuals measured/aged
SWE	Cod: A threshold of >=2 trips and >=4 hauls have generally been applied, however, in a few cases, single trips have been used
	Flatfish: Only fleets*quarter*stock*area with >30 individuals measured in >=3 trips were used; Final frequencies were visually inspected and looked reasonable.

The evaluation of the questionnaires show that there is an urgent need for action concerning these thresholds, as they have never been discussed neither in the RCG nor the stock assessment working groups. This should be done at least during the benchmarking process.

Conclusion

The DLS questionnaires provide valuable information that can be used to assess the current state of commercial exploitation and data collection of DLS in different regions. This information in turn can be used by RCG to formulate regional action and improve sampling (in terms of quantity and quality). However, the respective questionnaires need to be streamlined and make it easier to compile and compare answers. The final evaluation (such as identifying important harbours or data delivery thresholds) should be done by the respective RCG and in consultation with WGCATCH, which, in turn, can give advice on best practice and follow-up steps. The questionnaires could be included as a part of the RCG data call or gained from the RDB data after upload, e.g. as part of the work of the intersessional working groups that are planned to start in 2019.

Annex 11: ToR b) Abstracts from the presentations under the SSF

IFOMC 2018 abstract: Small-scale, size isn´t everything: Issues and progress in monitoring European small-scale fleets

Sébastien Demanèche

Small-scale Fleets (SSF) are diverse, multi-gear, multispecies, geographically widespread fleet, involving full-time, seasonal or part-time activities into coastal areas. Their ecological and socio-economic impacts are often little understood mainly due to the limited data available. Preliminary results suggest those impacts are largely underestimated and stress the need to improve data collection. However, SSF appear to be trapped in a vicious cycle where due to the existing data being incomplete and of lower quality, systematically lower importance is assigned to their characterization and sampling when compared to larger scale fleets. The European Commission stressed the intention to provide support to this sector in the latest draft of the Common Fishery Policy (CFP). Within Europe, the multitude of SSF vessels and the local issues contrast to complex multi-levels governance by regulatory and monitoring bodies that cover national and shared fish stocks and which often overlook the potential impact of SSF. Across Europe, the wide diversity of methodologies used in monitoring SSF introduces challenges harmonising and standardising data and quality indicators across countries. Ensuring that the collection of transversal, socio-economic, and biological data from SSF across Europe are sufficient, harmonised and comparable has been the focus of the ICES Working Group on Commercial Catches (WGCATCH) since 2015. In this review, we present some of the work developed in WGCATCH over the last three years: 1) progress in monitoring SSF and their contribution to the total catches (including incidental bycatches of protected species) and fishing effort in some areas; 2) regional variability of SSF in terms of species, gears, métiers or fisheries; 3) description of the different methodologies used by ICES Member States to monitor SSF and addressing some of the technical and logistical issues (sampling approach and census approach); 4) best practice guidelines for the collection of transversal variables and biological data from SSF, and 5) evaluation of the usefulness of some new technologies such as remote electronic monitoring by CCTV and vessels position recording by AIS/GPS for monitoring SSF. At the end, upcoming developments of WGCATCH work on SSF are outlined.

fishPi2 – Strengthening Regional Cooperation in the area of Fisheries data collection – WP5 Small-scale and Recreational fisheries

Estanis Murgeza

Under fishPi² project, WP5 is dealing with the Small-scale and Recreational fisheries. In WGCATCH 2019 meeting, the objectives and progress made were presented but only focusing in the SSF objectives.

One of the main objectives of the project is to identify the different methodologies used to collect data for this fishery considering stock assessment needs, but also for management purposes. For stock assessment purposes, census and sampling schemes are the methodologies used to collect these data. Under WP5, these methodologies are reviewed to identify which data are collected, data gaps, data quality, etc. In fishPi-1 a general review of these methodologies was done. However, as fishPi² is more focused in the practical implementation of these methodologies, real case studies are carried out by four institutes involved in the project to analyse all issues related on the implementation of these methodologies. These National case studies are working following the agreed structure:

- Characterization of the SSF by each country, MS, region, etc.
- Main objectives of the sampling (catch data, effort, biological data, others…)
- Coverage of the fleet: (i.e. total coverage, partial for specific gears, segments by LOA, etc.)
- Data collection methodologies used (census, directed sampling schemes, etc.)
- Data sources
- Estimates provided and resolution (catch, effort by trip, week month, etc. biological data as length structure for some stocks, etc.)
- When possible, compare estimates obtained from official data sources (transversal data)vs.sampling data.

An evaluation of the different methodologies and source of data used for science will be also evaluated using a scored matrix table. Main pros and cons will be also identified.

For management purposes, this WP is considering the use of the new technologies to monitor this fleet and improve their knowledge. For this, a review and comparison of these technologies will be done interviewing main companies/manufacturers producing these devices on the one hand and scientist using the information collected from these devices on the other hand.

Data collected from some of these devices will be also used as case studies. R scripts will be produced to work with geospatial and catch data to highlight their potential utilities for management purposes.

Finally, the incorporation of the data collected using different methodologies in the existing regional databases (i.e. RDBES for the North Sea, Atlantic and Baltic area) will be considered. fishPi² will provide potential option for this incorporation to ICES data centre team and to the SC RDB for their consideration, following exiting formats and fields in the current RDB.

Strengthening Regional cooperation in the area of fisheries biological data collection in the Mediterranean and Black Sea, STREAM

Charis Charilaou, Cyprus

STREAM is one of the four grants funded under the EU Call for Proposals MARE/2016/22 "Strengthening regional cooperation in the area of fisheries data collection", with main objective to provide elements, tools and expertise that will promote and support the design of Multiannual Regional Work Programmes (MRWP) in the Mediterranean and Black Sea, relying on a common and harmonized design. The STREAM Consortium consists of 12 Partners from eight countries. The project is organised in nine Work Packages (WPs) that are closely linked.

The WP3 aims at designing and proposing a regional sampling plan (RSP), covering commercial fisheries/stocks/métiers (RSP-CF) that have been identified as candidate case studies under WP2, taking into account the *statistical and practical aspects of sampling catches in Mediterranean and Black Sea*. The approach followed in WP3 is based on simulations and optimization methods to define the best strategy in terms of **allocation of fishing trips** and **number of biological samples.** Routines developed under previous grants (namely MARE/2014/19 Med&BS and FishPi) and ICES working groups (WKBIOPTIM, 2017; WKCOSTBEN, ICES, 2017) have been updated and are available in Sampling Design Tool and BiolSim Tool. The functions of Sampling Design Tool and BiolSim Tool, with examples from the analysis of a case study on a small-scale fishery in GSAs 9-11 (Ligurian and Tyrrhenian Seas) were presented. In conclusion, the WP3 of STREAM project, enhancing the already existing tools, developed a package allowing: to deal with the statistical and practical aspects of sampling catches, to explore different sampling schemes, and to help in the establishment of best practice and guidelines on sampling and estimation procedures.

Information on the work done under WP5 was presented, namely the Deliverable 5.1 "Review of the availability, quality and existing data gaps for SSF and RF in four case studies". The aim is to perform a review of the available knowledge of SSF in the Mediterranean and Black Seas to develop a common sampling strategy. Case studies were selected from Adriatic, Aegean, NW Mediterranean and Black Sea and include shared commercial stocks and high diversity in terms of gears, target species, seasonality of the fisheries, port location.

The SSF shared stocks identified under WP2 in NW Mediterranean are *Pagellus bogaraveo* and *Merluccius merluccius*, while in Adriatic the shared stocks are *M. merluccius*, *Mullus barbatus*, *Pagellus erythrinus*, *Sepia officinalis* and *Solea solea*.

The selected fisheries in the case studies are set longlines for hake in the NW Mediterranean, gillnets for sole in the Adriatic and gillnets for turbot and red mullet in the Black Sea.

From the review, the following can be concluded:

- The types of data should be defined in cooperation with end-user needs;
- the need for optimization of sampling allocation among different countries has been identified;
- coordination among the lead scientists in each country, RCGs and relevant WGs (ICES, GFCM, STECF) is fundamental;
- substantial additional investment in surveys is required;
- common survey methods are proposed to reduce costs.

Smartphone application *Mofi* for fisheries data collection: Improving data on fishing effort from small-scale fisheries

Uwe Krumme, Germany

Background

In the Baltic Sea, the Thünen Institute of Baltic Sea Fisheries (Thünen-OF; Rostock, Germany) has started a project (project acronym: STELLA, duration: 2017–2020) on alternative management approaches to minimize conflicts between gillnet fisheries and unwanted bycatch, i.e. marine birds and mammals. Currently, the available effort data from the small-scale fisheries fleet are highly uncertain because the data entry by fishers is not standardized for all logbook specifications such as the area of gillnet set and other key parameters such as soaking time are not obligatory as logbook entries. Vessels with <8 m length over all only have to provide monthly landing declarations and data on gear dimensions are missing. These and other issues hamper our understanding of the dynamics of the small-scale fisheries and the uncertainties related to the available effort estimates do not warrant any reliable extrapolations of bycatch events.

Mofi

During the STELLA project the smartphone application (App) *Mofi* (Mobile fisheries log) has been developed for the collection of better data on fishing effort (gear type used, time at sea, spatio-temporal distribution of fishing activities, net length and soaking time in case of gillnet fishery).

Mofi depends on the use of smartphones or iPhones with a GPS receiver, is multi-lingual (currently English, German, Danish, Polish and Spanish) and supplied free of charge, however with minimum requirements for the type of smartphone or iPhone. Mofi was developed by Thünen OF, Germany, and Anchor Lab K/S in Copenhagen, Denmark.

The basic idea of Mofi follows the approach of the reversal of the burden of proof. Mofi is unlike VMS or simple GPS monitoring systems. VMS position records and activity patterns are *post hoc* interpreted based on algorithms using properties of the datapoints such as vessel speed that are supposed to reflect specific fishing activities, i.e. steaming or fishing. These analyses do not provide proof in a manner that can stand up at court. In contrast, Mofi relies on self-reporting of fishing activities by the fishers at sea. Using Mofi, the fishers can categorize their trips into sections where they are either steaming, setting their gear or hauling their gear, with the activities assigned at high resolution in space (GPS position with information on its uncertainty) and time (scale of minutes).

Western Baltic cod spawning closure

Mofi was applied for the first time by German fishers during the spawning closure of western Baltic cod (SD22–24) from 1 February–31 March 2018.

During these two months, the cod fisheries were closed in waters deeper than 20 m because cod mainly spawn deeper than 20 m water depth in those areas. However, vessels <12 m (including vessels <8 m) were allowed to fish during this time period if they were able to document where they fished. The reason for this exemption is that the larger, more mobile vessels can move to other areas to fish while the smaller vessels cannot and stay more local. Vessels <12 m wanting to fish for cod during the spawning closure had to document that they were fishing in waters shallower than 20 m. This could be achieved by paper logbook, VMS or "equivalent electronic monitoring system certified by the control authority".

Implementation of Mofi

In Germany, Mofi was advertised by Thünen OF as such a possible alternative, offering the fishers a tool to proof that they fish shallower than 20 m by continuously logging position in combination with a defined activity status of their vessel (steaming, setting gear, hauling gear). The German government indeed considered it as an equivalent. However, while Thünen OF strongly suggested to recommend Mofi on a voluntary basis (so that fishers have a choice on the tool they want to use to document their activities), the German control authority decided to have Mofi as the only and mandatory tool to document fishing activity during the spawning closure. This was decided only a few weeks prior to the start of the spawning closure and immediately created reluctance among the fishing industry. Moreover, since Mofi was still at a beta version stage at this point, it forced the developers to make it suitable for full application within a couple of weeks, i.e. to collect data that can provide proof in a manner that can stand up at court.

The period prior to the start of the implementation was a quite intensive phase for the developers, involving testing under realistic conditions, fixing bugs, preparing a user manual, privacy statement, etc.

There was no test phase involving the commercial fisheries prior to the implementation and complains from the fishers were numerous. They ranged from simple login and application problems to issues regarding data security, data ownership and the right to access the data.

Among the critics received from the fishery about Mofi two practical improvements emerged. First, it turned out that different mobile phones have different GPS qualities, affecting the recording of the GPS positions and their accuracies. This issue was solved by Anchor Lab K/S by implementing an outlier routine excluding GPS positions if they pass a defined accuracy threshold. Second, Mofi is difficult to use on board of very small vessels steered by only one person because this person has to fulfil multiple tasks at once despite waves, wind and splash water affecting the work on board. This will be solved by the development of a waterproof buzzer, which can be installed on board and operated easily by pushing instead of having to use the mobile phone directly.

In the first week of February, numerous fishers called and their concerns, questions and requests were handled. After the second week, user problems became less frequent and during the last weeks of the spawning closure, queries by the fishery became less and less. After the end of the spawning closure, the control authority reported that approximately 90 German vessels had used Mofi and that no infringements had occurred. During a meeting with the control agency, an example was presented showing the highly resolved spatio-temporal data on fishing activities that were collected with Mofi.

The data collected with Mofi could be used to outline fishing grounds (relevant to fisheries management e.g. with respect to spawning closures or marine spatial planning, i.e. fishers can provide evidence on areas which they frequently use for fishing), estimate soaking time and net length in case of gillnet fishery.

Results

Results could not be presented. So far, Thünen OF was not granted access by the control agency to the data collected via Mofi, despite the fact that Thünen OF developed Mofi together with Anchor Lab K/S and offered it to the control authority to facilitate their control task as well as to generally collect better effort data from the small-scale fisheries. General data access policy issues are now under discussion because of the Mofi data, also involving VMS data. Despite the great potential of Mofi and statements from the federal government that digitalization is one of their key working objectives, the prospects of practical use of Mofi in Germany are at present uncertain. There will be no spawning closure for western Baltic cod in 2019 so the use of Mofi is put on ice. There are, however, other stakeholders interested in using Mofi (e.g. a group of small-scale fisheries vessels targeting herring).

During summer 2018 (when both the Android and iOS version were available) Denmark also has used Mofi addressing issues of marine spatial planning. Information on important fishing grounds of small-scale fisheries is often missing, as these vessels are not obliged to use VMS. In order to learn more about the gears used and the fishing locations of the Danish small-scale fisheries, DTU Aqua in Denmark suggested to the fishers that Mofi could be used on a voluntary basis as a tool to document their important fishing grounds. A fisher association having members conducting small-scale fisheries seemed interested in using the app but after testing, they gave the feedback that they only wanted to use Mofi if they could be anonymous. This cooperation was therefore stopped.

Outlook

Currently, the variety of experiences gathered during the western Baltic cod spawning closure 2018 is being analysed at Thünen OF. There are plans to (i) use Mofi in case decision-makers decide for area closures with small-scale fisheries exemptions or in other similar projects, and (ii) to further develop Mofi towards an e-logbook for small-scale fisheries given the designated reform of the control regulation.

Summary of the Polish presentation entitled: "Small-scale (coastal) fisheries in Poland (the Baltic Sea); structure, definitions, limitations"

Włodzimierz Grygiel

The aim of presentation entitled: "Small-scale (coastal) fisheries in Poland (the Baltic Sea); structure, definitions, limitations", and linked with the ToR b) was to analyse the status of national small-scale fleet, fish catches composition and utilization of the annual quota by SSF. Moreover, in the presentation were indicated the sources of possible conflicts of various users of the Polish Marine Areas with commercial fisheries.

Part of the presentation was devoted consideration on various definitions of the coastal zone and the coastal (SSF) fishery, applied in some countries. For example, the common understanding of the coastal fishery (SSF) in Poland is as follow: is realised mostly in the zone of 12 NM from the coastline, predominantly on the depth ≤ 20 m, by motorboats and rowing-boats <12 m length, frequently using passive fishing gears, e.g. moored and drifted gillnets and trapnets. Such fishery is practised by family members (not always) having many generations of professional tradition. In the presentation can be found also information about sources of descriptions of the structure of the Baltic and other seas national coastal fisheries.

The status of the Polish coastal fleet and utilization of the national annual fishing quota was not stabile over the period 1970–2017. In the 1970s, overall 1090 motorboats and rowing-sailing boats were operating in the Baltic. However, in 2009 (five years after accession to UE) the number of fishing boats decreased by 41%. In 2012–2017, the number of registered fishing vessels enlarged (especially from the size group <10 m length) and fluctuated from 792 to 869. The fish catches composition (2012–2017) considerably differ for two size groups of vessels, i.e. <10 m and 10–11.99 m length. For example, Baltic cod catches amounted 892.5 and 1986.2 tons, and herring catches was 2709.0 and 981.1 tons, respectively to mentioned size groups of vessels.

The traditional and new users of the Polish marine areas were also indicated, with remarks, which is limiting or potentially conflicting with the commercial fishery (Large-Scale Fleets and Small-Scale Fleets). To the group of traditional users of the Polish marine areas were included: fish research surveys (BITS, BIAS and BASS types) – not conflicted with the professional fishery, and fish recreational sea-angling – will contribute to the partial limitation of the commercial fishery, and the marine tourism and water sports – are a minor source of complication in fish catches realization. The new present and potential users of the seabed space were pointed as sources of complication in fish professional catching. To the group of new users were incorporated:

- the exploration and exploitation of mineral resources and the external connection infrastructure;
- implementation of the large-scale technical constructions, e.g.: marine wind power farms;
- the navy military trainings of the war-ships in areas closed to ships navigation and fishing, and soldiers exercises on beaches;
- the new roads for vessels, vessels traffic separation zone;
- the Baltic Sea Protected Areas and Natura-2000 sites.

As additional source of fish commercial catches direct limitation were pointed: sea-mammals (grey seals, harbour porpoise) and seabirds (common cormorant, sea gull) predation. Indirect source of fish commercial catches complication were considered;

the marine litter (incl. ghost nets), as well as CW and munitions dumped on the sea-floor.

The content of presentation was discussed with the attention address to the future of the Polish SSF realisation vs. exist and planed various technical constructions on the seabed and other new users of the Baltic space.

A new approach to estimate landings and fishing effort of small-scale fisheries by re-evaluating declarative data from the Ifremer exhaustive activity calendar survey. Application to the French Mediterranean vessels

By Sebastien Demaneche, Ifremer, France

The 1289 (year 2017, 1087 active vessels) French Mediterranean continental (without Corsica) vessels are characterized by a predominant part of small-scale coastal vessels (91% of the vessels are less than 12 meters and 83% less than 10 meters). This is a polyvalent fleet (often practicing more than one métier during the year and sometimes during the same fishing trip) practicing a large diversity of métier (mainly passive gears) from diving to dredges, also nets, pots, beach-seines or fykenets. Fishing activity is mainly practised in coastal area (included pond fishing) and concentrated in the 3–12 miles boundaries. Consequently, there is a large diversity of species landed. All of that introduce challenges for their fishing activity data collection.

Since 2000, Ifremer has implemented a Fisheries Information System (FIS), a permanent, operational and multidisciplinary national monitoring network for the observation of marine resources and their uses, allowing an integrated and comprehensive view of fishery systems including biological, technical, environmental and economical components (Leblond *et al.*, 2008). The FIS covers all the French fisheries, including small-scale and overseas fisheries.

One of the originalities of the FIS lies in the fleet monitoring procedure: a comprehensive collection of annual fishing activity calendars of the national fishing fleet register' vessels aiming at characterizing the inactivity or activity of the vessels each month of the year and, in the latter case, the métiers practised (use of a gear to target one or several species) and the main fishing areas (Berthou *et al.*, 2008). This survey covers all the French fishing fleets (exhaustive characterization of the national fishing fleet register) and provides minimum but exhaustive information on the vessels, giving structural information of the fisheries surveyed. The objective is to have a complete picture of the whole fleet in terms of monthly fishing activity schedules indicating notably the main fishing grounds and métiers operated by the vessels.

Annual fishing activity calendars survey provide input each year for, by example, the typological classifications of vessels by fleet, the complete description of their fishing activity or the definition of efficient sampling plans to structure the routine data collection. They are also used to assess the completeness, reliability, accuracy and pertinence of the declarative data (sales note, logbooks and monthly declarative forms) available.

For example, in 2012, incompleteness' indicators based on a comparison of all the declarative data available (compiled through a cross-validation tool of all the different declarative sources ; tool aiming to provide the best possible fishing statistics data and to build a dataset compiling the most accurate and complete information for each individual fishing trip) with the exhaustive fishing Activity calendars showed that the less than 12 meters French Mediterranean continental fleet was affected by a crucial lack of data, regardless the region considered (less than 20% of the fishing month in 'Provence Alpes Côte d'Azur' region (PACA) and 40% of the days at sea in 'Languedoc Roussillon' region (LR)). On the other hand, declarative data of Large-Scale Fleets (>=12 m) are much more complete (75% of the vessels for PACA and 95% of days at sea for LR).

Such missing data generate difficulties to estimate fishing activity variables of these vessels (landings and spatial fishing effort estimates). In fact, these data have been assessed as incomplete and imprecise, and therefore as insufficient to meet the end-users data needs (e.g. DCF requirements). Consequently, and since 2008, a complementary sampling approach has been deployed in the Mediterranean area (*GSA7)* for vessels under 12 meters to monitor this fleet and estimate their fishing activity variables (Demanèche *et al*., 2013). The sampling scheme consists in a cluster-weighted sampling of fishing trips (catch assessment survey, spatio-temporal on-site sampling plan) based both on the fishing fleet register (administrative data) and the Ifremer annual activity calendar survey.

However, recent analyses showed that the quality/representativeness and the completeness of the available declarative data are increasing since 2012; indeed incompleteness' indicators improve and are undoubtedly in an increasing tendency both in LR and PACA regions. For example, in 2012, 78% of the active LR less than 12 meters vessels had at least one declarative data available when this percentage achieve almost 100% of them in 2016. Analysis showed also that data quality/representativeness and completeness improvement affect all the length classes (from less than 6 meters vessels to 10–12 meters vessels), all the fishing areas and all the métiers. It could be then concluded that today the declarative data available integrate all the different parts/types of fishing activity taking place in the French Mediterranean continental less than 12 meters fleet.

Nevertheless, and that for the two regions, available declarative data still remain incomplete as it is (for example only 69% of the vessels in LR and 30% of the days at sea in PACA with declarative date available in 2016). Therefore, their data have to be re-evaluated/re-assessed/elevated in order to represent the reality of the total fishing activity of the fleet.

Consequently and following this increasing, trend an alternative methodology (different from the Catch Assessment Survey) has been developed in order to estimate the fishing activity variables of the vessels, based on a re-evaluation of the available declarative data scaled to the annual fishing activity calendar survey.

An empiric coefficient of re-evaluation is defined by métier based on a comparison of the comprehensive fishing activity calendars and the available declarative data:

$$\begin{cases} \boldsymbol{\tau_m = \dfrac{number\ of\ months\ in\ Activity\ calendars}{number\ of\ months\ in\ declarative\ data}} \\ \boldsymbol{\tau_d = \dfrac{number\ of\ days\ at\ sea\ in\ Activity\ calendars}{number\ of days\ at\ sea\ in\ declarative\ data}} \end{cases} \rightarrow \boldsymbol{\tau = \dfrac{\tau_m + \dfrac{{\tau_d}^2}{\tau_m}}{1 + \dfrac{\tau_d}{\tau_m}}}$$

The coefficient has been defined after an optimization analysis and is based on two basic coefficients, the first one τm comparing the number of month for the métier observed in the annual fishing activity calendars and the number of month for the métier available in the declarative data, the second one τd comparing the number of days at sea in the two data sources.

For a given métier, based on this coefficient and fishing activity variables (fishing effort-number of fishing trips, landings by species) directly available in the declarative data, total fishing effort (number of fishing trips, fishing days and days at sea are assimilated) and total landings by species are estimated.

The method is then embedded in a probabilistic framework in order to estimate confidence intervals of the re-evaluated indicators. A probability that a fishing trip is available in the declarative data is modelled following a probabilistic Bernoulli experiment law scaled to the coefficient of re-evaluation observed for the métier. Imprecision around this probabilistic law is then fixed arbitrarily at 10% to construct confidence intervals for the re-evaluated indicators.

$\mathbb{P}(n = k) = \binom{N}{k} \frac{B\left(k + \frac{\beta}{\tau - 1}, N - k + \beta\right)}{B\left(\frac{\beta}{\tau - 1}, \beta\right)}, k$	$IC_{95\%}(Q) = \left[\hat{Q} - 1.96\sqrt{\mathbb{V}(\hat{Q})};\ \hat{Q} + 1.96\right.$

The methodology, including the calculation of the precision and finally enable the calculation of all the fishing activity variables by métier and also by fishing area for French Mediterranean continental less than 12 m fleet. Comparison with fishing activity variables estimates calculated through the Catch Assessment Survey (today ongoing) has been done and it concluded that results are similar (similar patterns and values). It has been demonstrated for the region LR but also for the region PACA although their declarative data are much more incomplete. Good quality results could be provided by the method until the declarative data are sufficient to represent the diversity of gears and fishing area practised by the fleet considered and until fishing activity calendars are well designed, complete and of good quality.

Finally, an alternative method based on the declarative data has been has been developed, it is a promising method which proved to be applicable in a wide context in case of increase of declarative data.

In order to apply it, the following points have to be taken into account:

- Quality and representativeness of the available declarative data should be assessed before;
- Quality of the estimates calculated is depending of having a well-designed, complete and good quality comprehensive/exhaustive (covering all the vessels) fishing activity calendars.

Keywords

Small-scale fleets (SSF), data collection methodologies, annual activity calendar survey, fishing activity estimates, sampling approach, census approach, incompleteness/imprecision of declarative data, re-evaluation methodology, precision calculation.

Names of authors

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Annex 12: ToR b) Template for questionnaire on SSF effort calculation and data quality

Background

The following questionnaire is to be completed by the DCF National correspondents and/or WGCATCH scientists with knowledge of their national SSF data. If you cannot complete the questionnaire, please pass it to and expert in your National Institute.

Based on cross-validation of the declarative data (e.g. sales notes, landings declaration, logbooks, adapted declarative forms) available in your country on SSF (less than 12 m' vessels), the fishing fleet register and your expertise, complete the template below and answer the following questions.

Main questions

1) Could you describe the National legislation in place for SSF data collection and the associated control system?

2) Do you consider that a vessel without any declarative data is an inactive vessel?

3) Do you have any tool/mean in used in your country to assess the reality of the inactivity of the vessels without any declarative data (used of a complementary survey, cross-validation with other sources of data, ...)? If not, do you think that this assumption is correct based on your expertise?

4) Have you ever done a complete census or a sampling survey of your SSF fishing fleets to assess/qualify these assumptions? If yes, what were the main results of it?

5) Do you have some 'scientific' survey to assess the reality/quality of the declarative data collected under the legal requirement mainly control regulation (comparison of cpue, landings per trip, etc.)?

6) Could you assess the quality of the declarative data collected under control regulation, especially on gear, gear mesh size, gear dimension, spatial distribution, landings and catch data?

7) Do you think that declarative data collected under control regulation is appropriate to scientific use? If not, do you perform complementary sampling survey to improve the estimates' quality?

8) Summarise the methodology used for calculating fishing effort estimates for SSF and passive gears. Is it in line with the methodology developed during the 2nd DCF workshop on transversal variables (Nicosia, 2016)? If not, what are the main concern/difficulties you meet to apply it?

Part 2 of the questionnaire: Excel fil to be filled

Sampling info Excel sheet:

Country	Supra Region	ICES Region	Year	Sources of declarative data collected	Sampling programmes covering under 12m vessels?	If yes to previous, describe sampling programmes	Type of data collection used for 'official' fishing activity estimates calculation	Comments
Country Code and label (ex. FRA/France)	*FAO Area (ex. AREA 37/Mediterranean and Black sea)*	*If necessary, precision of the region concerned (ex. GSA8/Corsica Island)*	*Year of reference (ex. 2017)*	*ex. logbooks, sales notes, etc.*	*Yes/No*	*ex. Catch assessment survey*	*Census, Sampling or Combined ?*	*Some more explanations of the method used to assess the fishing activity estimates of the vessels*

No_vessels Excel sheet:

Country	Supra Region	ICES Region	Year of reference	vessel length range (m)	Number of vessels by vessel length range in official national fishing fleet register	Number of national fishing fleet register vessels with a minimum of one declarative data available in your dataset by vessel length range
Country Code and label (ex. FRA/France)	*FAO Area (ex. AREA 37/Mediterranean and Black sea)*	*If necessary, precision of the region concerned (ex. GSA8/Corsica Island)*	*Year of reference (ex. 2017)*	*0-6m, 6-8m, 8-10m,10-12m*	*In whole numbers*	*In whole numbers*
				0-6		
				6-8		
				8-10		
				10-12		

No_vessels_per_trip Excel sheet:

Country	Supra Region	ICES Region	Year of reference	Vessel length range (m)	Trips range	Number of vessels by vessel length and trips range
Country Code and label (ex. FRA/France)	*FAO Area (ex. AREA 37/Mediterranean and Black sea)*	*If necessary, precision of the region concerned (ex. GSA8/Corsica Island)*	*Year of reference (ex. 2017)*	*0-6m, 6-8m, 8-10m,10-12m*	*<10 trips, 10-50 trips, 50-100 trips, 100-150 trips, >=150 trips*	*In whole numbers*
				0-6	<10	
				0-6	10—50	
				0-6	50-100	
				0-6	100-150	
				0-6	>=150	
				6-8		
				8-10		
				10-12		

Annex 13: ToR b.2) Compile information on how different laboratories calculate effort for small-scale fleets and passive gears

The methodology applied for fishing effort estimates calculation has been summarized by most of the countries in the questionnaire replies (Q.8 Summarise the methodology used for calculating fishing effort estimates for SSF and passive gears. Is it in line with the methodology developed during the 2nd DCF workshop on transversal variables (Nicosia, 2016)? If not, what are the main concern/difficulties you meet to apply it?), only two countries did not provide any information on it and one country mentioned that there is no specific methodology in used for SSF fishing effort estimates calculation. Regarding the fact that the methodology MS applied is or not in line with the methodology developed during the 2nd DCF workshop most of the countries (eight) replied yes when six of them answer that they are partly following it. Key elements from these answers are that four countries mentioned that they applied the following assumption: 1 trip = 1 day at sea = 1 fishing day in order to calculate the fishing effort estimates when, even more, three countries apply the following stronger assumption: 1 sales note = 1 trip = 1 day at sea = 1 fishing day. Finally, few countries pointed out some specific concerns or difficulties faced in order to be in line with the "Nicosia methodology". These difficulties reflect concern shared by most of countries regarding the 2017 WGCATCH meeting discussions. Corresponding extracts from the questionnaires are provided hereafter:

- Difficulty to apply the "24h period definition" for "Days at Sea" calculation;
- Difficulty to count separately each separate fishing trip. Data available for these vessels are collected on a 'day by day' basis instead of a 'trip by trip' basis and in consequence effort calculation have been calculated on a 'day by day' basis. This is in line with the specific features of SSF (they could be a great impact to consider each trip separately for SSF vessels as they frequently used to do two trips during the same day, one to put the gears in the sea and one to remove them from the water) and the fact that in general SSF has a daily activity (one fishing trip = one day at sea = one fishing day);
- Effort is calculated on day basis using coastal logbook data;
- SSF Effort is calculated on fishing day basis;
- Monthly journals do not discriminate catch and effort on a trip by trip basis;
- Additionally, one fishing day for vessels <10 m length is considered as one fishing trip;
- For vessels less than 10m length, sales notes are used as a proxy for fishing days, which are considered equivalent with days-at-sea, fishing trips and fishing operations;
- Lack of "trip*gear" information available in monthly journal data to fully apply the "Nicosia methodology";
- Main difficulty: no data on the level of single trips by the day;
- one sales note = one fishing day = one day at sea;
- For vessels under 10, sale notes are used but then some analysis are made to provide effort information considering days at sea as effort unit;
- For the general fleet of vessels operating in SSF it can be assumed that the majority of trips are 24 hours, so effort in number of fishing days per gear is available;

- Additionally, one fishing day for vessels <10 m length is considered as one fishing trip;
- There is direct recording of fishing effort in terms of calendar days of effort;
- Difficulty to reach the gear information when only the sales notes or landings declaration are used to assess the SSF fishing activity;
- Not applicable for Norway because reporting of effort for SSF was not implemented until now, as the country is not in the EU so there is no obligation to follow EU Regulations. For the general fleet of vessels operating in SSF it can be assumed that the majority of trips are 24 hours, so effort in number of fishing days per gear is available. The Directorate of Fisheries is in the process of implementing mandatory reporting trough logbooks for SSF with detailed information on effort (such as number of hooks, number of gillnets etc.) and VMS monitoring. The plan is that all vessels regardless of size will be subject to mandatory ERS and VMS monitoring by 2022.

All of those confirm the different conclusions drawn in 2017 WGCATCH meeting. Difficulties are especially highlighted for most countries to calculate the SSF fishing effort estimates on a “trip by trip” basis (as requested in the “Nicosia methodology”). "Day by day” basis" calculation should be preferentially applied for them to take into consideration their specific features and ongoing data collection systems. In addition, “24h period definition” for SSF days at sea calculation could not be applied in most of the cases. Fishing effort estimates calculation methodology should be consequently adapted considering also the fact that SSF have generally a daily activity and consequently that it could be assumed in most of the cases that: 1 Trip is equivalent to 1 Day at Sea also equivalent to 1 Fishing Day as far as no other data contradicts this hypothesis. Finally, difficulties have been highlighted in many countries (in particular for the ones using sales note or landings declaration to follow SSF) to reach the gear information (including the gear dimension). For these countries, this information have to be assessed by sampling survey.

Overall, it can be concluded that MS tried, for SSF fishing effort estimates calculation, to keep in line as far as possible with the “Nicosia” methodology established for vessels carrying logbooks considering also: 1) the specific features of SSF and 2) the data available and the way to collect them.

Annex 14: ToR b.2) Evaluate the quality of SSF data and cross check between declarative data and register data and ToR b.3) Using case studies develop a list of quality indicators for sampling and estimation of small-scale fleets

WGCATCH 2015 provided a first overview and summarized a range of possible data (landings, fishing effort, other transversal variables and fleet-based biological variables such as length compositions or discards) collection methods currently applied in EU countries for small-scale fleets. The group concluded that SSF have to be monitored differently (by comparison with Large-Scale Fleet) by a method adapted to their specific features and that **for fishing activity SSF data collection** two main different approaches are applied: **Census** or **Sampling approach** (sometimes **combined**).

WGCATCH 2016 drafted a **generic** and **specific guidelines** on **best practices for collection of transversal variables and biological data in SSF** which deal among others with the following 1) the quality issues (design, implementation error, refusals, accuracy, estimation method, …), 2) how to assess the accuracy/reliability/completeness of data 3) appropriate sampling schemes and adapted declarative forms to monitor SSF, 4) census or sampling approach? (Issues of cost efficiency and precision), 5) key issues to sample SSF biological, discards and PETS catches data onshore and on-board, 6) spatial mapping activity estimates of SSF.

Since 2017, WGCATCH focused on the development of a list of **data quality indicators** and **quality checking methodologies**. The questionnaire elaborated in 2017, and analysed in 2018 WGCATCH meeting, focused on the coverage/completeness and the accuracy/reliability of data collected in a census approach with the objective to establish a first overview of the quality indicators and checking methodologies in place in MS.

First outputs of the questionnaires was to update the overview done in 2015 and assess the importance of the different approach in used in MS for fishing activity SSF data collection. Two summary tables have been compiled from the questionnaires received (in some cases the relevant DCF work plans available at https://datacollection.jrc.ec.europa.eu have been consulted for clarifications). Table 1 focus on the vessels under logbooks requirement (vessels more than 10 meters, 8 meters in Baltic) and Table 1 on the others vessels. Information issued from the “Sampling info Excel sheet” and principal outcomes and key outputs of the Q1 (Q1. Could you describe the National legislation in place for SSF data collection and the associated control system?) Replies have been taken into account.

The common sources for SSF effort and catch data collection used by the countries are the ones required under EU Control Regulation, i.e. Fleet register, Sales notes and EU logbooks for vessels >=10 m (>=8 m in Baltic Sea). At national level, in addition to the declarative requirements under the control regulation, different sources of declarative data to monitor SSF are used, especially for vessels <=10 m length, at census or reference fleet/fisheries specific/area level.

More precisely, for **vessels that are under logbooks requirement (vessels more than 10 meters, 8 meters in Baltic, Table 2))**, logbooks (hardcopy and/or electronic) are the most common source (almost available in all the countries surveyed) of declarative data used to assess SSF fishing activity variables. Consequently, census approach (18 countries) is the most common approach used by countries to collect data on SSF. Logbooks are cross-validated/completed with sales notes for twelve countries when six countries based their calculation only on logbooks (among them, Germany is developing crosscheck methodologies in order to take also into account sales note). Finally, the three following countries apply a different methodology: Norway uses only sales notes but main gear[3] and main fishing area are available within[4], Spain (Basque country) uses combined approach improving control regulation data with dedicated sampling programme and sales notes from fishermen association and France (other regions) uses sampling approach (catch assessment survey) for some regions/fisheries. In order to improve the estimates, some countries used data from innovative/new technologies systems when others collect additional data: 1) three countries use geolocalisation devices dedicated to a part of the fleet, 2) one country collect complementary data from an app' self-reporting programme, 3) two countries collect data from a reference fleet and 4) one country does an exhaustive survey (fishing activity calendars) in order to asses coverage and precision of the available declarative data and eventually re-evaluate/complement them.

For the other vessels (vessels less than 10 meters, 8 meters in Baltic, not under logbooks requirement) (Table 2), census approach (14 countries) remain the most common approach used but the situation is more diverse. Under an established national legislation for control purposes, eight countries complete a SSF adapted declarative form (named differently in each country as coastal logbooks, coastal journal, monthly declarative forms, etc. each of them presenting a specific format). They are cross-validated/completed with sales notes for three countries, while the other five countries based their calculation only on these declarative forms (among them, Germany is developing crosscheck methodologies in order to take also into account sales note). Germany completes these data with economic sampling program for fishing effort estimation. Nine countries used a census approach mainly based on sales notes (among them, UK is developing self-reporting program through weekly landings declaration as the one already in place in Scotland). In order to complete/enhance them, seven countries collect additional data coming from 1) on-site sampling program (three countries), 2) vessels sampling program (two countries), 3) sales notes collected by fishermen association (one country), 4) vessels fishing licenses data (one country) or 5) indirect reporting of vessels activity using local knowledge (one country). Only two countries used a sampling approach to collect and estimate 'official' SSF fishing activity data through an on-site or a vessels sampling program.

Six countries indicated that special regulations are enforced for some specific fleets/fisheries for which better quality data are available. Finally, five countries indicated that SSF data collection benefit or will benefit (data quality improvement) from innovative/new technologies (geolocalisation device and/or app' self-reporting programme) and one country do an exhaustive survey (fishing activity calendars) in order to assess coverage and precision of the available declarative data and eventually re-evaluate/complement them.

Information about less than 12 meters' **sampling programme** in place, have been also compiled in Table 3. Under this point, some first information about **biological SSF data collection** have been compiled although the questionnaire focused more on fishing activity variables. These first information globally confirm the conclusions coming from

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[3] But with no information on mesh-size and selective devices.

[4] No effort information are available except for specific shellfish fisheries with pot-days required.

the previous overview showing that it is mainly included in a general (across all vessel size) sampling scheme, however the SSF have specific issues, such as the limited space and safety on-board, which generates challenges to access those vessels for sampling discards and catches of PETS (Protected, endangered and Threatened Species) although they can have a significant contribution.

The group highlight that the different methodologies and data formats existing across countries, stored in different ways, create challenges to the standardization of calculation of fishing activity variables and encouraged countries, for sake of consistency and comparability, to share procedures and principles in used in order to pursue this objective.

Table 1. Summary of SSF data collection by country, vessels under logbooks requirement *(vessels more than 10 meters, 8 meters in Baltic)*

SSF - Fleet 10-12meters (8-12meters in Baltic Sea)										
Sources of declarative data collected	**BEL_27**	**CYP_37**	**DEU_27**	**DNK_27**	**ESP_27 (Basque)**	**ESP_27 (Others)**	**FIN_27**	**FRA_27, 37**	**FRA_31, 41, 51**	**GRC_37**
Fleet register				x				x	x	
EU Logbooks (landings declaration)	x	x	x	x	x	x	x	x		x
Sales notes	x	x	x[2]	x	x	x		x		
Sales notes from fishermen association					x					
On-site sampling program *(Catch assessment survey)*					x				x	
Vessels sampling program *(Reference Fleet)*										
New technology program *(new apps, geolocalization devices)*				x*	x			x*		x*
SSF census survey *(Fishing activity calendars)*								x	x	
SSF official' fishing activity data collection type	*Census*	*Census*	*Census*	*Census*	*Combined*	*Census*	*Census*	*Census*	*Sampling*	*Census*

[2] ***In development*** *(DEU: new database in order to cross-check EU logbooks (Landings declaration) / Sales note)*

**** Additional data to improve "census data"*** *(DNK: BlackBox system for mussel dredgers ; FRA: GPS devices for specific fleets ; GRC: VMS device for special licences (LLD, LHM large pelagic, SB) ; IRL: iVMS for some specific fisheries/species ; NOR: Catch assessment survey for Cod, Haddock, Saithe ; NOR: Reference Fleet: 7 vessels <12m)*

+ Extended data *(NOR: Main gear and Main fishing area declared in sales note)*

Continuation Table 1.

SSF - Fleet 10-12meters (8-12meters in Baltic Sea)										
Sources of declarative data collected	**IRL_27**	**LTU_27**	**LVA_27**	**NLD_27**	**NOR_27**	**POL_27**	**PRT_27**	**SWE_27**	**UK_27 (Scotland)**	**UK_27 (Others)**
Fleet register										
EU Logbooks (landings declaration)	x	x	x	x		x	x	x	x	x
Sales notes	x			x	x+		x	x	x	x
Sales notes from fishermen association										
On-site sampling program *(Catch assessment survey)*					x*					
Vessels sampling program *(Reference Fleet)*	x				x*					
New technology program *(new apps, geolocalization devices)*	x*									
SSF census survey *(Fishing activity calendars)*										
SSF official' fishing activity data collection type	*Census*	*Census*	*Census*	*Census*	*Census*	*Census*	*Census*	*Census*	*Census*	*Census*

[2] ***In development*** *(DEU: new database in order to cross-check EU logbooks (Landings declaration) / Sales note)*

**** Additional data to improve "census data"*** *(DNK: BlackBox system for mussel dredgers ; FRA: GPS devices for specific fleets ; GRC: VMS device for special licences (LLD, LHM large pelagic, SB) ; IRL: iVMS for some specific fisheries/species ; NOR: Catch assessment survey for Cod, Haddock, Saithe ; NOR: Reference Fleet: 7 vessels <12m)*

+ Extended data *(NOR: Main gear and Main fishing area declared in sales note)*

Table 2. Summary of SSF data collection by country, vessels not under logbooks requirement (vessels less than 10 meters, 8 meters in Baltic).

SSF - Fleet <10meters (<8meters in Baltic Sea)										
Sources of declarative data collected	**BEL_27**	**CYP_37**	**DEU_27**	**DNK_27**	**ESP_27 (Basque)**	**ESP_27 (Others)**	**FIN_27**	**FRA_27, 37**	**FRA_31, 41, 51**	**GRC_37**
Fleet register				x				x	x	
SSF adapted declarative forms *(Monthly landings declaration, Coastal fishery forms, Monthly declarative forms, Monthly catch reports, Coastal logbooks, Coastal journal, Weekly landings declaration, …)*			x				x	x		
Sales notes		x	x[2]	x	x	x		x		
Sales notes from fishermen associations					x					
On-site sampling program *(Gear/Gear dimension survey, Catch assessment survey)*		x			x				x	
Vessels sampling program *(Questionnaires, Reference Fleet)*										x
Economic sampling program *(fishing effort)*			x							
Vessels self sampling *(monthly self reporting in loal fisheries inspection)*										x
New technology program *(new apps, geolocalization devices)*				x*	x			x*		
Fisheries/Fleets specific regulations for data provision		x*								x*
Vessels fishing licenses data										
Indirect reporting of vessels activity (gears/area) *(via merchants/local knowledge, vessel by vessel basis)*										
SSF census survey *(Fishing activity calendars)*								x	x	
SSF official' fishing activity data collection type	***NA***	*Combined*	*Census*	*Census*	*Combined*	*Census*	*Census*	*Census*	*Sampling*	*Sampling*

[2] ***In development*** *(DEU: new database in development in order to cross-check Monthly landings declaration / Sales note ; UK (Others): introduction of weekly landings declaration for other UK vessels, as it is done in Scotland, in development)*

**** Additional data to improve "census data"*** *(CYP: Census landings declaration for the Category C' fleet (low rate fishing fleet) ; DNK: BlackBox system for mussel dredgers and AIS (test phase) ; FRA: GPS devices for specific fleets ; GRC: Logbooks/VMS device for special licences (LLD, LHM large pelagic, SB) ; IRL: iVMS for some specific fisheries/species ; IRL: Shellfish gatherers dockets for bivalve fisheries ; NOR: Catch assessment survey for Cod, Haddock, Saithe ; NOR: Reference Fleet: 7 vessels <12m ; POL: Logbooks for Baltic Cod fishing ; SWE: EU logbooks for vessels <10m using active gears ; UK (Others): Monthly Shellfish Activity return (MSAR) for shellfish licences vessels, UK (Others): Introduction of low-cost vessel monitoring system for SSF*

+ Extended data *(NOR: Main gear and Main fishing area declared in sales note)*

*- **Limited data** (POL: <8m no catch composition since 2017, data has to be estimate on 2016 + 8-10m vessels data basis)*

Continuation Table 2.

SSF - Fleet <10meters (<8meters in Baltic Sea)										
Sources of declarative data collected	**IRL_27**	**LTU_27**	**LVA_27**	**NLD_27**	**NOR_27**	**POL_27**	**PRT_27**	**SWE_27**	**UK_27 (Scotland)**	**UK_27 (Others)**
Fleet register										
SSF adapted declarative forms *(Monthly landings declaration, Coastal fishery forms, Monthly declarative forms, Monthly catch reports, Coastal logbooks, Coastal journal, Weekly landings declaration, …)*		x	x			x-		x	x	x[2]
Sales notes	x			x?	x+		x	x	x	x
Sales notes from fishermen associations										
On-site sampling program *(Gear/Gear dimension survey, Catch assessment survey)*					x*					
Vessels sampling program *(Questionnaires, Reference Fleet)*	x				x*					
Economic sampling program *(fishing effort)*										
Vessels self sampling *(monthly self reporting in loal fisheries inspection)*										
New technology program *(new apps, geolocalization devices)*	x*									x*
Fisheries/Fleets specific regulations for data provision	x*					x*		x*		x*
Vessels fishing licenses data							x			
Indirect reporting of vessels activity (gears/area) *(via merchants/local knowledge, vessel by vessel basis)*										x
SSF census survey *(Fishing activity calendars)*										
SSF official' fishing activity data collection type	*Combined*	*Census*	*Census*	*Census*	*Census*	*Census*	*Census*	*Census*	*Census*	*Census*

[2] ***In development*** *(DEU: new database in development in order to cross-check Monthly landings declaration / Sales note ; UK (Others): introduction of weekly landings declaration for other UK vessels, as it is done in Scotland, in development)*

*** *Additional data to improve "census data"*** *(CYP: Census landings declaration for the Category C' fleet (low rate fishing fleet) ; DNK: BlackBox system for mussel dredgers and AIS (test phase) ; FRA: GPS devices for specific fleets ; GRC: Logbooks/VMS device for special licences (LLD, LHM large pelagic, SB) ; IRL: iVMS for some specific fisheries/species ; IRL: Shellfish gatherers dockets for bivalve fisheries ; NOR: Catch assessment survey for Cod, Haddock, Saithe ; NOR: Reference Fleet: 7 vessels <12m ; POL: Logbooks for Baltic Cod fishing ; SWE: EU logbooks for vessels <10m using active gears ; UK (Others): Monthly Shellfish Activity return (MSAR) for shellfish licences vessels, UK (Others): Introduction of low-cost vessel monitoring system for SSF*

+ Extended data *(NOR: Main gear and Main fishing area declared in sales note)*

*- **Limited data** (POL: <8m no catch composition since 2017, data has to be estimate on 2016 + 8-10m vessels data basis)*

Table 3. Summary of SSF sampling program.

SSF Sampling program		BEL_27	CYP_37	DEU_27	DNK_27	ESP_27 (Basque)	ESP_27 (Others)	FIN_27	FRA_27, 37	FRA_31, 41, 51	GRC_37	IRL_27	LTU_27	LVA_27	NLD_27	NOR_27	POL_27	PRT_27	SWE_27	UK_27 (Scotland)	UK_27 (Others)
On-shore/ Port sampling			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Data collected	Landings		√			√				√	√					√*					
	Effort/gears		√			√				√	√					√*					
	Biological data		√	√*	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
At-sea sampling					X				X		X	X					X		X	X	X
Data collected	Catches (inc. discards)				√*				√		√	√					√		√	√	√
	Biological data				√*				√		√	√					√		√	√	√
Self-sampling						X *(discards)*						X *(reference fleet)*				X *(reference fleet)*	X				

BEL: In 2017 only 1 SSF vessel was active using the GTR gear. Trammel netters are not part of the sampling program ; ESP (Others): SSF partially sampled as long as they belong to the different sampling strata under the DCF programme ; NLD: SSF on-shore sampling in IVb/IVc ices division not in VIIa, cf. DCF programme ; NOR: SSF port sampling in Ib/IIa2/IVa ices division not in IVb/IIIa, cf. DCF programme ; NOR: Reference Fleet: 7 vessels <12m ; PRT: SSF biological data is collected only onshore, for selected metiers, and not at-sea due to the size of the vessels (safety issues) ; SWE: Sampling does not differentiate on vessel size but coverage of smaller sizes is probably limited

**** Limited sampling:*** *DEU: Biological sampling for 8-12m, for <8m few samples only for specific purposes (e.g. herring gillnetter in the Strelasund area) ; DNK: At-sea sampling for vessels down to 9.5m ; NOR: Catch assessment survey for Cod, Haddock,* Information about the **National legislation** and **associated control system** in place in the different countries could be found in the questionnaires' Q1 replies. Main procedures in place are detailed hereunder:

In Poland monthly catch reports are submitted to the Fisheries Monitoring Center though local inspectors of sea fishery, not later than five days after the end of the reference month; the completeness of catch data is validated by both administrative bodies.

In Latvia, information from coastal logbooks are entered in the integrated control information system. Data collected from various sources are crosschecked (e.g. logbooks, sales notes). A percentage of landings is also inspected and crosschecked with landing declarations.

In Norway, first hand trade is organized through licensed organizations, which ensure that registration is complete; catch correctness is also controlled by the authorities, and failure to report accurately has legal consequences. Yet periodic controls reveal that misconduct happens.

In Germany, logbooks and monthly landing declarations are national census tools to collect data of the SSF but there is not a control system by the state specifically designed for SSF. Landings declarations are checked by inspectors during the discharge procedure; about 20% of the annual landings in Germany are inspected. The government recognizes the need to improve reliability and accuracy of fishing activity data of the SSF, especially of vessels <8/10 m. The introduction of the FIT database seemed to have started a process of homogenization with respect to data collection (between federal and state officials) and seems to allow more comprehensive crosschecking of data than before. The governmental authorities support a more extensive data collection of the SSF and are planning to change the sea fishing regulation in order to achieve this goal. So far, this has not happened and there is still a lack of detailed data on the fishing activity of SSF (<8/10 m).

In Portugal there is a legal framework (Decree law 81/2005, 20 April) that regulates the first sale of fresh and refrigerated fish landed by all vessels. This legislation establishes that all vessels landing fresh and refrigerated fish must be sold in the auction. DGRM has access to daily data from national auctions on sold species, quantities and values by vessel.

In France, cross-checking data from the different declarative sources (fishing fleet register, logbooks, monthly declarative forms, sales note and geolocation data (e.g. VMS data)) is achieved by the SACROIS cross-validation tool aiming to provide the best possible fishing statistics data for vessels with complete and sufficient quality declarative data.

Second part of the questionnaires was to compile more precise and quantitative information on the declarative data available in the different countries for SSF. Based on these data, it may be possible to start defining risk assessment data quality methodologies especially concentrated on the evaluation of the coverage/completeness of fishing activity data collected via a census approach. First intended indicators will compare the number of vessels registered in official national fishing fleet register (cf. EU fleet register) against number of vessels with a minimum of one declarative data available (Figure 1). Second intended indicators will concentrate on vessels with declarative data and will investigate the completeness of their data regarding the number of trips they declared (Figure 3).

Among the 21 countries that provided data, the total number of SSF vessels (i.e. <12 m) in the national fleet registers was around 48 000, whereas the total number of vessels with declarative data (at least once in the reference data) was around 36 000, with this difference representing potential inactive vessels - which overall represent ca. 25% of the registered vessels (Figure 2). The size of the national SFF fleet (i.e. <12 m) differs largely between the countries (from very few vessels in Belgium to over 14 000 vessels in Greece). Only six countries (Basque country, Belgium, Germany, Poland, Portugal, Spain) is the percentage of vessels without any declarative data below 10%, whereas in most countries the number of SSF vessels in the fleet register differs considerably from the number of these with declarative data: 11 countries with 10%–50% and three countries with 50%–80% (Finland, Latvia, Lithuania).

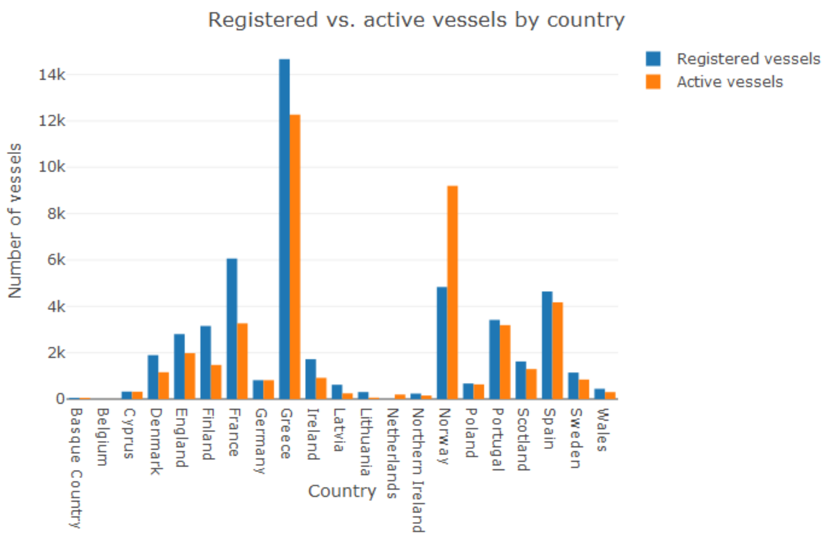

Figure 1. Registeredvs."active" vessels by country.

In a few countries, the SSF fleet that is registered/has declarative data are dominated *(>50%)* by the smallest length category vessels (0–6 m; Latvia and Lithuania, Finland and Spain). In many other countries, such as Denmark, Germany and Wales, the number vessels per length category decreased from the smaller to larger vessel length category of SSF (10–12 m). In contrast, few countries stand out for their very low percentage of these smaller vessels (Basque Country, Belgium, Cyprus, France). This scenario present strong similarity considering either vessels that are registered or that have declarative data (Figure 2).

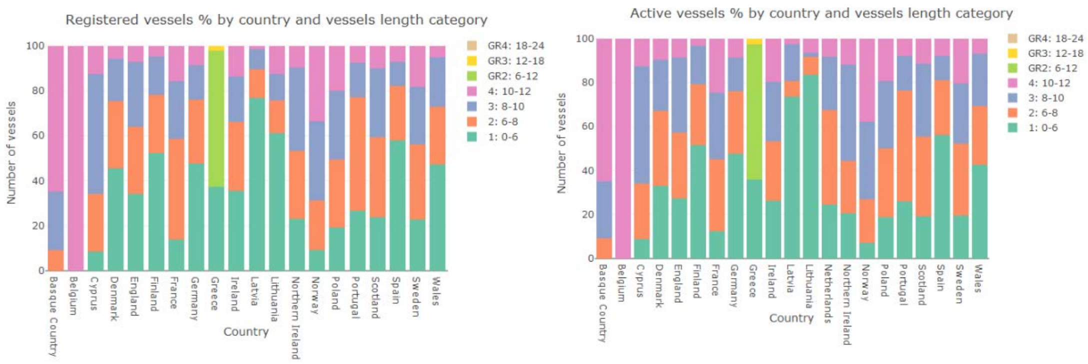

Figure 2. Proportion of vessels by vessel length range, in each country.

Most countries have a low percentage (<20%) of vessels with few trips per year (i.e. 1–10). However, some countries stand out for their high percentage of vessels with a low (1–10, 10–50) number of trips per year (Cyprus, Denmark, England, Finland, Latvia, Northern Ireland, Scotland, Wales). On the other hand, three countries stand out for their very high percentage of vessels that have a very high (>150) number of trips per year (Belgium, Germany, Netherlands). Finally, other countries have a high percentage of vessels with a large number of trips per year (100–150 trips, France, Greece, Portugal and Spain) and in addition some countries also have low percentage of vessels that perform few trips per year (Basque Country and Poland) (Figure 3 and 4).

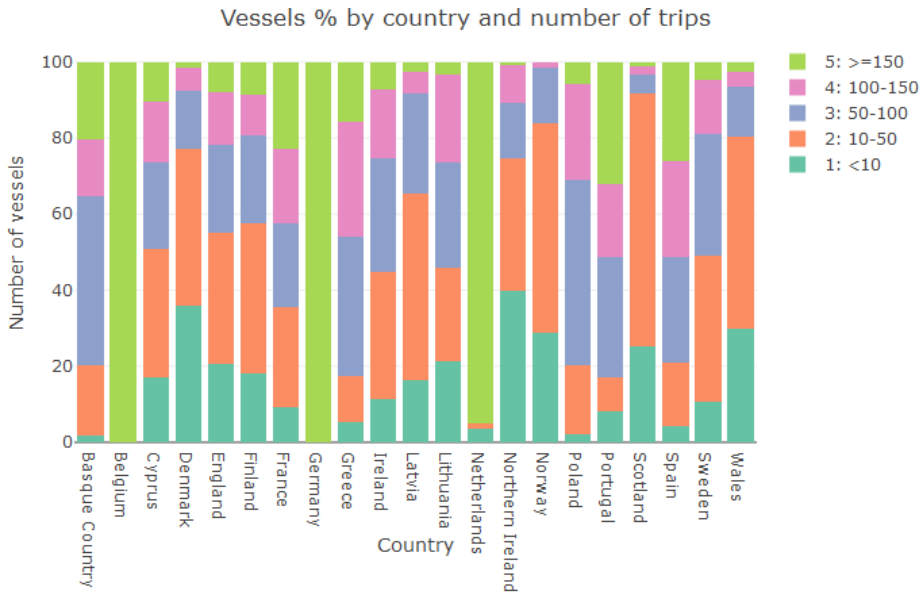

Figure 3. Distribution by number of trips ranges of "active" vessels, by country.

Figure 4. Percentage of vessels by country, vessel length ranges and number of trips ranges.

The graphs above give some initial information to assess the coverage/completeness of declarative data available through the control regulation (known as declarative data). Nevertheless and because of a lack of time, it was not possible to discuss widely them during the 2018 WGCATCH meeting and notably the following points: 1) how to complete/improve them and/or 2) how to assess/evaluate on this basis the SSF data quality (develop risk assessment methodologies). It is scheduled to further work on these aspects during the 2019 WGCATCH meeting.

Other part of the questionnaires (Q2 to Q7) provide information/data to continue to discuss SSF data quality and checking methodologies considering what is-it in place in the different countries and what could be generalized/promoted. Principal outcomes and key outputs for each question' replies are presented hereafter; the final aim being to develop a list of data quality indicators and checking methodologies in SSF data.

Q2. Do you consider that a vessel without any declarative data is an inactive vessel?

The EU definition (Commission Implementing Regulation (EU) No 404/2011) of inactive vessels is:

"(a) Active vessels: vessels referred to in Articles 16 and 25 of the Control Regulation 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 shall be considered 'inactive."

The approach used by most countries (15 out of 17) is to consider a vessel without any declarative data as an inactive vessel. The remaining two countries use other approaches. One of them does not rely on the declarative data available for the vessels below 10 meters as there is no national obligation to fill in data for this part of the fleet; the other uses a census fishing activity survey to identify vessels that could be classified as active although they have no declarative data.

The following summarises the comments made by countries that consider vessels without any declarative data as inactive:

- Three countries mentioned an issue of not all landings being reported in the sales notes due to the reporting threshold currently defined in the EU legislation (the catches and discards below 30 kg do not need to be recorded).
- One country confirms the inactivity of the vessels without declarative data based on complementary sampling data.
- One country mentions that in some cases a vessel with declarative data might in reality be inactive. A share of the landings from one vessel may be reported to another vessel.
- A country mentions that if a vessel is inactive for one year, it will lose its fishing authorization.

The classification of inactivity can also depend on the purpose, as for some purposes a country can consider a vessel without declarative data as inactive, while it can be present in a sampling frame if it has a fishing licence.

Q.3. Do you have any tool/mean in used in your country to assess the reality of the inactivity of the vessels without any declarative data (used of a complementary survey, cross-validation with other sources of data, ...)? If not, do you think that this assumption is correct based on your expertise?

There is considerable variation in the answers to this question, ranging from countries not collecting any information on the quality of the inactivity information to countries carrying out continuous census survey of fishing activity of the vessels to resolve a known issue. For some countries, the information is reliable or perceived as reliable, and therefore no checks are performed. The responses are summarised in the text table below.

Checks on inactivity of vessels	Checks needed	No checks needed
NO (no checks are or have been carried out)	Six countries reported that they do not have any other tools apart the declarative data to assess/evaluate the inactivity/activity of the vessels and that no other checks are carried out, but they might be needed.	Based on imposed logbook schemes, licence conditions, the levels of enforcement/control regulation and/or the size of the fleet, five countries perceived that the information is reliable and that, a priori, no checks are required: - three countries rely that they don't need checks; - one country relies on the assurance that all activity is accounted for; - one country has no SSF identified (no vessels under 10 m and only one using passive gear).
YES (checks are or have been carried out)	four countries report either ongoing or one-off schemes to identify gaps and improve estimates in the declared data: -three countries carry out continuous surveys to improve estimates of activity and landings compared to official data; -An intensive survey in 2017 by one country identified gaps in the landings for defined species and effort with variation in different localities.	three countries report either having done previous survey and/or having ongoing survey which allow them to rely on declared data checks (e;g. sales note). For two of them informal interviews indicate(d) that activity on vessels with no official declared data is negligible. The other carried out an extensive study which identified an insignificant gap in reported effort and landings before a logbook scheme was re-enforced and since then, as with the other countries, informal checks have not identified any issues.

The following tools could be used either to identify whether there is an issue, or to resolve an issue:

1) Conduct surveys to check if vessels without declarative data are actually inactive. The examples range from formal continuous surveys of the inactive vessels, as in Basque country and France, to "one off" intensive surveys used by Finland and England to identify if there were/are any issues. France's ongoing survey continues to identify an issue for some fisheries/regions. Finland did not identify a significant problem, while England is planning to resolve the issue by introducing iVMS systems and electronic logbooks. Collecting data of the number of vessels in port also forms part of a structured approach used by Basque. Finally, Greece indicated that a complementary survey is foreseen under the EU-MAP as SSF declared data are known to be incomplete.

2) Using the metadata collected when sampling onshore and at-sea for biological data as a check against the activity assumed from sales notes could also identify an issue, however this will only provide information for a limited amount of the vessels.

Other sources that have been used or suggested include:

- Using AIS as a source for the activity of a vessel – these data have been demonstrated to be extremely effective in plotting the activity of a vessel but is limited as it is voluntary, and it cannot be relied on to provide a complete log of their activity.
- The results of economic surveys carried out to by most European Countries to assess the value of different parts of the fleet might also offer another source for check data.
- In Germany, a Smartphone App called Mofi (Mobile fisheries log) had to be used during the spawning closure of western Baltic cod in spring 2018 by vessels without VMS. This allowed to assess the activity of the <8m segment of the SSF fleet, which only have monthly logbooks.

WGCATCH highlighted in previous meetings that the coverage/completeness of the estimates obtained by the data collection is a specific issue that will require specific attention. Therefore, the group advise the usefulness of such above described tools to address/identify such issues and considered it as a fundamental best practice to overcome problems with reliability and completeness of data collected. The group highlight also the impact the new technology could have to improve the reliability/completeness of SSF data in future (see below).

Q.4 Have you ever done a complete census or a sampling survey of your SSF fishing fleets to assess/qualify these assumptions? If yes, what were the main results of it?

In total, five of 18 countries made a complete census or a sampling survey to check the activity and landings of their SSF fleet.

The results of these surveys are listed below.

- Based on the sales notes, complementary sales notes coming from fishermen associations plus observations from the Basque sampling survey, registered vessels are either classed as active or inactive.
- Some regions within France show complete and other regions show incomplete declarative data. For the regions that showed incomplete data, complementary surveys and alternative methods (calculation of a coefficient of re-evaluation by métier of declarative data) were carried out to fill the gaps.
- In Finland, a difference of 0–8% in the landings was found for 10% of the inactive vessels.
- In England, a difference of 12–50% of the reported and observed landing data was found for some of the coastal regions.
- Greece indicate only that a complementary survey is foreseen under the EU-MAP to complete the incomplete SSF data available.

The remaining 13 of the 18 countries reported that no complete census or sampling survey of the SSF fleet was carried out to assess the assumptions. Two countries are planning to do a sampling/complementary survey in the near future to assess the activity and landings of their SSF fleet.

A key result for those countries that carried out surveys, to assess the completeness/coverage of data collection, have identified the problems and are introducing methods or processes to improve on the reporting or estimation of effort and catch for this sector. Countries that are unsure, at the very least, should carry out some of

the simpler methods to identify the potential scale of the issue if there is one. In a first instance, checking onshore and offshore sampling metadata with official records of effort and landings could be a very first step in order to identify potential issue.

Q.5. Do you have some 'scientific' survey to assess the reality/quality of the declarative data collected under the legal requirement mainly control regulation (comparison of cpue, landings per trip, etc.)?

Six of the 18 countries do not performed any cross-validation/check to assess the reliability/quality of the declarative data collected under the legal requirement mainly control regulation. Such answer is questionable. Indeed first necessary step is to collect data but data quality is an issue that should be also necessarily taken into account. This should include the implementation of a validation schemes to evaluate these. It could be noted that countries who do not assess the declarative data quality/reliability are basically the ones who answer yes at the next question about using declarative data for scientific purposes. It looks like that “official” declarative data available are seen as “reliable” without taking time to develop data quality checking methodologies to appraise them and/or to develop scientific evidence to confirm the assumption. The group advised that assessment of the reality/quality of the declarative data collected is an issue that requires particular attention.

In conjunction, only one country (Basque country) perform a specific sampling survey to assess the reality/quality of the declarative data collected.

Main quality control done or envisaged concern the comparison (by trip or by fleets/fisheries) of the data coming from the biological data on shore or on-board sampling (e.g. annual coastal monitoring in Latvia and Lithuania) and the available declarative data (comparison of Catch/cpue, species composition, catchability, gears parameter, etc.). As first step of a validation scheme, the group advised that such comparison should be put in place in any ongoing data collection system.

Two countries mentioned also the possibility to have some reference fleet/skippers (self-sampling program of some reliable fishermen) in order to assess the SSF data quality. Concern is about the difficulty to have a reference fleet representative of all the diversity (in terms of gears, métiers, fishing area …) of the SSF. One country indicate that fishing pattern (e.g. average fishing effort for the main commercial fish species and gears) calculated on previous/current year by vessel length ranges, could be also used to assess data quality. Some other countries mention also the possibility to develop cross validation tool between all the declarative data available in order to assess the quality and improve SSF data. Finally, one countries indicate that feedbacks from observers/experts about data quality are taken into account in order to improve them. **All of these tools should be shared and populated between countries in order to improve, in the end, SSF data quality**.

The group advised also that there is a link between this question and the work done on innovative/new technologies. As an example, one country indicate that direct reporting system using GPS devices could be a benefit tool in order to assess and control data quality (in particular activity/inactivity and period of activity). The group reaffirmed then the significant opportunities to improve SSF data collection by using innovative/new technologies (e.g. geolocalisation device, remote electronic monitoring (CCTV), new apps for smartphone/tablets, RFID tags …).

Q.6. Could you assess the quality of the declarative data collected under control regulation, especially on gear, gear mesh size, gear dimension, spatial distribution, landings and catch data?

All countries answered the question. For **gear information**, logbook information is considered as acceptable although still information about **mesh size** and **gear dimension** (e.g. number of nets/length, number of hooks, number of lines, number of pots/traps …) could be of insufficient quality. The issue is even more pregnant for under 10 meters total length vessels, as sale notes are the only mandatory declarative data required and consequently this information is often missing or not of enough quality. Some countries also highlighted that when vessels are allowed to use more than one gear during the same trip, there are even more important difficulties to assign a gear to those trips. In these cases, alternatives methodologies are recommended to collect gear information. In some countries, these methodologies are based on census methodologies (i.e. monthly fishing calendar survey, declarative forms data collection). In others, direct sampling approach is used as an additional source of data to check/improve this information. Same issues as for logbooks is observed in case of self-reported data using declarative forms although they are generally more adapted to the SSF specific features.

Geospatial data are still one of the main gaps for this fleet. In sale notes this information is missing and for logbooks/declarative forms the resolution of the information provided (i.e. ICES division, rectangle) is not enough. The best alternative to improve this information is the use of new technologies adapted to this fleet (see section about new technologies).

Biggest uncertainty from mandatory declarative forms is related to catch composition information. Although in few countries answers, logbooks data are assumed that could be enough, from the majority of the countries there are important gaps. Especially in the species identification and total catches reported due to exceptions in the regulations. To improve this information, majority of the countries used census approach methodologies to cross check these data. However, this information still is fishermen reported information and it´s recommendable to cross check this information from direct sampling programmes. Institutes carrying this sampling approach identified as main weakness the coverage of this fleet due to a high effort needed to fully cover it due to its specific characteristics (large number of vessels, distribution among ports, etc.).

Q.7. Do you think that declarative data collected under control regulation are appropriate to scientific use? If not, do you perform complementary sampling survey to improve the estimates' quality?

All 18 countries answered this question. 12 out of 18 countries considered that the declarative data collected under the control regulation are appropriate to scientific use. Six out 18 countries said the opposite. These six countries mention reasons why these data are not considered appropriate to scientific use. Ireland, UK, Cyprus, and Portugal mention that data for vessels <10 m are generally considered unreliable. Greece and Spain/Basque country specify that a particular reason for this is the "catch <50 kg rule" (EU 1244, 2009, e.g. articles 14, 21, 65). This EU-wide exemption actually applies to all countries, even to those who answered this question with Yes. Hence, inappropriateness of control data for scientific use would be an issue compromising the data quality of all EU-SSF vessels. Countries with a large proportion of SSF vessels in their national fleet may be more sensitive to uncertainties inherent to the control data than other countries. There may also be a psychological effect of the other countries answering this questionnaire in that they simply suppress or ignore the data quality issues linked to their SSF fleet ("see no evil, hear no evil, speak no evil") and therefore answered with Yes.

In fact, the proposed reform of the control regulation intends to remove the "50 kg catch" exemption from the legislation. WGCATCH supports the removal of this exemption from the legislation. One argument supporting the removal of the "50 kg catch" EU exemption is that this exemption is de facto in contradiction to the declared interest of the EU commission to collect better data from a similar fishery, the recreational fisheries. The sum of the single catches of recreational fishers is apparently considered to potentially have significant effects on the fish stocks health. This effect is equal to the potential effect of the numerous trips of the SSF with unreported catch amounts. Consequently, if recreational fisheries catches are considered significant and the estimation of the amounts is given high priority, the complete documentation of the catches of the SSF, no matter how small they are, should be of high priority, too. Although the amount of a daily catch can be small, the large amount of SSF vessels and the large number of trips can yield large overall removals that need to be quantified. Moreover, the "50 kg catch" exemption opened the floodgates to fishers illegally landing catches >50 kg on days they are not controlled at sea or in port, adding additional uncertainty (namely underestimation) on the true landings of the SSF.

Annex 15: ToR b.4) Structure and contents of the scientific manuscript that details the SSF work carried out by WGCATCH and draft a work-plan to accomplish that task

The group critically reviewed this extended abstract, discussed the main recommendations/conclusions they want to highlight and then elaborate the following structure (main chapters) for a future scientific manuscript:

1) **Introduction** (SSF definition, study area, status and situation, overview of data sources and data collection methodologies on going …)

2) **Characterization** (quantitative aspects *(number of vessels/fishermen, impact on specific stocks, etc.)* plus specific features highlighted, *e.g. multigears/multi-species fleet (polyvalence both between and within trips), importance of fixed gears (nets, pots, lines, onshore fishing, ...), daily fishing trip schedules (sometimes two times in a day), ...)*

3) **Importance** (evidence of the importance of SSF and proof with examples for some countries, impact on fisheries sustainability, in term of employment and socio-economic development …)

4) **Data gaps, Data quality issues, Limitations of the data collection in place** (data incompleteness issue, reliability of the data collected link with data collection in place and their limitations, etc. => Vicious cycle where SSF appears to be trapped).

5) **Need to improve SSF data** (main conclusion from the work presented above).

6) **Recommendation** (in particular in term of the data collection methodologies we want to highlight/push forward, e.g. innovative/new technologies which are significant opportunities to improve SSF data collection, e.g. combined approach with innovative/new technology/sampling approach to estimate average fishing trip including gear information and census approach as sales note/declarative forms).

Extended abstract for the 9th IFOMC conference in 2018. Title: Small-scale, size isn´t everything: Issues and progress in monitoring European small-scale fleets.

Authors: Demanèche S., Mugerza E., Armstrong M., Adamowicz M., Carlshamre S., Clarke E.D., Couperus B., Dammers M., Dingsør G., Egekvist J., Elson J., Fernandes A.C., Gitarakos G., Grygiel W., Kiparissis S., Kovsars M., Krumme U., Nimmegeers S., Norkus D., Otterå H., Reis D., Rodriguez J., Saks L., Schembri S., Spegys M., Stoetera S., Vandemaele S., Vasconcelos R., Vølstad J.H., Thasitis I., Williamson K., Gerritsen H., Prista N., Ribeiro-Santos A.

Keywords: Small-scale fisheries (SSF), Coastal and artisanal fisheries, Europe, Data collection methodologies, Fishing activity estimates (capacity, effort and landings data), Discards and fleet based biological variables, Best practices guidelines, New technologies.

Data from commercial fisheries are essential input to stock assessments and often the primary basis for reconstructing historical populations and estimating fishing mortality. It is the aim of the ICES Working Group on Commercial Catches (WGCATCH) to secure better quality data to improve stock assessment. One of the main responsibilities of WGCATCH is to ensure the quality of commercial catch data by: 1) documenting national fishery sampling schemes, 2) establishing the best practices and guidelines for sampling, acquisition and estimation of commercial fisheries data, 3) promoting training courses and workshops on sampling and estimation procedures and 4) advising on the uses of commercial fishery data.

Since 2015 one of the terms of reference for WGCATCH has been to ensure that the collection of transversal, socio-economic, and biological data from small-scale fleets (SSF) across Europe are sufficient, harmonised and comparable. The following topics have been addressed:

- National description of SSF, contribution to the total catches and fishing effort;
- Overview of the current SSF data collection methods, pros and cons;
- Best practice guidelines for fishing activity and biological data collection in SSF;
- Evaluation of the usefulness of innovative/new technologies in monitoring SSF;
- Discuss quality indicators and quality checking methodologies in SSF data.

There is no single harmonised definition of SSF in the literature. The definitions used are determined by the end-user needs, and what is covered by the term varies largely between end-users. WGCATCH supports that for data collection purposes, it is practical and more precise to refer to fleet categories defined by the vessel length overall (LOA) ranges (<10 m, 10–12 m also 12–15 m). WGCATCH adopted this pragmatic definition that is in line with the view adopted by previous expert meetings in the ICES and highlights that this definition is also related to the source of information available by fleet categories. For example (1) for vessels under-10 meters there is no legal basis under the Control Regulation for direct reporting of activity using EU logbooks, and (2) the LOA class 10–12 meters' vessels are not under Vessel Monitoring System (VMS) obligation (the LOA class 12-15 meters present also some exemptions in VMS data requirement).

SSF are important components of many fisheries in ICES areas and they have been receiving growing attention (e.g. within Marine Spatial Planning (MSP) initiatives). Around 70 000 SSF vessels operate in EU which amounts to 85% of the total EU fishing fleet. Although they are in general less active in term of days at sea than Large-Scale Fleets (LSF), their importance is significant in term of fishing Effort in nearly all countries. At the same time, in the latest draft of the Common Fishery Policy (CFP), the European Commission has stressed the intention to promote the SSF sector and to provide them support. Within Europe, the multitude of SSF vessels and the local issues contrast to complex multi-level governance by regulatory and monitoring bodies that cover national and shared fish stocks and which often overlook the potential impact of SSF. In addition, the ecological and socio-economic impacts (e.g. in terms of employment) of SSF are often little understood and largely underestimated, mainly due to the limited data available.

Preliminary results and several recent studies highlight the need to improve SSF knowledge to ensure their sustainable development. However, knowledge of SSF appears to be "trapped in a vicious cycle" where, due to incompleteness and/or lower quality of existing data, systematically lower importance is assigned to their characterisation (down-weighting them in stock assessment and management advice) and sampling when compared to LSF.

i) National description of SSF, and their contribution to the total catches and fishing effort

Based on questionnaires, presentations, working documents and discussions within WGCATCH, building on previous works, the group documented the importance of SSF and how much SSF contribute to the landings and effort. Briefly, 1) SSF are an important component in nearly all countries (no particular north/south distinction) and their share of TAC-quota or regulated catches of species (including incidental by-catches of protected species) can be high, 2) SSF are highly important for fishery spatial management and socio-economic studies, 3) SSF present certain unique features: highly diverse, multi-gear, multispecies, geographically widespread fleets, involving full time, seasonal or part-time activities in coastal areas, which add challenges for the SSF data collection, 4) SSF vary regionally in terms of species, gears, métiers or fisheries, and 5) SSF data collection need to be improved.

ii) Overview of the current SSF data collection methods, pros and cons

WGCATCH documented the sampling practices for SSF in ICES areas mainly.

For SSF data collection on fishing activity, two main approaches are applied: Census and/or Sampling approach. A census approach mainly based on sales notes generates some particular issues that have to be taken into account as sales notes could be used but are insufficient. Adapted declarative forms have to be used and accuracy/reliability/completeness of such data has to be assessed. The challenges related to the use of a sampling approach are mainly related to the statistical soundness of the sampling design, the logistical and financial constraints that reduce the sampling coverage, and the difficulties of assessing the accuracy/reliability of the data in case of self-reporting.

SSF biological data collection (onshore and on-board sampling) is mainly included in a general (across all vessel sizes) sampling scheme. However, there are some specific restrictions in sampling coverage for SSF especially linked to safety and space availability for observers during on-board sampling. It is therefore challenging to obtain reliable estimates of the overall SSF discard rate or incidental bycatches of PETS (Protected, Endangered and Threatened Species) although SSF can have a significant contribution.

Across Europe: 1) there is a wide diversity of methodologies used for monitoring SSF which introduce/create challenges in harmonising and standardising the SSF data and the quality indicators across countries, 2) there is a need to develop a best practices guideline for design, implementation and quality assurance of SSF data collection methods in order to reduce bias, increase precision and improve cost efficiency, 3) SSF data collection could benefit from innovative/new technologies to improve data quality and 4) there is a need to develop quality indicators and data quality check methodologies.

iii) Best practice guidelines for fishing activity and biological data collection in SSF

WGCATCH drafted generic and specific guidelines on the best practices for collection of transversal and biological data in SSF which deal with: 1) quality issues (e.g. design, implementation error, refusals, accuracy, estimation method, etc.), 2) assessment of accuracy/reliability/completeness of the available data, 3) appropriate sampling schemes and adapted declarative forms to monitor SSF, 4) census vs. sampling approach (issues of cost efficiency and precision), 5) key issues to sample SSF biological, discards and PETS data onshore and on-board, and 6) spatial mapping of SSF activity.

The first stage is to define the main end-users needs (i.e. identify the target population and the type of estimates, their resolution and the level of precision required) which allows defining the objectives/data needs (types, resolution, precision and quality of estimates, domain of interest). The resolution may refer to spatio-temporal strata, gear types, etc. Another important initial step is the pre-screening or frame survey of the fishery which provides useful information to evaluate the best data collection method (based on factors such as accessibility of the vessels, fishing and landing patterns, part-time activity, gears, target species, etc.) that will constitute the general framework of the data collection. Other stages are mainly related to sampling scheme design and implementation, data capture and quality control, data analysis and accuracy indicators and feedbacks to improve data collection.

iv) Evaluation of the usefulness of the innovative/new technologies in monitoring SSF

WGCATCH discussed how new technologies such as remote electronic monitoring (e.g. CCTV), new apps for smartphone/tablets, geolocalisation devices (AIS/GPS), RFID Tags, and other methods, could improve SSF monitoring. There are significant opportunities to improve SSF data collection using innovative technologies, for example to access detailed information on effort with high spatial resolution data or for self-sampling of PETS or discards data. To improving knowledge sharing, the first output of WGCATCH was a review of different technological projects ongoing in the ICES area.

v) Discuss the quality indicators and quality checking methodologies in SSF data

WGCATCH will engage a discussion on quality indicators and quality checking methodologies using case studies. WGCATCH 2017 has elaborated a questionnaire on these specific features that will provide the data needed for further work WGCATCH 2018, especially focusing on the coverage/completeness and the accuracy/reliability of data collected in a census approach and the way to assess the proper use of statistical soundness in a sampling approach.

WGCATCH developed work on standardisation and harmonisation of SSF data. In 2017, the first discussions were engaged on fishing effort calculation and a questionnaire has been elaborated for 2018, which will help to finalise the work.

Finally, WGCATCH advice and expertise is needed to achieve following objectives: 1) monitoring the implementation of best practices guideline and advise on regionalization of data collection, 2) standardizing reporting and RDB (Regional Data Base) formats to include SSF data estimates. These objectives define the future WGCATCH work on SSF monitoring.

Further complete information can be found in the WGCATCH reports of 2015–2017, available on the ICES website: http://www.ices.dk/community/groups/Pages/WGCATCH.aspx.

Annex 16: ToR e) Abstracts from the presentations relating to the RDB and discussions thereof

RDBES for WGCATCH 2018

Henrik Kjems-Nielsen

ICES DataCentre presented the underlying concept and progress so far achieved in the development of the data model of the new Regional Data Base and Estimation System (RDBES). It is the view of the ICES DataCentre that WGCATCH has an important role in supporting the development.

WGCATCH discussed the future role of WGCATCH in respect to the RDBES:

The role of WGCATCH – approving

WGCATCH is not responsible for approving sampling design and methods for estimation. WGCATCH's role is to develop guidelines for sampling design and estimation in both small- and large-scale fisheries. One of the main roles of this group is to provide a forum to members' present sampling and estimations methods, which are discussed and offer suggestions for improvements.

The role of WGCATCH – developing estimation methods

ICES DataCentre is looking for inputs about estimation to be incorporated in the development for RDBES. Following the multiannual ToRs, one of the major topic for WGCATCH 2019 will be estimation. WGCATCH will start to develop guidelines for ratio estimators and create an overview of methods currently used.

ICES DataCentre requested a subgroup to be created within WGCATCH to support the development of estimation scripts for the RDBES. One of the aims of WGCATCH group is to develop generic algorithms for estimation, which can be adopted to all kind of formats, including RDBES. Furthermore, the new RDBES format is currently too unfamiliar to most members of the WGCATCH group. At WKSDECC – I (2017) we spent the whole WK trying to get data into the RDBES format and never achieved our primarily goal – describing, comparing and evaluate sampling designs and estimation. In future, when people are more familiar with the format, the view on this may change.

The role of WGCATCH – RDBES subgroup under WGCATCH

WGCATCH has a RDB subgroup, which can be consulted for input to development of the RDBES e.g. reviewing suggested changes to the data model from a national perspective. For bigger development task, WGCATCH encourage all members to actively get involved with the development of the RDBES by joining the RDBES core group. Currently more than half of the members in the core group are members of WGCATCH, so the link is considered strong.

Small-scale Fisheries in the RDBES, WP5 in fishPi2

Lucia Zarauz

The RDBES data model uses tables CL and CE to provide aggregated information on catch and effort. This information is taken from official logbooks and sales notes, which is a suitable source information for commercial fisheries, but is often incomplete for SSF.

In the forthcoming scenario of the RCBES providing estimates from raw sampling data, it is important that the total catch and effort values are as much accurate as possible. For SFF this may imply to use alternative sources of information, such as dedicated sampling using monthly sheets, interviews, alternative logbooks, etc. The estimates coming from these alternative sampling programs should be incorporated in CL and CE tables if they are considered of better quality than the official data. A proposal of a Cl and CE format to store this information was presented. Basically, the proposed format includes a variable to indicate the source of the information provided (census/ sampling estimation), and a measurement of precision and bias. In addition, it was highlighted that the use of sampling estimations implies the need for a description of the survey and an assessment of its quality.

The presentation caused a discussion about mixing of official data with estimated landings and effort data. No conclusion was reached, but it highlights the need to start these discussions in ICES and that the problems with SSF official data need to be taken into account. The presentation also inspired a discussion about some of the other issues with the present format for commercial landings and effort statistics e.g. effort and variables needed for estimation e.g. sampling frame and number of sampling units per domain of interest, which again highlights the need to start these discussions in ICES on how to incorporate different methodologies of collecting and estimating landings and effort for SSF into RDB and RDBES.

Accommodating incidental bycatch in the new RDBES

Bram Couperus, Sara Königson and Nuno Prista

Incidental bycatches of organisms like, e.g. marine mammals or birds are sometimes recorded by at-sea observer programmes targeting commercial catches. The inclusion of such data on the RDB and its estimation by appropriate statistical methods has been a long time need from ICES EGs like WGBYC and WGCATCH. The definition of a new data model for the RDBES is seen as good opportunity to secure the data on bycatches (incidental and not) is appropriately recorded and used in the new format.

The main requirements from the RDBES to correctly store and estimate incidental bycatches are that its data model i) is able to record positive incidental bycatch events (i.e. has the correct bycatch codes, etc.), ii) discriminates between non-observations (= missing values) and zero-observation (true 0s), iii) capability of recording observations made (or missing) in different stages of the fishing operations (e.g. during the hauling, during the opening of the codend, during the sorting of the catch), iv) is able to discriminate between estimates obtained from sampling in volume (e.g. a box of fish) and sampling visually (e.g. observing 260 minutes out the total time spent hauling the nets), and v) is able to record state of individuals (e.g. dead, wounded, alive). With regards to aspects i) and ii) they appear, thus far, to have been adequately incorporated into the latest version of the data model (v.1.16) by means of a species selection tables and associated species lists. Aspects iii), iv) and v) are now under discussion. The latest proposal is that they can be accommodated in the RDBES data model by:

- Inclusion of the following variables in the FO table:
  - Slipping_observation (Y/N): Indicator of observation of slipping. Slipping takes place outside the fishing vessel.
  - Hauling_observation (Y/N): Indicator of observation of hauling. Hauling takes place between the water and the inner part of the fishing vessel.
  - Sorting_observation (Y/N): Indicator of observation of the sorting. Sorting happens inside the fishing vessel, on the deck or in some sort of a conveyer belt / sorting platform.
- Inclusion of the following variables in the key of the SS table:
  - "Activity_type" (text), defined as SLIP (= SLIPPING), HAUL (= HAULING) and SORT (="SORTING").
  - "Sampling type" (integer), defined as 1 (= volume) and 2 (= visual).
- Inclusion of a variable in one of the table of the lower hierarchy that records the state of the individuals (e.g. dead, alive, wounded, unknown).

WGCATCH discussed the suggested fields and support the suggested fields. WGCATCH participants were asked to review the suggested definitions of sorting, hauling and slipping in the context of the different fleets where on-board sampling of commercial fisheries takes place. This was not achieved during this year's meeting, but will be included in the intersessional work planned with WGBYC in 2019.

Annex 17: Routine ToR f) Liaise with other ICES groups (e.g. WGBIOP, WGRFS, PGDATA and SSGIEOM), RCMs/RCGs, the LM and research projects that deal with commercial catch data

Planning group on Data needs for Assessment and Advice (PGDATA)

Laurent Dubroca (on behalf of chair of PGDATA): (February 2018, Nantes, France).

ICES PGDATA has a new three year programme covering the period 2018–2020. The main objectives are (1) to design a quality assurance framework (QAF), (2) to ensure consistency of approach for fishery-dependent information, (3) to develop and to test analytical methods for identifying improvements in data quality and (4) to improve (or to create) communications routes between data collectors, data managers and end-users. The Series of ICES Survey Protocols (SISP) document is proposed to provide reference information on commercial sampling protocol. To improve communication with the assessment working groups, the standardization of diagnostics plot regarding sampling effort and estimation is proposed. The available documentation on commercial sampling methods and estimations will be better organized using tags and the existing ICES depository.

Uwe Krumme (on behalf of the chairs of WGBIOP)**:** Working Group on Biological Parameters (October 2018, Gent, Belgium)

WGBIOP updated several EU-wide overview tables, planned otolith exchanges and suggested new workshops (e.g. WGBECOSS – Working group on better coordination of stomach sampling). There were discussions to stop or strongly reduce the collection of maturity data if the period of sampling is irrelevant to the end-users. The programme Smartdots (to coordinate, implement and analyse otolith exchanges, and in future also maturity staging exchanges) is the successor of WebGR and was presented during the meeting (see http://www.ices.dk/marine-data/tools/Pages/smartdots.aspx). There was a scientific afternoon with several presentations regarding possible applications of otoliths beyond age reading, e.g. otolith shape analysis or microstructure analysis.

Annex 18: Routine ToR i) WGCATCH response to recommendations from other EGs

From: WKASMSF

To: WGCATCH

Recommendation (ICES reference 71): WKASMSF recommends to adopt the 'WKMATCH 2012 maturity scale revised' and approve the implementation plan (presented in chapter 7). Approval should be sent to WGBIOP. (Note that all requests with regards to maturity scales or stages in the ICES, RCG and GFCM databases should be directed, in the form of a recommendation, to WGBIOP for approval.).

WGCATCH response: WGCATCH informed its members about the 'WKMATCH 2012 maturity scale revised' and its implementation plan. No objections to the implementation plan outlined in the WKASMSF report.

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From: WKASMSF

To: WGCATCH

Recommendation (ICES reference 72): All survey groups should update their manuals with the correct references (see chapter 4 in this report) and include or update the conversion table for the national maturity scales.

WGCATCH response: WGCATCH conveyed to its members the use of 'WKMATCH 2012 maturity scale revised' on their sampling protocols referring to maturity data from commercial catches.

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From: WGHANSA

To: WGCATCH

Recommendation (ICES reference 92): A pelagic survey to be carried out on an annual basis in autumn in the western Portuguese coast to provide information on the recruitment of small pelagics (particularly sardine and anchovy) in that region.

WGCATCH response: This recommendation does not fall within WGCATCH remit, as it cannot dictate what surveys are carried out by member countries, particularly on independent-fisheries surveys. This recommendation falls within the DC regulation, therefore NA RCG should be approached. WGCATCH have emailed WGHANSA, who confirmed that no action is needed from WGCATCH and will deliver a request to NA RCG.

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From: WKBASS

To: WGCATCH

Recommendation (ICES reference 145): New studies are needed to assessment the discard survival from commercial rods and lines, and nets, and trawls.

WGCATCH response: As it stands, this recommendation does not fall within the remit of WGCATCH, as the group cannot dictate what studies countries carried out, in particular for survival estimates. We can ask to our members if they are carrying out any studies on sea bass survival. WGMEDS – Working group on Methods for Estimating Discard Survival (Thomas Catchpole and Sebastian Uhlmann).

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From: WGBIE

To: WGCATCH

Recommendation (ICES reference 80): The WGBIE requests that working documents be submitted for review to the WGBIE no later than the data submission deadline and that working documents be provided if national labs submit revisions to survey data, catch data or have changed raising/sampling methodologies. This will provide the working group with the necessary background to compile a history and audit trail of these changes and make better informed choices.

WGCATCH response: WGCATCH agrees and supports this request, but it should be explicit in the data call and it should be extended to all stock assessments EGs, preferably in a standard format. WGCATCH developed templates to document current and historical sampling designs and estimation methods that should reflect changes on those procedures, these can be found at can be found at WGCATCH webpage at ICES (https://www.ices.dk/community/groups/SiteAssets/WGCATCH-publications.aspx). However, these templates are very detailed and WGCATCH is working on summarising the information in useful way for the EG. Next year we will a trial version and we would like to engage with WGBIE on the usefulness of these "summaries".

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From: WGBYC

To: WGCATCH

Recommendation (ICES reference 129): Best practice on-board sampling procedures need to be finalised and presented to the RCGs and/or national contacts leading sampling programmes under the EU-MAP. The procedures should take into account existing work, e.g. Report of the Joint NAMMCO/ICES Workshop on observation schemes for bycatch of mammals and birds (WKOSBOMB).

WGCATCH response: WGCATCH supports the development of a second WKPET-SAMP to outline the best practice for on-board sampling procedures.

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From: WGBYC

To: WGCATCH

Recommendation (ICES reference 133): WGBYC recommend that WGCATCH work with us to maintain the metadatabase on bycatch monitoring initiated at the joint PET-SAMP workshop. ICES DataCenter should consider where the database should be kept.

WGCATCH response: WGCATCH agreed to do this. Thus, the inventory will be updated twice a year during the meetings of WGBYC and WGCATCH. Collection or preparation of new input for the inventory may take place intersessional.

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From: WGWIDE

To: WGCATCH

Recommendation (ICES reference 186): It is recommended that differing national approaches to the assignment of mixed gurnard catches to species level be reviewed in order to develop a standardised procedure, which can be used going forwards and investigate the assignment of historical mixed catches.

WGCATCH response: At this year's meeting, WGCATCH only had the time to document how some member countries report and how provided data for red gurnards (gur.27.3–8), which will be provided to WGWIDE. WGCATCH recommends WGWIDE to issue a data call requesting how all countries are assigning individual species landings in a mixed gurnard catches and report back to WGCATCH. WGCATCH can evaluate if the sampling design of the species are according probabilistic sampling design, but due to the diversity of sampling schemes is difficult to standardize procedures to assign mixed catches, as they are dependable on the sampling schemes.

Country	Reported landings	Biological Sampling
Netherlands	Report landings as what is described in the logbooks.	No biological sampling for these species.
Portugal	No reported landings for GUR. The official landings are not accurate (GUR landings are over reported) and the Portuguese landings were the result of mixed gurnards (1 to 6 species).	For gurnards, the identification and low incidence of the sampling selection for some gurnard species have preclude obstacles to statistical modelling attempts. Currently, there are 6 designations (GUG, GUN, GUR, GUU, GUX and LVD) that are typically associated with the 6 gurnard species landed on Portuguese auction markets. Most of those designations were found to be applied to mixtures of several of those species. We were able to stablish marked differences on mixture proportions between regions and fishing gear segments. We expect that, from 2017 onwards, improved commercial designation data collection and focus on problematic mixture cases accurate models for realistic gurnard landings can be developed.
Spain	As in logbook. Despite mixed gurnards landings, sampling showed low contribution of GUR to the total landings of GUX (<1%).	Box of mixed gurnards are measured by spp. The proportion in weight of each species is used after to calculate the proportion of each species in the landings
UK-England & Wales	As in logbooks.	Box of mixed gurnards are measured by spp.

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From: PGADATA

To: WGCATCH

Recommendation (ICES reference 196): In relation to Section 3.2 of the report: "Development of SISP". To critically review the proposed SISP template in their 2018 sessions and advise on the first sampling scheme/survey which should use the new template. PGDATA 2019 will evaluate the feedback and make any changes required to the template and also evaluate whether a workshop to start filling the SISP template is required.

WGCATCH response: WGCATCH agrees with the overall structures for SISP template. However, WGCATCH has questions concerning how those SISP's will be organized and presented, is it by country, year & sampling design? Further, the number of design classes have expanded since WKPICS3, especially there seems to be a great diversity in onshore sampling schemes (ref: Documentation of the RDBES Data Model v1.16). In 2017, WGCACTH has developed templates to document current and historical sampling designs and estimation methods. However, these templates are very detailed and probably more relevant to national documentation, than ICES end-users. In 2019, WGCATCH will work intersessional with the creation of R Markdown summary reports based on these templates. WGCATCH would like to engage with PGDATA on the usefulness of these "summaries". The templates can be found at WGCATCH webpage at ICES (https://www.ices.dk/community/groups/SiteAssets/WGCATCH-publications.aspx).

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From: PGDATA

To: WGCATCH

Recommendation (ICES reference 197): In relation to Section; 3.3 of the report: "Communication and cooperation with expert groups". To review the proposed diagnostics plots, with the objective of proposing standard plots and initiate a continuous improvement process.

WGCATCH response: WGCATCH agrees with the idea of standardizing plots and welcomes plots highlighting overview of commercial sampling like the figure suggested in Section 3.4, PGDATA 2018. However, during the meeting WGCATCH could not carry out an extensive revision of all proposed diagnostics plots, hence it was not possible to propose any standardized plots, due to time constraints. WGCATCH is in doubt how PGDATA sees this process, who will do what work? An initial workshop would be useful to define diagnostic plots with various end-users and data submitters. Furthermore, similar work are ongoing e.g. RCG Subgroups using the RDB to develop standardized regional overviews of fisheries and sampling, and it seems relevant to couple this work.

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From: PGDATA

To: WGCATCH

Recommendation (ICES reference 198): In relation to Section 4 of the report: "Methodological procedures and quality estimates from past ICES technical workshops and working groups". WGBIOP and WGCATCH 2018 to add their expertise to this issue for consideration by PGDATA 2019 ICES to extract all tags which are attached to the documents in the repository, if any, and inform on the possibility to add/modify tags.

WGCATCH response: Overall, WGCATCH support this idea and the need for an organized repository. During the meeting, WGCATCH could not carry out an extensive revision of the format and the approach developed by PGDATA. Nevertheless, the approach is considered appropriate. However, WGCATCH raises concerns how the process will be carried out, who will take responsibility and how it will be available to the wider expert groups and other scientists. WGCATCH maintains a repository of resources on catch sampling / WGCATCH publications and it could be used to test the approach (https://www.ices.dk/community/groups/SiteAssets/WGCATCH-publications.aspx). WGCATCH suggests further and detailed discussions are required between the two groups and ICES to define tasks and responsibilities.