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## **COORDINATING WORKING PARTY ON FISHERY STATISTICS**

**Report of the**

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**FAO Technical workshop on global harmonization  
of Tuna fisheries statistics**

**Rome, 19–22 March 2018**



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## **PREPARATION OF THIS DOCUMENT**

This publication describes the outcomes of the technical workshop on global harmonization of Tuna fisheries statistics, organized by Food and Agriculture Organization of the United Nations, Fisheries and Aquaculture Department (FAO/FI) in collaboration with the Areas Beyond National Jurisdiction (ABNJ) program, convened at FAO Headquarters in Rome from 19<sup>th</sup> to 22<sup>nd</sup> March 2018.

### **ABSTRACT**

This is the report of the technical workshop on global harmonization of Tuna fisheries statistics, organized by Food and Agriculture Organization of the United Nations, Fisheries and Aquaculture Department (FAO/FI) in collaboration with the Areas Beyond National Jurisdiction (ABNJ) program, at FAO Headquarters in Rome from 19<sup>th</sup> to 22<sup>nd</sup> March 2018.

The workshop was made possible thanks to financial support from Japanese project GCP/INT/228/JPN (Improved fisheries management for sustainable use of marine living resources in the face of changing systems). The meeting also received support from ABNJ program. BlueBRIDGE, EU Horizon 2020 project, supported the activities of FAO Tuna Atlas in partnership between FAO, IRD and CNR.

This report contains a record of the six sessions of the workshop, including summaries of presentations and contributions, related discussions and feedback on each session. The main topics presented and discussed were CWP activities, standards and formulation of proposals. Then, the updated FAO Tuna Atlas with associated tools and services was reviewed. The workshop covered also several subjects of common interest to all tuna RFMOs.



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**ABBREVIATIONS AND ACRONYMS**

ABNJ	Areas Beyond National Jurisdiction
ASFIS	Aquatic Sciences and Fisheries Information System
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CWP	Coordinating Working Party on Fishery Statistics
DSD	Data Structure Definition
FAO	Food and Agriculture Organization of the United Nations
FIRMS	Fisheries and Resources Monitoring System
GFCM	General Fisheries Commission for the Mediterranean
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
IOTC	Indian Ocean Tuna Commission
RFMO	Regional Fisheries Management Organization
SPC	Pacific Community
TG	ad-hoc Task Group on reference harmonization for capture fisheries and aquaculture
t-RFMO	tuna Regional Fisheries Management Organization
WCPFC	Western and Central Pacific Fisheries Commission
WECAFC	Western Central Atlantic Fisheries Commission

## EXECUTIVE SUMMARY

The Food and Agriculture Organization of the United Nations, Fisheries and Aquaculture Department (FAO/FI) in collaboration with the Areas Beyond National Jurisdiction (ABNJ) program sponsored a technical workshop on global harmonization of Tuna fisheries statistics. The workshop was held in FAO Headquarters in Rome from 19<sup>th</sup> to 22<sup>nd</sup> March 2018 and brought together 26 participants including representatives from eight members of Coordinating Working Party (CWP) namely CCSBT, FAO, GFCM, IATTC, ICCAT, IOTC, SPC and WCPFC and one RFB (WECAFC).

The workshop was organized under the CWP ad-hoc Task Group (TG) on “Reference harmonization for capture fisheries and aquaculture statistics” with a focus on Tuna fisheries statistics. The TG aims at establishing the CWP standard for reference harmonization, a unified data structure composed of harmonized statistical concepts and definitions to meet the needs of CWP parties for data exchange and reporting. CWP parties expressed the need of adopting this CWP standard during several previous sessions as it will facilitate data interoperability across different organizations’ databases. The meeting acknowledged the timely relevance of efforts made so far to create this CWP standard for reference harmonization and showed a strong interest to contribute to this ongoing process.

This workshop was an opportunity to work closely with t-RFMOs to i) review previous proposals of CWP standard of reference harmonization, ii) review the updated FAO atlas for tuna and billfishes, and iii) discuss other subjects of common interest to the t-RFMOs.

The four days of the workshop led to several recommendations, agreements and next actions that are summarized below.

- **CWP reference harmonization and CWP handbook classifications.**

The group reviewed the progress of CWP TG and formulated two data structures for tuna fisheries statistics namely Nominal catch, and Catch and Effort. Both data structures cater for concepts used by t-RFMOs and correspond respectively to structures commonly referred as TaskI and TaskII.

A proposal to revise the CWP diagram of catch concept was suggested and it will be further discussed in the coming CWP session with other parties. The t-RFMOs revised the categories of fishing gears of common interest and the most common associated measures of effort observed (t-RFMO based analyses, which used the catch and effort information to obtain the ratios - number of datasets/records - of each effort measure by gear) and produced an inventory of the commonly used effort measures in combination with gear used across t-RFMOs. Based on the inventory’s output, the group proposed to include a module fishing practice that combines two concepts fishing gear and fishing mode in the data structure.

The group reviewed the usage of CWP grid system guidelines and the related technical document. The importance and value of this work was acknowledged and the recommendations proposed by CWP were supported by the group.

FAO will provide all CWP members of this Task Group a revised version 3.0 of the working document which will include the new data structures and a summary of the discussion on each concept. The updated version will be also communicated and presented in the coming CWP session towards consensus on the CWP standard for reference harmonization.

- **FAO Atlas for Tuna and Billfishes.**

The revamped FAO Atlas for Tuna and Billfishes catches was reviewed. Representatives of t-RFMOs acknowledged the progress made to provide new services and tools. The group recognized the usefulness to the scientific community and the global user community with further developments of data contents.

The group expressed the need for further work with data managers of t-RFMOs on the use of the services. t-RFMOs will be engaged to share two public datasets nominal catch and catch and effort together with the respective codelists, and mappings of t-RFMO with CWP codes and also any other metadata required. With the goal to set-up a governing mechanism with established data sharing agreement, FAO suggested to obtain this data from t-RFMOs under the FIRMS multilateral partnership with each of four out of five t-RFMOs members of FIRMS and to include provision of data submission. t-RFMOs representatives would come with the mandate to provide their final agreement on data provision after discussion and approval with commissions and secretariat under amendment of FIRMS partnership arrangement between FIRMS and each t-RFMO.

The atlas will be effectively operating based the data structures implemented by CWP standard of reference harmonization. The adoption of this CWP standard is expected to be a major key for minimizing maintenance burden and cost of the atlas. The data provided by t-RFMOs will be submitted according to the harmonized structure and codelists mappings made available will efficiently allow their interoperability across databases.

FAO will keep exploring possibilities with t-RFMOs for further enhancement to the data disseminated under the FAO global tuna atlas (e.g. additional data types, raised catches or effort). Derived estimations (obtained from the original data) will be accompanied with documentation (to be made public) on assumptions, parameters and statistical procedures provided by t-RFMOs.

- **Other subjects**

The workshop entailed other topics and t-RFMOs identified common interest and potential collaboration opportunities when they exchanged information on the following:

- Small Scale Fisheries data collection as a major improvement to expand the coverage of fisheries statistics. CWP standard for reference harmonization would be the basis to define harmonized minimum data requirements for data collection forms;
- Improvement of Small Scale Fisheries data quality to support data limited models in assessing other tuna and tuna-like species (e.g. bonitos, mackerels, sailfish, etc.).
- E-reporting data collections systems, tools and mobile applications. Many similarities were identified and potential collaboration was encouraged;
- Standards for data and metadata interoperability for fisheries statistics and geospatial information;
- Conversion factors used in tuna fisheries for the calculation of nominal catches in round weight (live weight equivalent) obtained from landings often recorded in product (gilled, gutted, head-off, etc.) weight. Experiences on estimations of weight-weight relationships were shared.

Finally, representatives of the t-RFMOs were very positive on the opportunity of having met each other in person, to contribute to setting CWP standards for the common global interest of the CWP community, to work on the delineation of the fisheries statistics data collection and reporting activities. Participants looked forward to continuing this opportunity of collaboration among data managers of t-RFMOs.

## INTRODUCTION

The technical workshop on global harmonization of Tuna fisheries statistics was held at the Headquarters of the Food and Agriculture Organization of the United Nations (FAO) in Rome from 19<sup>th</sup> to 22<sup>nd</sup> March 2018. It was organized by FAO as secretariat of Coordinating Working Party on Fishery Statistics (CWP) in collaboration with Areas Beyond National Jurisdiction (ABNJ) program.

This workshop was held under the frame of the **ad-hoc Task Group** on “Reference harmonization for capture fisheries and aquaculture statistics” of the CWP, as informal **tuna sub-group**, to put forward CWP Task Group objectives with a focus on CWP parties involved on tuna specific matters.

The workshop brought together representatives of 8 CWP parties namely: **CCSBT, FAO, GFCM, IATTC, ICCAT, IOTC, SPC and WCPFC**. Tuna RFMOs participants were managers of data collection programs and database managers. GFCM representative attended sessions relevant to CWP ad-hoc Task Groups’ activities.

Two representatives of fisheries department on statistics from Oman and Trinidad and Tobago joined the workshop as CWP observers to present the importance of data harmonization process and on facilitating the multi-reporting of fisheries statistics.

FAO and independent experts in Tuna fisheries statistics, artisanal and recreational fisheries and electronic data reporting systems participated to provide relevant regional experiences. The list of participants is provided in Appendix 2.

## OPENING OF THE WORKSHOP

Mr. Manuel Barange, director of FAO Fisheries and Aquaculture department, welcomed the participants and opened the meeting. He highlighted the relevance of CWP ad hoc Task-Group on harmonization of reference data and fisheries statistics in contributing to FAO’s vision of streamlining reporting mechanism of fishery statistics and allowing member countries submitting one data provision of several uses. He underlined the support of FAO to Tuna RFMOs beyond the workshop on potential future activities on sustainable fisheries management and in particular for small scale fisheries.

Mr. Marc Taconet, acting CWP secretariat and chief of FAO Fisheries and Aquaculture Statistics and Information Branch delivered opening remarks introducing the background and objectives of the workshop. He presented the ongoing CWP efforts to harmonize standards and classifications to improve data quality and timelines of the data reporting and exchange between national, regional and global organizations. The main objective of these ad-hoc Task Groups (on Geographic Information System, and on Reference Harmonization) is to promote the use of the CWP grid system and establish the CWP standard for Data Harmonization, building structures that accommodate statistical concepts and the coding system used by CWP parties for catches and aquaculture statistics.

## AGENDA

The workshop consisted of six main sessions for which the number of presentations varied. Chairs were nominated for each session to introduce the subject and moderate the discussions. The agenda is presented in Appendix 1. The agenda was adopted with an amendment in session 3 by adding presentations from WCPFC and ICCAT on the status of small scale fisheries and recreational fisheries in both t-RFMOs. The full list of presentations for each session is displayed in Appendix 3. Objectives, tasks and expected outputs of each session are summarized below.

## **Meeting overview**

**Session 1:** The workshop starts with an introduction of each t-RFMO presenting an overview of data collection framework and impact of the workshop on their work.

### **Session 2: Harmonization of reference data and grid system**

- Review the proposal of CWP standard for reference harmonization and its data structures.
- Scrutinize and review the mapping between the codes of Tuna RFMOs and CWP standards.
- Identify needs of t-RFMOs and their assistance to use CWP grids and other geo-data standards.

#### **Outputs**

- Validation of data structures for Tuna data (catch, catch and effort, logbook) and related metadata.
- Validation of the mapping between codes of t-RFMOs and CWP standards.

### **Session 3: Data collection programs to improve knowledge on recreational and small scale fisheries**

- Discuss opportunities to improve data quality to support Data Limited Models (DLM) in the case of small scale and coastal fisheries.
- Recreational and artisanal fisheries: success stories and harmonization of data collection forms and minimum data requirements.
- Present data collection frameworks of all t-RFMOs and the latest developments on electronic reporting systems of ICCAT and IOTC.

#### **Outputs**

- Guidance and recommendations regarding minimum data requirements for monitoring small scale and recreational fisheries. The output will support RFMOs to improve data collection and commit information to stock assessment.
- Identification of priority issues regarding challenges and best practices in electronic data reporting.

### **Session 4: Data exchange, reporting and standards**

- Present FAO Master Data Management Solutions and its role in upgrading the management of reference data of fisheries statistics
- Review of standards that facilitate fisheries data interoperability at CWP party level and with national members (SDMX, UN/CEFACT FLUX, OGC).
- Strengthen promotion and implementation of geographic information standards and best practices.

#### **Outputs**

- Guidance and recommendations regarding alternatives for data exchange format and standards for the needs of fisheries statistics.

**Session 5: Update of the FAO global Tuna Atlas – Tools, services, Maintenance and Partnership**

- Introduce the new FAO global Tuna Atlas, its renovated tools and services to facilitate the data exploitation based on geographic information standards and FAIR (Findable, Accessible, Interoperable, and Re-usable) data principles.
- Review user community needs for resources such as FAO global Tuna Atlas, including the possibility by RFMOs to benefit of regional views of the Tuna Atlas as embeddable software.
- Ensure acknowledgement of t-RFMOs as data owners (data provenance, citation, usage accounting), as the Tuna Atlas contains public data.

**Outputs**

- Guidance for finalized version of the FAO Tuna Atlas, upon meeting's feedback and validation.
- Guidance towards validation of partnership arrangement for data provision and maintenance of the Tuna Atlas.

**Session 6: Other Business - Break-out groups**

- Discuss and take diverse views in regards to issues of importance to all Tuna RFMOs.
- Conclude recommendations and perspectives of other business

**Outputs**

- Finalize and summarize the workshop outputs to the CWP community.
- Adopt the meeting report.

## MEETING REPORT

### SESSION 1: INTRODUCTION, WORKSHOP OBJECTIVES AND PARTICIPANTS EXPECTATIONS

Representatives of the five t-RFMOs, responsible for data management, provided an overview of their organization's data collection frameworks, data structures and reference data used. Each participating t-RFMO shared information on the status and availability of small scale fisheries data in their respective region. A brief summary of each t-RFMO presentation is provided herewith. Mr. Marc Taconet chaired this first session.

#### CCSBT

Mr. Colin Millar presented an overview of the CCSBT and its data ([CWP-TW/2018/S1-1](#)). The CCSBT manages the global fishery of a single species, Southern Bluefin Tuna and has no convention area, although the distribution of SBT catch is in a fairly narrow latitudinal band.

The CCSBT receives aggregated data for scientific purposes through two annual data exchanges:

- A scientific data exchange of used by the CCSBT Management Procedure and Stock assessments, which includes aggregated catch and effort data, ageing, length, CPUE datasets, non-retained catches, and recreational catches.
- A data exchange for Ecologically Related Species data, which includes highly aggregated catch and effort data of bycatch species and groups of species.

The CCSBT essentially holds no operational level logbook or detailed observer data, and no VMS data.

The primary compliance data source for the CCSBT is its Catch Documentation Scheme, which is fairly intensive with almost every fish being tagged with a CDS tag and having its length and weight recorded. CDS data are required quarterly and are provided as scans of paper forms or emailed/uploaded as Excel files.

#### IATTC

Mr. Nick Vogel described the various data collections held by the IATTC ([CWP-TW/2018/S1-2](#)). The focus is on purse seine (PS) gear, since 90% of the Eastern Pacific Ocean (EPO) tuna catch is by PS. IATTC manages a PS observer program with 100% coverage on larger vessels, which catch 85% of the catch. Data from unobserved PS trips is taken from fishing logbooks. IATTC has field stations in Mexico, Panama, Ecuador and Venezuela. Field station personnel collect fishing vessel logbook data, cannery unloading data, and take tuna length measurements during unloading. These data sources allow IATTC flexibility in data aggregation.

Longline (LL) data is submitted to IATTC annually, aggregated by year, month, 5x5 degree area. High seas transshipment data is collected through the IATTC Transshipment Observer program. The IATTC is currently improving LL Observer data collection, which is submitted by each country. Detailed data from artisanal gear is scarce. Artisanal fishers catch <0.1% of EPO tuna, though they do have substantial catch of targeted sharks, billfish and other large fish.

A comment was made that even though artisanal fleets don't catch a lot of tuna, they still have significant impact on shark populations. The IATTC has management responsibilities for sharks and billfish, and is taking steps to work with national fishery agencies to collect existing catch information. Ecuador has been especially helpful in these efforts.

## ICCAT

Mr. Carlos Palma presented the main characteristics of the ICCAT data collection system ([CWP-TW/2018/S1-3](#)). ICCAT has nowadays about 160 data requirements (for management and statistical purposes) which determines the specifications behind each set of information compiled (fisheries statistics and biological data, and, compliance related data) on tuna and tuna like species (and sharks bycatch species associated with tuna fishing activities) in the ICCAT Convention area (Atlantic Ocean and adjacent Seas).

About 95% all the information is sent by email (using the ICCAT standard forms/e-forms/templates) and only structured data is validated and integrated into the ICCAT database system (ICCAT-DB). As of today, only a small fraction of the forms (statistical forms, “ST”) have data handling automation (“unattended read/validate/store”) tools, developed on the basis of the ICCAT Scientific Committee (SCRS) “filtering criteria to validate/accept statistical data”. The “Online Statistical Validation System” (which uses the same code-base) developed by the Secretariat, will enter during 2018 (deployed in the next few weeks) in a testing period, and hopefully, in production during 2019.

Fisheries statistics (Task I nominal catches, Task II catch & effort, and, Task II size frequencies) datasets represent a small fraction of the number of datasets managed by ICCAT. Task I/II have large time series (from 1950 onwards) of highly aggregated data. ICCAT doesn’t compile any kind of operational logbook data or detailed observer data. In general, fisheries statistics are reported once a year (deadline: July/31), but explicit requests (new data and revisions) can also made for intersessional meetings by the SCRS and the Commission. All the Task I/II information is, after the explicit approval of the SCRS, publicly available on the ICCAT website (web-apps, CSV/XLS files, or, stand-alone ms-access databases). The Secretariat has also started the development of web-services (RESTful APIs) for statistical data dissemination/exchange, which will facilitate the data exchange among t-RFMOs, FAO/CWP, and users in general.

## IOTC

Mr. Fabio Fiorellato presented an overview of the fisheries data reporting and management processes currently in place at the organization, including background notes on the history of the Commission, on the standing, binding requirements (IOTC Resolutions) and how these turn into data and information reporting requests from CPCs (Contracting and cooperating, non-contracting parties) ([CWP-TW/2018/S1-4](#)).

The timeline of the IOTC workflow includes two annual deadlines related to the submission of mandatory statistical information: currently, the IOTC Secretariat recommends the adoption of Excel based data submission templates, yet a number of developing countries (as well as distant water fishing nations) provide information using custom, CPC-specific formats that require additional efforts to be processed.

This, summed up to the extent of artisanal fisheries within the region (accounting for over two thirds of all reported catches) and the inherent issues when it comes to report accurate, georeferenced information for these fisheries, is calling for a rationalization and standardization of reporting requirements and templates as well as capacity building activities at country level. For this reason, the IOTC Secretariat is supporting the work of the CWP in ensuring that double reporting efforts are minimized by adopting standard classifications and concepts in the context of data exchange processes between RFMOs and FAO.

## WCPFC

Mr. Peter Williams presented an overview of the Western and Central Pacific Fisheries Commission scientific data ([CWP-TW/2018/S1-5](#)). The WCPFC comprise 26 member countries, 7 Participating Territories and 7 cooperating non-member countries. The Pacific Community (SPC) comprise 15 Pacific Island member countries 7 Territories and four founding member countries. SPC is the

contracted WCPFC science service provider and data manager and the main work conducted in this role include:

- Conduct of the key WCPFC stock assessments and related analyses;
- Collection, management and dissemination of WCPFC scientific data;
- Direct assistance to Pacific Island countries (SPC members) with data collection and management through provision of database tools and capacity development, so these countries can satisfy their WCPFC reporting obligations;
- Supports compliance work of WCPFC.

The requirements for each source of WCPFC scientific data are described in the document “Scientific data to be provided to the Commission”. The data sources and their characteristics were presented: annual catch estimates, aggregated catch/effort data, operational catch/effort data, aggregated size data and observer data. Most of these characteristics are similar to those in other t-RFMOs.

The dissemination of WCPFC science data is guided by the “Rules and Procedures for the Protection, Access to, and Dissemination of Data Compiled by the Commission” (RaP-WCPFC). This document, inter alia, covers the following:

- Lists types of public and non-public domain data
- Rules for members access to data (flag state and coastal state)
- Includes provision for the data exchange agreements between WCPFC and other RFMO (based on equivalence and reciprocity)

The WCPFC have Memorandums of Cooperation (MOC) on data exchange with both IATTC and CCSBT.

The WCPFC public domain data products on the WCPFC web site include:

- Aggregated catch/effort data
- Yearbook (bulletin and data files)
- Data Inventory
- Bycatch Data Exchange Protocol (BDEP)

### **Feedback and conclusions**

During the session 1, representatives of t-RFMOs illustrated the core of data collection systems that consist of catch/effort, Monitoring Compliance and Surveillance data. The role of t-RFMOs as key and preferred provider of tuna statistics for regional and global use was emphasized during these presentations.

All t-RFMOs presented current initiatives and challenges in improving data collection on small scale fisheries and distinction of its contribution to total catches.

The presentations revealed differences between the five t-RFMOs, for instance in the data coverage (species, area, amount of information), procedures and technologies used. However, they highlighted many common challenges and similarities in the use of CWP classifications and data structures.

The group addressed the multiplicity of data collections mechanisms and data submissions by member countries. Participants highlighted the need to avoid duplication of reporting tasks while addressing multiplicity of reporting format. Mr. Aymen Charef noted that this underlines the relevance of the CWP task group on reference harmonization which aims at improving the data reporting and exchange between the national, regional and global organizations. The current CWP TG on reference harmonization is establishing a set of statistical concepts, as minimum global requirements, that accommodate the coding system used by CWP parties (t-RFMOs). This improve data reporting, reduce

time and costs of mapping data elements to standard terminology and improve mainstreaming and reconciliation for national sources.

## **SESSION 2: HARMONIZATION OF REFERENCE DATA AND GRID SYSTEM**

Mr. Marc Taconet chaired the session and introduced the activities of CWP task groups to establish CWP standard of reference harmonization for capture fisheries and to identify needs of tuna RFMOs to use CWP grids and provide them assistance to use CWP grids and other geo-data standards.

### **Session 2.1: CWP efforts on Harmonization of reference data and global data structure (concepts, dimensions, definitions, etc.)**

Mr. Aymen Charef presented the background and objectives of the CWP ad-hoc task group (TG) on reference data harmonization ([CWP-TW/2018/S2-1](#)). He also underlined the main overall aim of the TG which is establishing the **CWP standard for reference harmonization**, set and structure of statistical concepts that accommodate the coding system used by CWP parties to improve data reporting and exchange between national, regional and global organizations. This CWP standard defines the set of minimum global requirements that are based on CWP standards and international classifications (e.g ISSCFG, Areal Grid System,..) to minimize time and costs of mapping data elements to standard terminology to the extent possible.

The first draft of the standard for global reference harmonization was presented ([document](#)<sup>1</sup> and [presentation](#)<sup>2</sup>) at the CWP intersessional meeting that was held in Copenhagen, 19-22 June 2017. The meeting's recommendations included revising terminology and expanding the scope of data structures to data collection and dissemination and to cover nominal catch, catch and effort, logbook. Remarks and actions to be carried out were summarized in the [meeting report](#)<sup>3</sup>.

The second version of the background technical document<sup>4</sup> (V2.0) was distributed to CWP for a second round of offline feedback. The presenter recalled the essence of the work's rationale and terminology used in the second version of the document.

As a result, the ultimate objective of this TG is to lay the basis for establishing data-sharing agreements as practical work arrangements between agencies involved in a data workflow. This is expected to reduce data reporting burden for data producers and to improve data quality by mainstreaming the cross-checking and reconciliation of information from national sources.

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<sup>1</sup> First version of the technical background document (V1.0) of the ad-hoc CWP Task Group on reference harmonization for capture fisheries and aquaculture statistics [www.fao.org/fi/static-media/MeetingDocuments/cwp/cwp\\_IS\\_2017/2e.pdf](http://www.fao.org/fi/static-media/MeetingDocuments/cwp/cwp_IS_2017/2e.pdf)

<sup>2</sup> Presentation: [www.fao.org/fi/static-media/MeetingDocuments/cwp/cwp\\_IS\\_2017/Pr6e.pdf](http://www.fao.org/fi/static-media/MeetingDocuments/cwp/cwp_IS_2017/Pr6e.pdf)

<sup>3</sup> Report of the CWP fifth meeting of the aquaculture subject group and the twenty-sixth meeting of the fishery subject group (FIAS/R1213) [www.fao.org/3/a-i7805e.pdf](http://www.fao.org/3/a-i7805e.pdf)

<sup>4</sup> Second version of the technical background document (V2.0) of the ad-hoc CWP Task Group on reference harmonization for capture fisheries and aquaculture statistics [www.fao.org/fi/static-media/MeetingDocuments/cwp/ReferenceHarmonization/2018/2e.pdf](http://www.fao.org/fi/static-media/MeetingDocuments/cwp/ReferenceHarmonization/2018/2e.pdf)

The objective of this session was to carry on activities of the TG by building up on preceding proposals of and taking into account the feedback of CWP parties, members of the TG, during previous discussions.

An overview of the latest version of various data structures was given:

- Global Capture production (Landings/Nominal catches) addressing the reporting needs from Member Countries to FAO;
- Nominal catch
- Catch and Effort, oriented towards t-RFMOs needs for statistics.
- Logbook
- Data modules (building blocks) used in each structure were also described such as Catch, Effort, Time, Position details, Vessel information.

The participants were informed about the course of reasoning that led to development of these structures. The feedback of other CWP parties on these structures was also presented to preserve the continuity of the TG's efforts.

A demonstration of the foreseen CWP Catalogue was presented, where resources such as reference data, codelists mappings, and data structures are expected to be published by the different CWP agencies. Main governance and maintenance principles were enumerated as pre-requisites to set-up and release the CWP catalogue.

### **Feedback and conclusions**

Following the presentation, Mr Aymen Charef kicked off the review's session and recalled that the objective is to seek for consensus on the structure, the definition of concepts with t-RFMOs concepts and taking into account precedent feedback from other CWP members.

The group acknowledged the timely relevance of efforts made to create CWP standards for reference harmonization and strongly supported the ongoing process.

The group reviewed the data structures, contents, including concepts, definitions, classifications and codelists building on the previous feedback of CWP parties on the matrix V2.0 ([CWP-TW/2018/S2-1](#)).

The group recommended to change the title from "CWP standard for Data Structure Definition Standard" to "CWP standard for reference harmonization". This new title better covers the domain of the standard. It was also agreed to use terms data structure or data matrice instead of Data Structure Definition.

An active discussion took place and the group agreed to build the CWP standard for reference harmonization into two structures to cater for tuna fisheries statistics namely Nominal catch, and Catch and Effort. Both data matrices cater concepts used among t-RFMOs and correspond respectively to structures commonly referred as Task I and Task II.

The group thoroughly reviewed concepts and modules of both data structures. Participants underlined that definitions presented in some concepts do not correspond exactly to those used by t-RFMOs. The review of CWP definitions and classifications resulted in these proposals and recommendations:

- Adding "discarded deads" box to the catch concept diagram M1 (Appendix 7).
- Adjusting Annex N1 with list of possible combinations of gear and effort used by t-RFMOs (Appendix 8).

The group also proposed to include in the data structures the following:

- Concept "Flag entity" (instead of flag state) for use under the module (broader concept) "political/administrative entity".

- Module “geographic area” composed of two concepts “fishing area” and “area type” (e.g. Statistical area; jurisdiction area; grid coding system).
- Module “fishing practice” that reunites “fishing gear” (CWP ISSCFG) and “fishing mode” (free school/associated schools).
- Concept “coverage” to indicate the degree of coverage of catch data for the fishing operations.

The session’s outputs contributed to revision of the data structures V2.0. Recommendations and proposals of new concepts were incorporated in both data structures displayed in Appendix 4. Detailed feedback and comments on each concept are presented in Appendix 5.

FAO will provide CWP members of this Task Group a revised version (V3.0) of the working document which will include the new data structures and a summary of the discussion on each concept. The updated version will be presented in the coming CWP session towards validation and consensus on the CWP standard for reference harmonization.

## **Session 2.2: Harmonization at semantic level (mapping among coding systems: CWP vs CWP parties)**

Mr. Miguel Herrera presented an overview of the types of codes used by t-RFMOs for the management of catch, effort, and biological data on fisheries for stocks under their management (Available at: [CWP-TW/2018/S2-2](#)). The review covered country, species, gear, and other codes used by RFMO and how they compare with CWP international classifications. It was noted that an RFMO had agreed to initiate a process of harmonization for this information indicating that the meeting of the CWP represents an opportunity to initiate such process.

It was noted that while all t-RFMOs have adopted a mandate to manage tuna and tuna-like species most t-RFMOs do not cover all the existing stocks in their areas of competence. The same applies to stocks of sharks for which the RFMOs have requested more information and advice on impacts from their fisheries. For this reason, it was recommended that the CWP agrees on a list of species for which all RFMOs can provide data and limit transfer of data to the FAO for those.

As for the codes used by the t-RFMOs, they do not necessarily match international agreed standards. The following cases were presented to illustrate this:

- Codes for the aggregation of attributes encompassing less attributes than the available international standard (e.g. codes used for specific country or gear aggregates, use of various codes for NEI categories, etc.);
- Use of various codes to refer to a single ISSC code (e.g. use of several codes for the same country to account for different types of fleets, chartering arrangements; use of various codes for a specific gear to account for different types of targeting or gear configuration, etc.);
- Use of non-standard codes although those codes are available in the ISSC system (some RFMOs use their own classification system).

Concerning the data exchange mechanism the CWP is promoting, it is important that the CWP: (i) identifies who the potential users of the information would be; (ii) reviews the data and agrees on a standard format for the release of this information, so as the data are displayed in a consistent and user-friendly manner. At the same time, the RFMO Secretariats were encouraged to work towards harmonization of their coding systems and definitions.

### **Feedback**

The group acknowledged the importance to map codes of t-RFMOs and CWP classifications. Participants went through the questions addressed in the presentation.

Mr. Miguel Herrera recalled that codelist mapping was a recommendation from the Kobe Process. He also led the discussion and noted the concern raised on the use of FAO area codes and whether these correspond to biological stock boundaries or whether data should be distributed according the biological

stocks (e.g. Atlantic SKJ Eastern and Western stocks, in ICCAT). No clear answer could be provided (acknowledging however that, stock assessments are usually made using biological stock delimitations) and these aspects should be further discussed at future opportunities.

### **SESSION 3: DATA COLLECTION PROGRAMS TO IMPROVE KNOWLEDGE ON RECREATIONAL AND SMALL SCALE FISHERIES**

The third session was moderated by the co-chairs Mr. Aymen Charef and Mr. Olivier Roux. The session focused on guidance and recommendations regarding minimum data requirements for monitoring small scale and recreational fisheries. Co-chairs introduced the common interest of t-RFMO to improve data collection and use new technologies to facilitate electronic data reporting.

#### **Session 3.1: Opportunities to improve data quality to support Data Limited Models (DLM) in the case of small scale and coastal fisheries**

Mr. Nicolas Gutierrez delivered a presentation on Data-limited tuna and tuna-like fisheries: a way forward? (Available at: [CWP-TW/2018/S3-1](https://www.wcp-tw.org/2018/S3-1)).

Main commercial tuna species (i.e. bluefin, bigeye, yellowfin, albacore and skipjack) are often subjected to quantitative stock assessments, using time series of catches, effort, size/age composition, among other pieces of information, in order to derive management recommendations. These species constitute about 9% of the global marine capture and their stock status are known, with various degrees of certainty. On the other hand, many other tuna and tuna-like species (e.g. bonitos, mackerels, sailfish, etc.) are considered data-limited and assessments are either lacking, or with large uncertainties associated. These poorly assessed and in many cases unmanaged stocks, mostly targeted by artisanal, small-scale fisheries, represent around 25% of the total tuna and tuna-like landings as estimated by FAO, therefore being of social and economic importance for local communities, but also relevant for food security implications. Therefore, further attention should be given to improve the information for these stocks, particularly aiming at the use of data-limited assessment approaches. These methods rely mostly on catches and ancillary data such as size composition and life history information. The objective of this presentation, and the overall session, was to introduce the problematic of data limitations for the assessment and management of tuna fisheries, to provide some examples of data-limited methods that can be used, and more importantly to get experts' opinion on: (1) what is currently being done at the tuna RFMO level to improve data for the "unassessed" stocks (e.g. neritic and small tunas); (2) proposing mechanism for improvement of such data in the short and medium-terms; and (3) providing suggestions on how FAO can support and facilitate the identified processed for data and information improvements.

#### **Feedback**

IATTC recognized the importance of boosting data collection for data-limited tuna fisheries and a stronger coordination with governments collecting statistics is needed. E.g. by formalizing data sharing agreements. Currently, IATTC has data collection programs for sharks and for data-limited tuna species via observers' forms.

IOTC acknowledged the need to improve both the quality of the information that is reported by CPCs as well as the type of data that is collected for these data-limited species/stocks. There is a need to further estimate the uncertainty around the reported catches for neritic tunas. There are some initiatives at the country level (e.g. Iran, Pakistan). Other countries are more challenging (India, Indonesia).

ICCAT informed the group about the Small-Tuna Year Program that covers 13 data limited species which will include recovering size structure data and recreating catches. Some capacity building for data collection for data limited species at the country level has been done.

WCPFC: WPEA project aimed at improving data collection for artisanal fisheries (3 countries).

Mr. Miguel Herrera: Considering a substantial proportion of catches for the data-limited tuna (neritic, small-tunas, etc) comes as bycatch of other fisheries, it is suggested that FAO put additional resources to document and record tuna and tuna-like bycatch species in other fisheries globally.

Mr. Nicolas Gutierrez addressed the question asked by some participants about stock delineation, especially for neritic tunas and how to improve knowledge of stock limits through the data collected from these fisheries. He explained that genetics and distributions of effort/catch can provide key information about stock structures, which can then be incorporated within stock assessments.

IATTC are taking steps to coordinate more closely with nations (e.g. Ecuador) that are already collecting data from these fisheries. Some of the datasets are substantial and good relations can help inform these assessments. Shark survey program in Panama is also identifying how many artisanal fishery boats are operating, and what their catch composition is. An access database has been developed and data collection forms have been developed in coordination with OSPESCA, to allow fishers to collect data onboard. The various forms are available on the IATTC website. Opportunities to work more closely with FAO and other organizations to extract maximum value from the developing databases in coming years

IOTC noted various nations that are already collecting data from these fisheries, particularly for neritic tunas. Some other nations catches are largely estimated from alternative data for now, and IOTC is discussing options through which estimations of uncertainty can be assigned to each component of these databases. Data improvements are expected in coming years, with a relatively large opportunity for this coming through India.

ICCAT is placing more focus on small tunas, and current improvements since 2012/13 are encouraging. Large improvements noted and ICCAT supported some biological studies in African and European countries investigating historical catches of small tunas. ICCAT is providing financing and technical support to improve biological data collection from these fisheries. Uncertainty remains about how much total catch is achieved collectively through these fisheries activities, so there remains much scope for ongoing improvements.

WCPFC have a new phase of a relevant project starting soon. Some countries of interest have already developed data collection from these fisheries, which is being used as a basis for ongoing works. Dedicated annual catch estimate meetings occur each year with all nations to report to the RFMO, and this is providing opportunity to include neritic species data within assessments. They have managed to refine and reduce the uncertainty around the provided data.

Some participants expressed the concern about incomplete data, particularly for the ecologically linked by-catch species for which many RFMOs already have recommendations for. Without the data on these species, it is very difficult to assess and follow up on the implementation of these recommendations.

## **Conclusions**

It was acknowledged that the main tuna species are relatively well covered for stock assessment purpose across the five t-RFMOs (with on-going effort to increase the knowledge on small-scale fisheries) and

there is an on-going effort focused on improving data availability on bycatch species caught in association to tuna species, as well as neritic/coastal tuna and tuna like species.

The ongoing effort being done by t-RFMOs and other RFBs to collect information from small-scale, artisanal tuna fisheries, includes port sampling, observers and apps. However, it seems most of the information collected is still aimed at improving information for main tuna commercial species and not necessarily to move data-limited stocks and species (bonito, wahoo, sailfishes, etc.) from data-limited to data-moderate. Therefore, a more systematic approach to data collection (from biology to catches and effort) should be developed in coordination with local governments, CSOs and NGOs.

Mr. Nicolas Gutierrez raised the need to further discuss and analyze the processes at the t-RFMOs level for transferring the information from small-scale fisheries into assessment and management to better elucidate FAO's contribution and support to improve these processes.

### **Session 3.2: Recreational and Artisanal fisheries: success stories and suggested harmonization of data collection forms and minimum data requirements**

Mr. Roy Bealey (Caribbean Billfish Project/WECAFC/FAO) presented successes of programs collecting data from Recreational and Artisanal fisheries within developing nations ([CWP-TW/2018/S3-2](#)). Recreational and Artisanal fishery sectors were discussed separately and considerations that will promote the successful, long term, data collection from each sector were described in context. Lacking tangible commercial consequences for these fleets when they are not submitting data to t-RFMOs, the need for convenient data capture and the provision of feedback of interest to these sectors was highlighted as essential to promote long term buy-in among these stakeholders. Typical points of feedback interest to each fishery sector were then described, alongside methods available to conveniently provide and appropriately present such feedback via electronic methods. The typical causes of data bias in Recreational fisheries were then highlighted, with resolution suggestions proposed. Broad, sporadic and sometimes migratory distributions of Recreational and Artisanal fisheries create a common challenge to data collection from these sectors, and suggestions to combat these issues were also then proposed. Some noted concerns relating to trends seen within developing small scale and longline fisheries in developing nations were also mentioned in the context of collective impacts they are having upon the tuna and billfish stocks that fall within RFMO mandate.

#### **Feedback**

Suggested Minimum Data Requirements and a draft version of a recommendation on “Data collection from Recreational fisheries” as then provided for consideration and discussion towards potential endorsement by the t-RFMO representatives. The report from a relevant workshop held through the Caribbean Billfish Project was also shared with participants (Available at: [www.fao.org/3/i8241en/I8241EN.pdf](http://www.fao.org/3/i8241en/I8241EN.pdf)).

It was recalled to the group that given the heterogeneity in type of recreational fisheries, the cost of comprehensive surveys to cover from shore fishers to charter boats is tremendous and few countries can afford regular data collection. Involvement of fishers and captains is key to success of recreational fisheries monitoring.

The relevance of CWP standard for reference harmonization was highlighted. The implementation of this standard will serve as basis to build a data structure composed of common concepts used by RFMOs and harmonized definitions for data collection and reporting in the context of recreational and artisanal fisheries.

### **Session 3.3: Support to data collection program: Smartforms**

Mr. Aureliano Gentile delivered a presentation on “SmartForms: Support to data collection programs”; a mobile App to collect and review fishery and observer data (Available at: [CWP-TW/2018/S3-3](#)). The development of the app is in progress and it will be released as a FAO corporate application (from an IT viewpoint) within the context of the mobile data collection initiative. The objective is to release a system for the dynamic collection of fishery observers’ data on-board fishing vessels or at landing sites by establishing a robust infrastructure to collect, validate, amend, archive and share data. An open source version is also expected to serve a community of interest. The deliverables include data input forms suitable for use on a tablet or mobile phone that satisfies the requirements of the regional fisheries organizations and other partner organizations in the global initiative on ‘Sustainable Fisheries Management and Biodiversity Conservation of Deep-sea Living Marine Resources and Ecosystems in the Areas Beyond National Jurisdiction’ (ABNJ Deep Seas Project) and similar projects. A few case studies were identified: Observations on Sharks, fragile benthos in South Indian Ocean, Observations on VME Taxa in SEAFO Area, Port inspections forms, Caribbean Billfish Project – monitoring recreational fisheries. The latter is currently in progress and field activities will be launched soon under the coordination of the FAOSLC (Subregional Office for the Caribbean). Several expressions of interest were made along the presentation of this new mobile app. A live demo of the SmartForms App and the Data Hub was delivered based on the “Catch of the day” form, purposely designed for the Caribbean Billfish Project.

#### **Feedback**

The meeting acknowledged the need for tools that are easy and configurable and that can be shared to be tailored to various needs, and especially in the context of artisanal and recreational fisheries.

Some participants highlighted the need to get industry, and more specifically artisanal and recreational fishermen, on board the implementation, notably through capacity building and answering their needs.

### **Session 3.4: Data collection and multiple reporting in WECAFC area: tuna small-scale fisheries**

Mr. Yann Laurent presented the WECAFC and effort done at the regional level to improve process to report to many stakeholders by national fisheries authorities (Available at: [CWP-TW/2018/S3-4](#)).

The WECAFC area was presented highlighting the broad variety of countries in the region, from few large coastal states to many Small Islands Developing States (SIDS). The Commission and Member states were presented, emphasizing that some States are members of many different sub-regional and regional organizations, in addition to international ones.

That led to the presentation of the issue of multi reporting by states to meet the needs to support national policies, regional managements and international commitments to feed the global databases, illustrating with the example of Belize.

Challenges at national level with highly manual processes result usually in a unique source of data that needs to be recompiled (manually again) to match the various formats and classifications imposed by the different organizations.

Opportunities to improve this reporting were presented on which several activities were initiated by FAO in the past years: the development of a regional database prototype in support to WECAFC data and statistics collection that would be required once a RFMO is established in the WECAFC area implementing simple tools for the Regional Data Manager and the National Data Manager to respectively defined data calls according to the Data Collection Reference Framework and to enter,

validate and submit data for the data call. Based in standardized data and metadata, the suite of tools also encompasses a generic map viewer for the published data that could be reused in other contexts.

Another activity is to support the improvement of national fisheries statistics systems in two countries to provide automatic reporting for national needs, regional data calls and FAO questionnaires.

Both supports are expected to be reinforced through a new project being drafted to seek fund from EU DEVCO targeting 15 countries in the WECAFC region.

Mrs. Louana Martin (Trinidad and Tobago) shared Trinidad Fisheries Division experience in reporting to ICCAT. She acknowledged the need of further development of this framework.

The group was informed about the roadmap for the upcoming developments in terms of data collection.

Mr. Carlos Palma valued the effort of Trinidad on data reporting as datasets submitted are among the most complete in the past years.

### **Session 3.5: Data collection frameworks and electronic reporting systems of ICCAT and IOTC.**

#### **1- ICCAT presentation on small scale fisheries reporting**

Mr. Carlos Palma shortly described how ICCAT characterizes and discriminates the small scale (artisanal and recreational/sport) fisheries (Available at: [CWP-TW/2018/S3-5](#)). In the past those series were classified using special gear codes (SPOR, SPHL, etc.) and sporadically under “Fleet”. This approach poses problems when there is a need to identify the proper gear (e.g.: rod & reel and hand line in recreational fisheries). Currently, the complete list of fleet codes are under revision and normalization. Each fleet code is now made of three components: [fishing flag] + [flag of the vessel (accommodates chartering)] + [suffix descriptor (port/zone/fishery/etc.)]. After studying other possibilities of classifying small scale fisheries, the SCRS adopted the inclusion under the fleet code, the following suffix descriptors: “art” for artisanal fleets; “rec” for recreational fleets (could contain sport); “spor” for explicit sport fleets (rare cases). The identification, review, and reclassification of these small scale fisheries statistics series, is now being made by the Secretariat with the collaboration of the respective CPC scientists.

Mr. Palma also informed the group about the ongoing ICCAT efforts for data recovery targeting 13 small tuna species. He gave as example the Spanish work (under the SMTYP) to recover 20 years of data on small tunas in the Mediterranean Sea.

#### **2- WCPFC presentation on Artisanal fisheries**

Mr. Peter Williams presented the data collection service provided by SPC to WCPFC: Both mobile applications “Tails” and “Tufman 2” data collection were described and promoted (Available at: [CWP-TW/2018/S3-6](#)). 800 000 tons of tuna being logged through these applications, which are focused on small scale fisheries (substantial catches being made in the region). Such data collection is supported by mandatory data reporting requirements of the WCPFC. Now, it has a continuous time-series from 1997 (most reliable since 2010).

A discussion was held on data validity and options for effectively collecting data through fisheries officers, and through the fishers themselves (data validation options - bringing citizen science into proper science).

### 3- IOTC reporting system presentation

#### 3.1- Observer reporting system

Mr. Enrico Anello (FAO) presented an overview of the data collection and reporting tools developed under the Regional Observer Scheme (ROS) pilot project (Available at: [CWP-TW/2018/S3-7](#)).

The presentation explained the main reasons why these tools are needed, the current implementation of the different modules and their possible future developments.

The currently available modules are:

- the ROS data Model, which structures the information that needs to be collected,
- the ROS e-reporting interface, to support the collection of scientific observer data on the field,
- the ROS National Database, an entry point for all participating CPCs to store and analyze the data collected by their scientific observers,
- the ROS Regional Database, a common storage for all ROS data collected by CPCs and subject to mandatory reporting requirements.

The presentation highlighted that workshops will be held on CPCs interested on piloting the project. Some questions arose after the presentation highlighting the importance of using a central and common way on how the observer data should be collected.

#### Feedback

The group acknowledged the uptake for observer compared to paper forms. Participants raised the importance of developing similar e-reporting systems based on standards classifications and harmonized definitions, so countries can contract third parties to develop tools according to these specifications. The details of information to be collected (mandatory / optional) to be defined in specifications and the revision of these specs is fed from observers' feedback.

As for data submission by countries, Mr. Fabio Fiorellato explained that data are kept in the National Databases to allow countries review and validate data before submitting the information to the Regional Database.

#### 3.2- IOTC and ICCAT e-reporting systems

The IOTC Secretariat provided updates on the status of development of an electronic Monitoring and Reporting Information System (e-MARIS) whose original idea stemmed from the outcomes of the 2nd IOTC Performance Review in 2015.

The ABNJ tuna project provided funding and support for the e-MARIS preliminary study and consultation workshop and promoted the idea of a streamlined workflow that would facilitate self-reporting of data and information from CPCs while at the same time enforcing the adoption of standard formats for data exchange (which is also a goal of the CWP framework).

A comparable study was also conducted at ICCAT, still with the support of ABNJ program, and similar needs were also identified across all RFMOs during the inception phase of the project: these include providing one central location for all data and information submissions, the possibility of receiving immediate feedback after each interaction with the system and the provision of real-time submission status and preliminary compliance level assessment to CPCs.

For this reason, and recognizing the differences at t-RFMO level that were also discussed during the 2<sup>nd</sup> Tuna Compliance Network meeting in Honiara in February 2018 (Report available at: [www.fao.org/fileadmin/user\\_upload/common\\_oceans/docs/TCN2ndWorkshopReport.pdf](http://www.fao.org/fileadmin/user_upload/common_oceans/docs/TCN2ndWorkshopReport.pdf)), the IOTC secretariat agreed about considering further liaisons with interested organizations during the developing

phase of the project, in order to ensure that common features (management of information calls, information submissions, reporting and compliance evaluation among others) might be reused in different contexts when needed.

### **Feedback**

Mr. Yasser El Musalhi (Sultanate of Oman) commented on the usefulness of the eMARIS. He informed the group that the national submission of statistics to IOTC is a complex task, which involves the reporting according to demanding forms (e.g discards / size frequency).

Mr. Fabio Fiorellato acknowledged the inherent challenges in current data reporting tasks for all IOTC CPCs, and provided further information on the e-MARIS specifications, including the possibility of adopting simplified formats for the submission of mandatory statistical information as well as future plans for IOTC to fund capacity building activities to assist members in effectively using the system for statistical and compliance-related data reporting.

Mr. Olivier Roux explained that allowing countries to self-report information extracted from their own information systems is a necessary goal, and that most of the tasks involved in the implementation of e-MARIS are related to the implementation of a reliable transportation mechanism for all required data (easy reporting, multiple source of data, feedback to countries etc.). The harmonization process is a separate flow that is not directly part of the main e-MARIS core process.

Mr. Carlos Palma informed the group that ICCAT, over the last 2 years, worked on the online reporting field (mostly online statistical form validation tools). In 2017, a feasibility study (financed by ABNJ-GEF) and a prototype to handle catch and effort data (FORS: Fisheries Online reporting System) was made, with great results. A working prototype is being now deployed (borrowing some knowledge obtained with the FORS) which aims to process (validate, integrate, store) fisheries statistics data. The next step will be merging all levels according to FORS specifications.

In the context of WCPFC, Mr. Peter Williams informed the group about the reporting system that has been adopted for logbook data submission and where SPC is managing the dashboard and the platform. There are also plans to adopt and implement standards of data exchange and submission in the case of high seas transshipment and, statistical documentation.

Participants expressed the need to link the various initiatives to promote re-using their outputs and avoid redundancy. They also pointed out the primary objective should be simplification of data requirements and reporting procedures for countries.

Mr. Colin Millar raised the discussion about possibility of developing a single system that would benefit from all other t-RFMOs. Participants pointed out the need of having joint meetings to approve common functionalities and they identified the challenges that hamper this common goal: difference in timelines, budgets and validation process (scientific committee, compliance committee, etc...).

Mr. Marc Taconet underscored that achieving one unique system could be promoted as there are diverse systems but delivering similar services. However most importantly these solutions should be implementing standards (e.g. OGC standard) to enable data interoperability and facilitate the work of non-cooperating resources with minimal effort. Using harmonized standards still allow different institutions/recipients to report data in different formats.

The group recalled the relevance of the ongoing CWP's work to establish CWP standard for reference harmonization which will generate guidelines and rules to facilitate data submission and dissemination.

## **SESSION 4: DATA EXCHANGE, REPORTING AND STANDARDS**

Mr. Marc Taconet and Mr. Yann Laurent chaired this session that consisted of three presentations and moderated an interactive discussion on the relevance of exchange standards that facilitate data interoperability at CWP party level and at national members' level and ways forward.

### **Session 4.1: Current spatial gridded systems for fishery data reporting and harmonization outlook**

Mr. Emmanuel Blondel introduced the purpose of the session Geographic Information Standards – CWP Harmonization outlooks (Available at: [CWP-TW/2018/S4-1](#)): to present the activities of the CWP GIS working group, created through CWP together with the ad-hoc task group on reference harmonization for capture fisheries and aquaculture statistics. The three activities of the working group are: *Activity 1 – Spatial gridded systems for fishery data reporting*; *Activity 2 – Strengthening promotion and implementation of geographic information standards*; *Activity 3 – Establish a list of GIS datasets and layers relevant for fishery*. The purpose of the session was first to present the outputs of a data survey carried out in 2017 with few CWP agencies; and to extend on harmonization outlooks by activity. In the data survey, only few information was collected from t-RFMOs, indirectly through the ad-hoc reference data harmonization working group. Hence, the session aimed to collect additional feedback from t-RFMOs to improve completeness of the data survey.

On activity 1: key definitions were given, distinguishing the *grid classification system*, as regular geo-referenced grid characterized by (i) a maximum geographic extent or scale (global, regional, local), (ii) a grid unit/cell shape (e.g. square, rectangle), (iii) a grid resolution (e.g. 1 x 1deg, 5 x 5 deg); and the *grid coding system*, defined as the logic associated to a *grid classification system*, and that allows converting a pair of geographic coordinates (Longitude/Latitude) into a string-based code, and vice-versa. Given these definitions, the CWP areal grid coding system standard was described, with an emphasis on the very limited use, especially for Tuna fisheries data. Indeed, among t-RFMOs, only IOTC actually uses this coding system. The objective of the session was to understand possible reasons why such coding system, although a standard in CWP, is not used by other t-RFMOs; and how alignment to this coding system could be considered by t-RFMOs. An ongoing alignment exercise was presented with the creation of a mapping between GFCM grid coding system and CWP areal grid system.

On the activity 2: the purpose was to give an overview of geographic (meta)data standard formats and protocols valuable for fostering fisheries reference data interoperability in CWP context. These standards include OGC formats and services for data, and for metadata: ISO/OGC 19115/19139 metadata format and OGC Catalogue Service for the Web (CSW) protocol; On the activity 3: an illustration of activity 2 standards was provided with the availability of FAO major areas and breakdown and CWP global grid systems, made available through the FAO Geonetwork. The draft CWP catalogue was presented, showing the benefit of above ISO/OGC metadata standard & CSW protocol for harvesting of existing reference data. The objective of this illustration is to promote similar approach for publishing t-RFMO geographic reference data, especially irregular areas (e.g. GFCM statistical areas, ICCAT stock management units and sampling areas) into the draft CWP catalogue, with possible technical support from the CWP GIS working group.

The group was asked to contribute to the survey presented in this session.

### **Feedback and conclusions**

t-RFMOs supported the use of the grid system. They reviewed the status of use of CWP grid system guidelines and the related technical document.

The group acknowledged the importance and value of this work and didn't express any concern regarding proposed recommendations (Use of ISO/OGC 19115/19139 and CWP standard and provide mapping / the CWP grid as a reference given its flexibility for mapping). Recommendations proposed during the presentation were supported by the group.

On sharing reference areas through standard, RFMOs agreed (e.g. ICCAT, GFCM) to share shapefiles, and further exchanges on the matter foreseen under CWP GIS working group, including peer-review of reference metadata.

Discussion followed with exploring feasibility of t-RFMOs mapping georeferenced code systems with CWP ones.

IOTC praised the flexibility and compactness of the CWP grid coding system, that with its 7 digits makes it immediately understandable by humans.

ICCAT noted that they use in some cases (dissemination purposes and "on petition") the CWP areal grid coding system mechanism (function transformations), but expressed the willingness to liaise with CWP GIS working group chair to evaluate feasibility to add CWP areal grid coding system to standard datasets publically available.

IATTC indicated that they have been using center Longitude/Latitude coordinates for practical reasons (dissemination / exploitation).

GFCM and CCSBT highlighted that upgrade of their system to CWP grid would be a complicated task and concluded that mapping is a more suitable solution to align with standards.

CWP GIS Working Group chair will liaise with IATTC on how they could use global CWP grid layers made available to easily map data to CWP area grid coding system.

#### **Session 4.2: FAO Master Data Management architecture and solutions**

Mr. Aymen Charef presented on overview of the FAO Master Data Management (MDM) that enables the organization to maintain master data as an authoritative source (Available at: [CWP-TW/2018/S4-2](#)). He also presented the MDM architecture that captures reference data flow throughout data imputation, curation, management to dissemination. The latter step allows the exchange of reference data with CWP members or national institutions through MDM tools, catalogs, registries, and websites. MDM tools allows third party owned reference data (e.g. regional, national classifications) to be made interoperable and stored in other infrastructures.

The MDM solution in FAO "eBX5" offers more than maintaining a central repository of master data within FAO. It coordinates and manage the lifecycle of master data. It provides a single source of truth of CWP and FAO classifications and codelists to be used by countries and RFBs for data exchange and reporting. eBX5 provides the ability to cleanse reference data being used operationally, to improve the quality and make it more consistent for use in the operational environment.

Mr. Thomas Berger delivered a demonstration of the MDM FAO solution eBX5 and illustrated the modelling deployed to curate and manage CWP classifications (e.g. codelists, hierarchical codelists, children-parent).

#### **Feedback**

Participants recognized the value of a centralized repository and management of CWP global codelist, classifications as it has been demonstrated by FAO.

Participants asked about accessibility of FAO MDM tool eBX5 by t-RFMOs. Mr. Aymen Charef noted that the access will be made available to primarily IOTC and GFCM as FAO bodies. As for third parties, FAO is exploring possibilities to provide access to the MDM solution.

### **Session 4.3: Standards of fisheries data interoperability**

Mr. Aymen Charef introduced the activities of the Fisheries Data Interoperability working group (FDI WG) under Research Data Alliance ([www.rd-alliance.org/groups/fisheries-data-interoperability-wg](http://www.rd-alliance.org/groups/fisheries-data-interoperability-wg)) (Available at: [CWP-TW/2018/S4-3](http://CWP-TW/2018/S4-3)). There is good coordination between CWP and FDI WG: while CWP's scope covers conceptual aspects of fishery and aquaculture statistical standards, the FDI WG focuses on the operationalization of metadata standards – specifically, it addresses how to make data interoperable, with potential feedback on the setup of the metadata standards concerned.

The presenter gave an overview of two data exchanges standards namely SDMX and UN/CEFACT FLUX. Main advantages and limitations to cater fisheries statistics were presented. Geo-information's exchange is still challenging when using both standards.

The Standard of Data and Metadata eXchange (SDMX) is global collaborative initiative established in 2004 SDMX standard offers an information model which describes statistical data sets and the structural metadata needed to exchange them in a standard fashion. The content of SDMX files have visible structure with explanations what is stored where in the file. The usual format in SDMX information model is XML (SDMX-ML) which make it a good option for exchange of fisheries statistical data sets and accompanied metadata. SDMX is not just a technical standard, it also offers many guidelines such as Modelling Guidelines ([https://sdmx.org/?page\\_id=4345#modelling](https://sdmx.org/?page_id=4345#modelling)) which are highly relevant for establishing an SDMX project for a data domain. For a specific data domain (e.g nominal catch data), an SDMX project starts by creating a concept scheme that describes this domain and the data flows (e.g Country sends dataset to an organization). The structure of this checklist is based, to the largest extent possible, on the [UNECE Generic Statistical Business Process Model](#).

FAO made progress in the implementation of SDMX information model. Two pathways were developed one through FAO by disseminating DSDs and related reference data of fisheries statistics in CSV packages, the other through the BlueBRIDGE e-infrastructure by publishing SDMX artefacts in the Fusion registry.

FLUX stands for Fisheries Language for Universal Exchange which developed and maintained by the Centre for Trade Facilitation and e-Business (UN/CEFACT). It provides a harmonized message standard allowing national and regional fisheries Organizations to automatically access the electronic data, such as vessel and trip identification, fishing operations (daily catch or haul-by-haul), logbooks, landing and sales information, license information and inspection data. The list of FLUX standard data domains was presented (General principles, Vessel, Fishing activity, MDM, Aggregated Catch Data reports). The domains of interest for exchange of fisheries statistics are Fishing Activity and Aggregated Catch Data reports. FLUX is a free, open and global standard to automate data collection and dissemination and facilitate data interoperability between IT systems.

#### **Feedback**

ICCAT and WCPFC asked about availability of documentation of the UN/FLUX (e.g. Business Requirement Specifications BRS document, examples of XML schemas). WCPFC recalled its plans to adopt and implement standards of data exchange and submission in the case of high seas transshipment and, statistical documentation. The meeting highlighted the need of making available documentation on UN/FLUX and its implementation in the context of t-RFMOs business and current exchange processes.

Mr. Aymen Charef informed the participants about the coordination between CWP secretariat and the FLUX Team of Specialists to ascertain the use of CWP standards and definitions in alignment with FLUX schemas for the exchange of fisheries statistics. The CWP standard of reference harmonization

once endorsed will be a major reference to the data structuring and exchange of catch, catch and effort and logbook.

Mr. Marc Taconet noted that the proposal of CWP standard on logbook data structure, including the modular approach was supported by the logbook guidelines developed under WECAFC. The activity in WECAFC is led by Mr. Yann Laurent and being reviewed and expanded by Mr. David Ramm, former CCAMLR data manager.

#### **Session 4.4: Standards of metadata and geo-information interoperability**

Mr. Emmanuel Blondel presented the Research Data Alliance and its Fisheries Data Interoperability (FDI) working group (Available at: [CWP-TW/2018/S4-4](#)). The data fragmentation and lack of data bridges is not specific to fisheries domain, but a concern across disciplines and data domains. There is an increasing need of building blocks and data bridges to foster data discovery, access, exploitation including cross-disciplinary approaches. Activities of the FDI working group focus on 1) inventorying (meta)standards in support to fisheries data interoperability, 2) defining iteratively a draft vocabulary for defining data structures definitions with a broader scope than fishery statistics reporting at national/regional/global level (CWP scope) extending to the scientific field (fishery dependent/independent, scientific surveys, biological data), 3) promoting methodologies for enforcing international (meta)data standard formats & protocols in line with FAIR (Findable, Accessible, Interoperable, Re-usable) principles.

The main international (meta)standards were enumerated. Distinction was made between widely used and internationally recognized generic standards (such as ISO/OGC, DublinCore) from community standards (e.g. SDMX, UN/FLUX). Distinction was also made between standards from the statistical exchange domain from those having a broader coverage while being initially focused on geographic information. Trends noticed through FAO participation to RDA meetings were highlighted, with an emphasis on the convergence of data domains and disciplines towards generic metadata formats, in particular the ISO/OGC 19115/19139 metadata format and protocols based on it (e.g. OGC CSW); and the relatively low interest on SDMX, except of the need to map it to the ISO/OGC standards (in particular in context of INSPIRE European directive).

Metadata needs were explained, highlighting main metadata building blocks for describing datasets (Metadata, Data Identification, Data Distribution, Data Structure Definition, Data Quality). The FAIR Principles (Findable, Accessible, Interoperable, Re-usable) for data and metadata were introduced.

Finally, the presentation presented a generic methodology strictly based on ISO/OGC (meta)data standards to enable data catalogues and exploitation tools. These standards include formats (OGC data formats, ISO/OGC 19115 – 19110 – 19119 metadata formats) and protocols (OGC Catalogue Service For the Web – CSW- for data discovery, and Web Map and Feature services for data access). The methodology was illustrated and demonstrated with two concrete case studies: the BlueBRIDGE Global Tuna Atlas and the WECAFC-FIRMS Regional fisheries database. Perspectives were highlighted including the need to establish mappings between (meta)data standards (SDMX, CF-Conventions, Ecological Metadata Language), and possible enhancements of data exploitation & visualization tools, conditioned that there would be willingness from involved parties (FAO, t-RFMOs) to pursue developing and promoting these tools.

#### **Feedback**

When asked about examples of standards' implementation for metadata exchange, Mr. Blondel cited the case of Global Tuna Atlas that took 20 days to set up generic data viewer and to activate the components and related functionalities. He also presented the webviewer which UI for content was

completely generated automatically from the data definitions. So different datasets could be shown side by side (e.g. for multiple species).

Mr. Yann Laurent informed the group about the operational workflow to generate data in the webviewer, as he previously tested all the steps of the workflow. He also mentioned WECAFC regional database which illustrated opportunities of new tools based on harmonized data and metadata according to these international standards.

#### **Session 4.5: Prospects raised by recent initiatives in enhancing quality and availability of data, synergies, and ways forward**

The representatives of CWP parties shared their diagnoses and possibilities of collaborations to improve data quality and availability. The group's discussion focused on strengthening the promotion and implementation of geographic information standards and best practices.

Mr. Marc Taconet noted that the role of the global community is establishing common standards that respond to member countries needs.

Mr. Federico DeRossi highlighted GFCM continuous effort to be fully with CWP standards and definitions. He noted that mapping codelists would be a more convenient solution than moving in a new coding system.

CWP grid system as presented was supported by the group and will be reported for further validation to the CWP group. As for the irregular systems, CWP parties were invited to submit their irregular areas and discuss at CWP level how these can be standardized through best practices developed by CWP.

ICCAT noted that not all data produced can be shown using CWP standards. For other information in shapefiles it would be possible, however there is need to address differences in reporting and CWP areas. In all cases, it is important to keep tracks of these transformations and show back to original picture. Albacore was given as example to illustrate the challenge in associating ICCAT catches (5 sampling areas and three stocks) with FAO major areas.

WCPFC can provide statistical areas and catch by EEZ and high seas areas, as SPC is not mandated to produce according to any CWP standard.

IATTC don't publish data by EEZ and prefer referring as jurisdictional waters.

FAO can make available grid systems and coding easily usable and readable by users not being GIS experts. FAO can support t-RFMOs by illustrating best practices for data exchange. FAO privileges t-RFMOs datasets to national submission of data for quality assurance of global capture statistical collection.

### **SESSION 5: UPDATE OF THE FAO GLOBAL TUNA ATLAS – TOOLS, SERVICES, MAINTENANCE AND PARTNERSHIP**

Mr. Aymen Charef and Mr. Emmanuel Chassot moderated the third day session. Co-chairs highlighted the importance of global data structures issued from CWP standard of reference harmonization to laydown data arrangements between FAO and t-RFMOs and simplify the provision and compilation of statistical data and reference data.

#### **Session 5.1: FAO Global Tuna Atlas – Tools and services** (Available at: [CWP-TW/2018/S5-1](https://www.wcpfc.int/sites/default/files/2018-05/CWP-TW/2018/S5-1))

Mr. Yann Laurent introduced the historical background of the FAO Tuna Atlas. Formal agreement was established around 2004 between FAO and t-RFMOs to share tuna statistics for several purposes: (i) use of t-RFMOs data as authoritative sources of tuna nominal catches in the global fisheries statistics database and (ii) presentation of tuna statistics in a user friendly tool, the FAO global Tuna Atlas.

Attempts were made in the past years with the support of the iMarine project to automate the manual process of collation, harmonization and standardization of the t-RFMOs data in the global tuna atlas. With the availability of improved functionalities in the iMarine e-infrastructure and with the BlueBRIDGE support, a new set of tools was created to revive this important FAO tool.

Mr. Emmanuel Blondel then presented the objectives of the BlueBRIDGE Global Tuna Atlas tools and services, with a focus on the main one which is the renewal of the FAO Tuna Atlas with an enhanced capacity to maintain and disseminate same datasets and additional ones (e.g. on fishing effort) . In addition, the global Tuna Atlas is a concrete use case to foster the reference data harmonization process primarily in the context of CWP, and secondly in a broader Fisheries data science context with the RDA Fisheries Data Interoperability working group. The operationalization of this global Tuna Atlas requires building a partnership among institutions in order to avoid duplication of work and foster mutualization of efforts (“why re-doing something that has been already done?”). Through the global Tuna Atlas, a concrete technical framework has been set-up in support of shared Tuna Data Management Plan including two pillars 1) a collation/harmonization flow between the t-RFMOs and FAO, thanks to harmonization outputs (code list mappings), reproducibility, versioning, and the openness, sharing and scalability of the data harmonization processes; and 2) a semi-automated (meta)data publication flow enabling a catalogue of Tuna fisheries data products, driven by FAIR principles, implementing internationally recognized open (meta)data standards, and based on a generic methodology and open-source framework for data/map query, extraction and visualization of data statistics.

The last section of the presentation was delivered by Mr. Paul Taconet on the first pillar of the atlas namely data collation/harmonization/import.

In a first step, public domain datasets of nominal catches and catch-and-efforts were collated from the five t-RFMOs. These are the so-called primary (or « source ») datasets. The reference data for gears, species and fishing countries were also collated from the five t-RFMOs and from FAO; as well as the mappings between the t-RFMOs (regional) and FAO (global) code list. These were integrated within a database developed on purpose after having harmonized the datasets structure in ways that fit the database’s one. Despite the harmonization of the structures, the content of the data - coding systems, was not modified.

In a second step, global datasets on tuna fisheries were built by merging the primary datasets and applying some scientific corrections (e.g. conversion from number of fishes harvested to weight) in order to get a more pertinent overview of tuna fisheries at global scale. These dataset were also integrated within the database. Three different global geo-referenced catch datasets were computed at global scale (so-called ‘tuna atlas’ dataset), corresponding to three different visions of the tuna fisheries. The levels gradually modify the primary datasets: level 0 datasets are the closest to the primary data delivered by the t-RFMOs, while level 2 are more transformed data that aim, through the corrections applied to the primary datasets (e.g. harmonization of units through conversion factors, raisings, etc.), at providing a science-based overview of tuna fisheries at global scale.

R scripts were also developed that enable users to create their own tuna fisheries dataset(s), with their own assumptions. Taking as source datasets the t-RFMOs primary datasets stored in the database, the scripts create the tuna atlas datasets with the parameterization set by the user. The IRD global tuna fisheries datasets were all created through these scripts. The scripts, available as web services, are currently tested by FAO to reproduce the FAO Tuna Atlas.

The creation of the global IRD tuna atlas met many challenges, at various levels of data processing (collation, harmonization, combination). Locating data, code lists and metadata on the t-RFMOs

websites was a first challenge. When located and gathered into a single folder, harmonizing the structures of the datasets (+20 different structures) to reach one single structure was another challenge. Finally, issues were faced in the merging of the regional datasets to generate the global datasets: mappings between code lists, multiple units of catch or efforts, overlapping areas of competences between RFMOs, missing dimensions or dimensions split between code lists.

Finally, the entire work is reproducible yearly as long as the structure of the source data does not change or that the t-RFMOs provide the data + metadata in the harmonized structure (i.e. the one used as input of the database).

The second pillar (data publication & exploitation tools) was finally presented by Mr. Emmanuel Blondel (FAO), re-highlighting the generic methodology based on ISO/OGC standards to find, access, query, extract and map geo-referenced data statistics. The two main products of the global Tuna Atlas were lively demonstrated: the Global Tuna data catalogue (enabled by Geonetwork) and the data map viewer. The demonstration of Tuna data catalogue was the opportunity i) to relate to the need of having a CWP reference data catalogue, ii) to illustrate the main building blocks being part of a dataset metadata (with a particular focus on roles and legal interoperability), and iii) to prove the benefit of data structure definitions in support to query and extraction of data.

### **Feedback and conclusions**

t-RFMOs acknowledged efforts of FAO and its BlueBRIDGE's partners (IRD, CNR) to update the FAO Atlas for Tuna and Billfishes. The group recognized the atlas's usefulness as a tool to the scientific community and the global user community with further developments of data contents.

IOTC suggested to keep only publicly accessible, potentially unprocessed data in the Tuna Atlas, as these are originally available from the respective t-RFMOs, in order to avoid creating misunderstanding and prevent misuse by end-users that might not be fully aware of the actual processes applied by the global Tuna Atlas, and how these compare to the proprietary t-RFMO-specific ones (e.g. different strategies for the conversion from number of fish to total weight). At the same time, IOTC recognized the importance of providing a clearer attribution (at metadata level) of the original ownership of all information currently stored and managed by the global Tuna Atlas.

CCSBT and ICCAT concurred with the usefulness of contributing with only public data at this stage. A notification scheme could be considered with push/pull mechanism to revise outdated data.

IATTC is producing raised data in catch dataset, whereas raised catch and effort are not public. Specifications on the processing should be included in the metadata associated to each dataset.

WCPFC highlighted the issues in raising the data as there are no agreements made. At any rate, the data processing should be included in metadata so data users understand the process, not necessarily for public dissemination, e.g. to understand where there are overestimates.

Mr. Nicolas Gutierrez expressed opinion that the Tuna Atlas platform should, beyond the acknowledged capacity to collate functional statistics from t-RFMOs, contribute to the improvement of data and information for data-limited species, as well as other services that can be provided to t-RFMOs to improve assessment and management of tuna fisheries.

Mr. Marc Taconet referred the worldwide initiatives (e.g. PEW, SeaAroundUs, IRD) that use and process public data made available by t-RFMOs. FAO has been always the lead on this. FAO can share the data and platform, but partial views can be generated and made available to others. This would rationalize the use of resources and make data consistent to all contributors and users. FAO could

collaborate on the same platform with t-RFMOs on public data exchange and to collaborate with the scientific committees to develop a shared views of processed data.

The co-chair of the session Mr. Aymen Charef noted that FAO Tuna Atlas is conceived to be a collaborative platform with t-RFMOs to improve their data flows to the atlas, and assist them with meaningful global services, e.g. to collect and describe metadata, or to provide geo-spatial data services. He also noted the importance, yet the challenge of raising factors assumptions, proxies and corrections. The t-RFMOs should be in charge of this process and the Tuna Atlas will contain results of t-RFMOs commissions. Data processing methodologies used by each t-RFMO should be also published with the metadata of processed data series explaining specific exceptions and assumption to produce this data (e.g. choice of spatial strata, or raising geo-referenced purse seine catch data to match the level of nominal catch). For instance, FAO will explore with IATTC the provision of geo-referenced catch that could include the raising of catch of some species (billfishes and sharks) and also geo-referenced effort. The IATTC's raising procedure and statistical methodology will be published together with datasets in the Tuna Atlas.

### **Session 5.2: User community needs for FAO global Tuna Atlas, including the possibility by RFMOs to benefit of regional views**

Mr. Emmanuel Chassot presented a review of the community needs for a Tuna Atlas like tool ([CWP-TW/2018/S5-2](#)).

The fisheries public domain datasets available from the five t-RFMOs are numerous and include aggregated information on catch, effort, and size which can be expressed in different formats, units, granularity, levels of raising, etc. The data sets are rich and cover large spatial scales over decades and across oceans. But they are also complex, heterogeneous, and uncertain for some fisheries components (e.g. small-scale fisheries), which does not facilitate their manipulation and use. In this context, the tuna atlas provides a harmonized global tuna data set with a transparent and reproducible methodology that is useful for FAO's mission. In the case of the t-RFMO secretariats, the tuna atlas has contributed to the harmonization work of the codelists and to the consolidation of a generic approach dedicated to the development of metadata compliant with ISO/OGC standards. The use of the (meta)data catalogue is expected to increase the visibility of the fisheries data sets while the online data viewer provides a powerful tool to explore spatial tuna data at global scale, through query, extraction, visualization and overlay modules but also exporting/sharing facilities. In addition, the global tuna data sets can be used to address several research questions related to the monitoring of fishing capacity and effort (e.g. changes in global longline effort), changes in some fisheries strategies (e.g. expansion of FAD fisheries across the globe) and the provision of catch data for data-poor assessment approaches, e.g. detection of collapse in time series of catches, data-limited assessment models, and changes in mean trophic level of the catch. The detection of common patterns across oceans such as temporal changes in nominal CPUEs (e.g. "jump" in bigeye CPUE in the mid-1970s) can also provide insight into the mechanisms and driving factors of such patterns. The global unified vision of tuna catch and effort data can also be of interest for quantifying the economic value of tuna fisheries and explore global scenarios of management such as the closure of the high seas (White & Costello 2014, Sumaila *et al.* 2015). More recently, global tuna data sets have been shown to be of major interest to address ecological questions such of the contraction of tuna distribution in relation with the reduction in abundance (Worm & Tittensor, 2011), the habitat preferences of pelagic populations and communities (Lewison *et al.* 2004, Reygondeau *et al.* 2012, Arrizabalaga *et al.* 2015) and the effect of climate changes (Dueri *et al.* 2016,

Monllor-Hurtado et al. 2017). Overall, the tuna atlas can provide an access to large and very rich data sets that can be of major interest to a wider audience and in particular the scientific Community.

### **Feedback**

The participants discussed the issues of data processing and responsibilities related to assumptions used to compute for instance CPUE. Mr. Peter Williams and Mr. Nick Vogel pointed out that their RFMOs could improve data used based on their raising factors before dissemination on their website or provision to FAO Tuna Atlas.

Mr. Marc Taconet noted that the Tuna Atlas can be a tool to orient people to global understanding of trend and new approaches, and thus could assist in advancing new approaches in a collaborate fashion. In WECAFC the discussion around FAD was given as an example where different fisheries discovered common issues, yet they could not rely on a FAIR platform. Also in support of programs such as WECAFC, the platform could support research topics in regional context. Many researchers topic that need data but they all say that data is difficult to access.

Mr. Taconet highlighted the importance of improving alignment between national, regional and global statistics. There is an agreement between FAO and RFMOs to exchange data (i.e. for tuna statistics FAO relies in priority on data from t-RFMOs rather than data provided directly by the countries). This Tuna Atlas can provide a lot of transparency as to how the data are (eventually) transformed by FAO for integration in its global capture database, in agreement with t-RFMOs and using their datasets. It hence contributes to produce better statistics and to strengthen collaboration between FAO and t-RFMOs.

FAO captured the opportunity through various collaborations to enhance the global data framework for fisheries that goes beyond the tuna fisheries. Tuna Atlas related products could be used for incorporation in stock assessment, and stock assessment results disseminated through e.g. GRSF.

Mr. Kim Stobberup informed the group that the second phase of GEF – ABNJ program will work towards Data Limited Methods. Thus it would be interesting to explore how the Tuna Atlas can be a tool of communication and analytical features between FAO and the t-RFMOs and other parties.

### **Session 5.3: Maintenance and workflow/rules and procedures**

The group discussed the governance and workflow maintenance of the FAO tuna atlas. t-RFMOs noted that as data owners information of data provenance, citation, usage accounting should be published.

t-RFMOs agreed to provide to the FAO Tuna Atlas the following: Nominal Catch (public data); Catch and effort (public data); Codelists; mappings of codelists and Metadata associated to each data set.

Mr. Aymen Charef explained the data governance aspects of the Tuna Atlas. Mr. Aureliano Gentile presented the FIRMS partnership arrangement that will provide the basis for establishing data sharing arrangements where t-RFMOs will find a data exposure pathway under a data policy ([CWP-TW/2018/S5-3](#)). The Appendix 6 shows as example the annex 2 of arrangement between CCSBT and FIRMS.

Mr. Marc Taconet recalled how the process to establish a FIRMS arrangement evolved over many years. Fishery statistics supporting stock assessment, resources status and fisheries monitoring, such as Catch and Effort are eligible under the FIRMS partnership arrangement, with the opportunity of a governance framework for formal data sharing agreements.

Four t-RFMOs namely CCSBT, IATTC, ICCAT and IOTC are FIRMS partners and can provide some of these information. FAO suggested that the Annex 2 of these t-RFMOs' FIRMS partnership arrangements could be amended to include provision of the above data sets and reference data to the FAO global tuna atlas [www.fao.org/fi/static-media/MeetingDocuments/cwp/ReferenceHarmonization/2018/S5\\_3.pdf](http://www.fao.org/fi/static-media/MeetingDocuments/cwp/ReferenceHarmonization/2018/S5_3.pdf)

The representatives of t-RFMOs at FIRMS Steering Committee would come with the mandate to provide their final agreement on data provision after discussion and approval with commissions and secretariat. That would proceed with amendment of Annex 2 of the respective FIRMS arrangements to be presented to the FIRMS steering committee planned for May 2019. FAO presented the FIRMS to WCPFC. Both parties agreed on running a pilot test for submission of data on stock and fisheries status with reference to FIRMS standards. In parallel, FAO will initiate the formal procedure towards the partnership arrangement for WCPFC consideration.

The group highlighted the notion of copyright when disseminating the data and reference data and questioned whether t-RFMO should present a legal entity for copyright holder or need of license.

In the FAO global tuna atlas, t-RFMOs will be designated as owner/provider of the datasets and FAO as the publisher and custodian.

Mr. Emmanuel Blondel explained that there is a need to reflect the RFMOs in the generic citation. In previous sessions it was question of a concatenation. He pointed out that research paper, for example, will need unique citation to refer to t-RFMOs work and published information. Mr. Blondel also put forward the different granularities of citations for instance: Generic level (FAO Tuna Atlas as web product), Dataset level, Query level (URL used), dataset or metadata URL.

On this, the group exchanged ideas and formulated these citations to be used when published items in the Tuna Atlas:

The first citation to be activated will be based on the following elements: FAO is the custodian, therefore copyright holder, of the database contents (for which primary data providers are t-RFMOs), and the web interface enabling to access and visualize the data (the data map viewer) is hosted under a Virtual Research Environment VRE within D4science (platform of BlueBRIDGE project).

Bibliographic citation	<a href="#">email it</a>
<p>© FAO 2018. Global Atlas of Tuna and Billfish Catches. In: D4Science.org Infrastructure [online]. D4Science.org. Version 1.0. Updated dd/mm/yyyy. [Cited dd/mm/yyyy]. <a href="https://tunaatlas.d4science.org/tunaatlas/index.html">https://tunaatlas.d4science.org/tunaatlas/index.html</a></p> <p>Source of information: Tuna Regional Fisheries Management Organizations are the provider of data sets and associated reference data. See "Sources citations" for full references.</p>	

The following two citations will be presented and discussed in the forthcoming FIRMS steering committee meeting FIRMS FSC11. When decision will be made for the public dissemination of the VRE content one of the citations will be used.

t-RFMOs members of FIRMS will provide the data related to Tuna Atlas under the amended Annex 2 of the arrangement, that will be reviewed an eventually endorsed in the coming FIRMS session. FAO will compile t-RFMOs data contribution on behalf of the FIRMS partners.

### If Tuna Atlas disseminated as **FIRMS** resource

<b>Bibliographic citation</b>	<a href="#">email it</a>
<p>© FAO 2018. Global Atlas of Tuna and Billfish Catches. In: <i>Fisheries and Resources Monitoring System (FIRMS) [online]</i>. Version 1.0. Updated dd/mm/yyyy. [Cited dd/mm/yyyy]. <a href="http://firms.fao.org/tuna-atlas">http://firms.fao.org/tuna-atlas</a></p> <p>Source of information: Tuna Regional Fisheries Management Organizations are the provider of data sets and associated reference data. See “Sources citations” for full references.</p>	

### If Tuna Atlas disseminated as **FAO-FI** resource

<b>Bibliographic citation</b>	<a href="#">email it</a>
<p>© FAO 2018. Global Atlas of Tuna and Billfish Catches. In: <i>FAO Fisheries and Aquaculture Department [online]</i>. Version 1.0. Updated dd/mm/yyyy. [Cited dd/mm/yyyy]. <a href="http://www.fao.org/tuna-atlas/">www.fao.org/tuna-atlas/</a></p> <p>Source of information: Tuna Regional Fisheries Management Organizations are the provider of data sets and associated reference data. See “Sources citations” for full references.</p>	

## Session 5.4: Towards Global Tuna Atlas Partnership

The co-chair Mr. Aymen Charef wrapped the session of the day to conclude with partnerships and data arrangements between t-RFMOs and FAO to support the FAO Global Tuna Atlas.

### Conclusions of the session 5

The t-RFMOs acknowledged the BlueBRIDGE’s efforts made to update the FAO Global Tuna Atlas. The group recognized the Atlas’s usefulness as a tool to the scientific community and the global user community with further developments of data contents.

t-RFMOs will provide public catch and effort (as available level 0) datasets and the following:

- Nominal Catch
- Catch and effort
- Codelists
- Codelists mappings
- Metadata associated to each data set

FAO suggested amendment in the FIRMS partnership arrangement with each of four t-RFMOs to include provision of data to the FAO Tuna Atlas.

t-RFMOs representatives would come with the mandate to provide their final agreement on data provision after discussion and approval with commissions and secretariat, under their respective FIRMS Partnership arrangement.

That would proceed with amendment of Annex 2 of each t-RFMO’s FIRMS partnership arrangement to be presented to the FIRMS steering committee planned for Feb 2019.

FAO presented the FIRMS to WCPFC. Both parties agreed on running a pilot test for submission of data on stock and fisheries status with reference to FIRMS standards.

## Actions

- FAO will initiate the formal procedure towards a FIRMS partnership arrangement for WCPFC consideration.
- FAO will keep exploring possibilities with t-RFMOs for further enhancement to the data disseminated under the FAO global Tuna Atlas (e.g. additional data types, raised catches or effort).
- FAO will communicate a draft proposal on metadata to be attached to each data item (including citation). FAO will liaise with t-RFMOs to identify best practices for citation and review the actual published metadata content and citation.
- FAO will provide a draft of codelists mappings and metadata to be attached to each dataset.

## SESSION 6: OTHER BUSINESS - BREAK-OUT GROUPS

Mr. Marc Taconet moderated the last session of workshop that consisted of a presentation on conversion factors and breakout group to formulate an inventory of gear. The afternoon was dedicated to wrap up the outputs of the workshop and discuss perspectives of t-RFMOs collaboration. The chair closed the meeting after the revision of the workshop conclusions and the adoption of the report.

### Session 6.1 - Conversion factors

Mr. Carlos Palma presented conversion factors for tuna species that are used to convert the landed weight to the live weight equivalent of the catches ([CWP-TW/2018/S6-1](#)). He presented three types of allometric relationships: weight-length relationship, length-length relationship and weight-weight relationship. The latter has the least information which make it the most difficult to estimate. Mr. Palma invited FAO and t-RFMOs to produce and report nominal catches in live weight but based on proper conditions.

### Feedback

The t-RFMOs shared their experiences in generating and applying conversions factors. There are others sources to collect information but sometimes hard to find for instance in scientific studies.

Interest was expressed in a database of raw data at global scale, and subject to approval by t-RFMOs. This will require resources to proceed. This database could become part of the global Tuna Atlas.

Mr. Aymen Charef presented the ongoing questionnaire distributed by FI-FIAS (Led by Mrs. Stefania Vannuccini) to collect and update conversion factors from national authorities, RFMOs, RFBs and international organizations. t-RFMOs will contribute with their conversion factors and/or W/W relationships in use to the global FAO database.

### Session 6.2 – Breakout group on Gear and Effort

During Session 2-1, while reviewing the module effort and CWP effort categories included in the previous version (V2.0) of data structures proposed by CWP Reference Harmonization WG, the group acknowledged the need to review CWP definitions to cater for the effort measures and descriptions used by the t-RFMOs. The CWP handbook section on fishing effort identifies three levels of precision (A, B, and C categories) of fishing effort. Annex N1 shows possible combinations of gear and effort in category A.

The breakout group was set and the five t-RFMOs representatives could:

- inventory commonly used effort measures across t-RFMOs towards a potential harmonized classification of effort measure descriptors by fishing practice.
- establish a common gear list to harmonize all t-RFMOs gear and map it to the CWP classification.

The output of the breakout-group contributed to the revision of the data structure' proposals V2.0 and was incorporated in the effort module, in relation with fishing gear and fishing practice concepts.

The findings of the inventory of gears and associated effort for each t-RFMO are summarized in the table 1. The group compiled the list of combinations of effort measures (i.e days/hours fishing, sets) for each fishing gear in use (CPCs data submission) by all t-RFMOs (Appendix 8). This list is an update of the Annex N1 and covers descriptors and measures in use for CWP parties involved in tuna fisheries statistics.

Based on this, the group formulated a proposal of standard for effort measure to be reported for each gear (Table 2). The proposal consists of three levels of reporting requirements. The first level includes list of recommended units to report effort exerted, whereas the second and the third levels consist of alternate “preferred” alternate units to be used if recommended units are not available.

Table 1: Inventory of gears and associated effort measures for each t-RFMO.

Gear	Fishing Mode	Potential Effort descriptor				
		"STANDARD" [historical] Measure of Effort				
		CCSBT	IATTC	ICCAT	IOTC	WCPFC
Longline		Hooks	Hooks	Hooks	Hooks	Hooks
Purse seine	All	Days fishing	Days fishing	Days fishing	Searching Hours	Days fishing
	Free schools	Sets	Sets	Days fishing	Searching Hours	Sets
	Associated	Sets	Sets	Days fishing	Sets	Sets
Pole-and-line		Days fishing	Sets	Days fishing	No. of poles used	Days fishing
Troll		Days fishing	Vessels	Days fishing	No. lines set	Days fishing
Handline		Days fishing	N/A	Days fishing	Hooks set	Days fishing
Drift Gillnet		Days fishing	Days fishing	Days fishing	Net length set	Days fishing
Ring-net		N/A	N/A	N/A	Trips	Sets
Harpoon		N/A	Days fishing	Days fishing	N/A	N/A
Recreational (sport)		N/A	Days fishing	Days fishing	Days fishing	N/A
Trawl		N/A	N/A	Days fishing	Fishing hours	N/A
Traps		N/A	N/A	Days fishing	N/A	N/A

Table 2: Proposal of standard list of **required** effort units for each gear.

Gear	Fishing mode	Potential CWP standard		
		Recommended	Alternate1	Alternate 2
Longline		Hooks		
Purse seine	All	Days fishing	Sets	Fishing/Searching Hours
	Free schools	Sets	Days fishing	Fishing/Searching Hours
	Associated	Sets	Days fishing	
Pole-and-line		Days fishing	No. of poles used	Sets
Troll		Days fishing	No. lines set	
Handline		Days fishing	Hooks set	
Drift Gillnet		Days fishing	Net length set	
Ring-net		Days fishing	Sets	Trips
Harpoon		Days fishing		
Recreational (sport)		Days fishing		
Trawl		Days fishing	Fishing hours	
Traps		Days fishing		

## APPENDIX 1: AGENDA

<b>Day 1: Monday, 19 March</b>	
9:00 – 9:15	Opening remarks (FAO-FIA Director)
<b>Session 1: Introduction and Workshop objectives, participants expectations</b> <b>Chair : Marc Taconet</b> <b>Rapporteur : Aymen Charef</b>	
9:15 – 10:40	<ul style="list-style-type: none"> <li>- Introduction and workshop objectives</li> <li>- Adoption of agenda</li> <li>- Expectations from t-RFMOs, illustrated with overview or relevant aspects of Tuna RFMOs fisheries data collection frameworks (questionnaires, forms, structures, concepts) (10 min each) <ul style="list-style-type: none"> <li>- CCSBT (<b>Colin Millar, S1-1</b>)</li> <li>- IATTC (<b>Nick Vogel, S1-2</b>)</li> <li>- ICCAT (<b>Carlos Palma, S1-3</b>)</li> </ul> </li> </ul>
10:40	Coffee Break
<b>Session 2: Harmonization of reference data and grid system</b> <b>Objective: Review the proposal of CWP standard of DSD towards the validation of DSDs on catch, catch and effort, and logbooks</b> <b>Identify needs of tuna RFMOs to use CWP grids</b> <b>Chair: Marc Taconet</b> <b>Rapporteur : Emmanuel Blondel – Yann Laurent</b>	
11:00 – 12:30	Continue with Session 1 <ul style="list-style-type: none"> <li>- IOTC (<b>Fabio Fiorellato, S1-4</b>)</li> <li>- SPC-WCPFC (<b>Peter Williams, S1-5</b>)</li> </ul>
12:30 – 13:45	Lunch Break
13:45 – 15:30	<ul style="list-style-type: none"> <li>- Background of CWP efforts on reference data Harmonization (<b>A. Charef, S2-1</b>)</li> <li>- Harmonization of global data structure definition (concepts, dimensions, definitions, etc.)</li> </ul>
15:30	Tea Break
15:50 – 17:30	- Harmonization at semantic level (mapping among coding systems: CWP vs CWP parties) ( <b>M. Herrera, S2-2</b> )
<b>Day 2: Tuesday, 20 March</b>	
<b>Session 3: Data collection programs to improve knowledge on recreational and small scale fisheries</b> <b>Objective: Propose recommendations regarding minimum data requirements for monitoring small scale and recreational fisheries</b> <b>Chair: Aymen Charef – Olivier Roux</b> <b>Rapporteur: Roy Bailey – Fabio Fiorellato – Carlos Palma</b>	
9:00 – 10:40	<ul style="list-style-type: none"> <li>- Data quality in support to DLMS: case of small scale and coastal fisheries (<b>N. Gutierrez, S3-1</b>)</li> <li>- Data collection programs and success stories for monitoring of Tuna artisanal fisheries, Recreational fisheries and by-catch species (<b>R. Bealey, S3-4</b>)</li> <li>- Support to data collection programs: “SmartForms” (<b>A. Gentile, S3-5</b>)</li> </ul>
10:40	Coffee Break

11:00 – 12:30	<ul style="list-style-type: none"> <li>- Data collection and multiple reporting in WECAFC area: Tuna small scale fisheries (<b>Y. Laurent, S3-6</b>)</li> <li>- Status of small scale fisheries data discrimination in ICCAT (<b>C. Palma, S3-3</b>)</li> <li>- Cases studies in WCPFC of data collection in Artisanal/Small Scale Fisheries (<b>P. Williams, S3-2</b>)</li> <li>- Data collection and reporting system - regional experiences (Usage scenario, architecture, discussion of implementation perspectives) (<b>C. Palma, F. Fiorellato, E. Anello, S3-7</b>)</li> </ul>
12:30 – 13:45	Lunch break
<p><b>Session 4: Data exchange, reporting and standards</b>  <b>Objective: Review methods and standards that facilitate the data interoperability at CWP party level and with national members</b>  <b>Chair: Marc Taconet – Yann Laurent</b>  <b>Rapporteur: Emmanuel Blondel – Anton Ellenbroek</b></p>	
13:45 - 15:30	<ul style="list-style-type: none"> <li>- Current spatial gridded systems for fishery data reporting and harmonization outlook, Geographic information standards and best practices (<b>E. Blondel, S4-1</b>)</li> <li>- FAO Master Data Management services (<b>A. Charef and T. Berger, S4-2</b>)</li> <li>- RDA Fisheries Data Interoperability WG: <ul style="list-style-type: none"> <li>• Standards for fisheries data interoperability (SDMX and UN/CEFACT FLUX) (<b>A. Charef, S4-3</b>)</li> <li>• Standards for metadata and geo-information interoperability (<b>E. Blondel, S4-4</b>)</li> </ul> </li> </ul>
15:30	Tea Break
15:50 - 17:30	- Discussion: prospects raised by recent initiatives in enhancing quality and availability of data, synergies, and ways forward
<b>Day 3: Wednesday, 21 March</b>	
9:00 – 9:10	Refresher of Day 2 results and introduction to Day 3
<p><b>Session 5: Update of the FAO global Tuna Atlas - Tools and services</b>  <b>Discussion on the partnerships and governance to maintain the atlas</b>  <b>Chair: Aymen Charef – Emmanuel Chassot</b>  <b>Rapporteur: Anton Ellenbroek – Yann Laurent</b></p>	
9:10 – 10:40	<ul style="list-style-type: none"> <li>- Overview of the Global Tuna Atlas (<b>E. Blondel, P. Taconet, Y. Laurent, S5-1</b>) <ul style="list-style-type: none"> <li>• Framework, architecture, Data catalogue and metadata,</li> <li>• Content, and challenges met in its collation</li> <li>• Maps and services visualization tools</li> </ul> </li> </ul>
10:40	Coffee Break
11:00 – 12:30	- Inventory of common services of interest to FAO, RFMOs, scientific community and general public ( <b>E. Chassot, S5-2</b> )
12:30 – 13:45	Lunch break
13:45 – 15:30	<ul style="list-style-type: none"> <li>- Governance and Maintenance of workflow through FIRMS arrangement (<b>A Gentile, S5-3</b>)</li> <li>- Rules and procedures: frequency of data submission/update, data quality</li> </ul>
15:30	Tea Break

15:50 – 17:30	- Towards global Tuna Atlas Partnership (update and dissemination policy, ownership, FIRMS partnership arrangement Annex 2)
<b>Day 4: Thursday, 22 March</b>	
<b>Session 6: Other Business - Break-out groups on WG topics requiring further focus</b>	
<b>Objective: Discussion on several subjects of interest to t-RFMOs</b>	
<b>Finalize and summarize the workshop outputs to the CWP community</b>	
<b>Chair: Marc Taconet</b>	
<b>Rapporteur: Aymen Charef - Yann Laurent - Carlos Palma</b>	
9:00 – 9:10	- Refresher of Day 3 results
9:10 – 9:40	- Conversion factors for nominal catches ( <b>C. Palma, S6-1</b> )
9:40 – 10:30	- Breakout session/groups for topics requiring potential discussions Definition of CWP catches Inventory of effort and gear codes and definitions ( <b>P Williams, S6-2</b> )
10 :30	Coffee Break
11:00 – 12:30	- Breakout session (continued) - Report of sub-groups to the meeting
12:30 – 13:45	Lunch Break
13:45 – 17:00	- Wrap-up discussion and perspectives - Report formulation to CWP session (review and adoption)

**APPENDIX 2: LIST OF PARTICIPANTS**

<b>Participants</b>	<b>Affiliation</b>
Carlos Palma	International Commission for the Conservation of Atlantic Tunas ( <b>ICCAT</b> )
Colin Millar	Commission for the Conservation of Southern Bluefin Tuna ( <b>CCSBT</b> )
Fabio Fiorellato	Indian Ocean Tuna Commission ( <b>IOTC</b> )
Federico DeRossi	General Fisheries Commission for the Mediterranean ( <b>GFCM</b> )
Lara Manarangi-Trott	Western and Central Pacific Fisheries Commission ( <b>WCPFC</b> )
Nick Vogel	Inter-American Tropical Tuna Commission ( <b>IATTC</b> )
Peter Williams	Pacific Community ( <b>SPC</b> )
Lounane Martin	Ministry of agriculture, land and fisheries, Trinidad and Tobago
Yasser El Musalhi	Ministry of agriculture and fisheries wealth, Sultanate of Oman
Paul Taconet	French National Research Institute for Sustainable Development ( <b>IRD</b> )
Emmanuel Chassot	Independent expert
Miguel Herrera	Independent expert
Olivier Roux	Independent expert
Anton Ellenbroek	FAO - Branch of Fisheries and Aquaculture Statistics and Information ( <b>FIAS</b> )
Ahmed Al-Mazroui	FAO - Branch of Fisheries Policy, Economics and Institutions ( <b>FIAP</b> )
Aureliano Gentile	FAO - Branch of Fisheries and Aquaculture Statistics and Information ( <b>FIAS</b> )
Aymen Charef	FAO - Branch of Fisheries and Aquaculture Statistics and Information ( <b>FIAS</b> )
Emmanuel Blondel	FAO - Branch of Fisheries and Aquaculture Statistics and Information ( <b>FIAS</b> )
Enrico Anello	FAO - Branch of Fisheries and Aquaculture Statistics and Information ( <b>FIAS</b> )
Marc Taconet	FAO - Branch of Fisheries and Aquaculture Statistics and Information ( <b>FIAS</b> )
Nicolas Gutierrez	FAO - Branch of Marine and Inland Fisheries ( <b>FIAF</b> )
Paula Anton	FAO - Branch of Fisheries and Aquaculture Statistics and Information ( <b>FIAS</b> )
Kim Stobberup	FAO - FishCode Programme ( <b>FIDF</b> )
Kiran Viparthy	FAO - Branch of Fisheries and Aquaculture Statistics and Information ( <b>FIAS</b> )
Roy Bealey	FAO - Subregional Office for the Caribbean ( <b>SLC</b> )
Thomas Berger	FAO - Branch of Fisheries and Aquaculture Statistics and Information ( <b>FIAS</b> )
Yann Laurent	FAO - Branch of Fisheries and Aquaculture Statistics and Information ( <b>FIAS</b> )

**Group photo of the workshop's participants**



**APPENDIX 3: LIST OF PRESENTATIONS**

(Available at the meeting's webpage [www.fao.org/fi/static-media/MeetingDocuments/cwp/ReferenceHarmonization/2018/default.htm](http://www.fao.org/fi/static-media/MeetingDocuments/cwp/ReferenceHarmonization/2018/default.htm))

	<b>Title</b>	<b>Presenter</b>
CWP-TW/2018/S1-1	CCSBT Overview and expectations from workshop	Colin Millar
CWP-TW/2018/S1-2	IATTC Overview	Nick Vogel
CWP-TW/2018/S1-3	ICCAT Overview of the ICCAT data collection framework	Carlos Palma
CWP-TW/2018/S1-4	IOTC Overview of fisheries data reporting and management processes	Fabio Fiorellato
CWP-TW/2018/S1-5	WCPFC Scientific Data	Peter Williams
CWP-TW/2018/S2-1	CWP ad-hoc Task Group on reference harmonization for capture fisheries and aquaculture: Progress and review of CWP standards	Aymen Charef
CWP-TW/2018/S2-2	Mapping RFMO vs FAO codes	Miguel Herrera
CWP-TW/2018/S3-1	Data-limited tuna and tuna-like fisheries: a way forward?	Nicolas Gutierrez
CWP-TW/2018/S3-2	WCPFC- Artisanal/small-scale fisheries data	Peter Williams
CWP-TW/2018/S3-3	Small scale fisheries: ICCAT ongoing work (Artisanal, recreational/sport)	Carlos Palma
CWP-TW/2018/S3-4	Data and statistics from Recreational and Artisanal fisheries	Roy Bealey
CWP-TW/2018/S3-5	Support data collection programs: Smart Forms - A mobile App platform to collect and review fishery and observer data	Aureliano Gentile
CWP-TW/2018/S3-6	Data collection and multiple reporting in WECAFC area - Tuna small scale fisheries	Yann Laurent
CWP-TW/2018/S3-7	IOTC - Data collection and management tools to support the Regional Observer Scheme (ROS) pilot project	Enrico Anello
CWP-TW/2018/S4-1	GIS standards-CWP outlook	Emmanuel Blondel
CWP-TW/2018/S4-2	FAO services - Master Data Management	Aymen Charef - Thomas Berger
CWP-TW/2018/S4-3	Standards for fisheries data dissemination and exchange	Aymen Charef
CWP-TW/2018/S4-4	Geographic Information (Meta)data standards	Emmanuel Blondel
CWP-TW/2018/S5-1	FAO Tuna Atlas renewal-Tools and Services	Emmanuel Blondel Paul Taconet - Yann Laurent
CWP-TW/2018/S5-2	The Global Tuna Atlas: Services of interest to FAO, RFMOs, scientific Community and general public	Emmanuel Chassot
CWP-TW/2018/S5-3	FIRMS - Streamlined arrangement for sharing fishery statistics	Aureliano Gentile
CWP-TW/2018/S6-1	Conversion factor for tuna species	Carlos Palma

## APPENDIX 4: DATA STRUCTURES (VERSION 3)

### 1- Data structure of Nominal Catch

Module	ADMINISTRATIVE/ POLITICAL ENTITY	TIME	GEOGRAPHIC AREA		GEAR	CATCH					COVERAGE
Concept	Flag Entity	Time	Fishing area	Area type	Fishing gear	Aquatic Species	Catch type	Obs_ Meaure	Unit	Obs_Status	Coverage
<b>Classification system</b>	UN Standard country or area codes for statistical use (M49)	Calendar Year)	FAO major fishing area; EEZ or RFB competence area;	Statistical area; Jurisdictional area;	The International Standard Statistical Classification of Fishing Gear (ISSCFG)	ASFIS List of Species for Fishery Statistics Purposes	CWP definition of concepts (for catch type)		UCUM Unified Code for Units of Measure	FAO statistical standard for Observation status flags	
<b>Code List</b>	UN code	Time		Area type	Gear Category	Inter-agency 3-alpha code	Catch type		Units of measure	Observation Status Flag	
<b>Codelist_id</b>	UN_CODE	TIME	FISHING_AREA	AREA_TYPE	ISSCFG_CODE	3ALPHA_CODE	CATCH_TYPE		UNIT	STATUS_FLAG	
<b>Description</b>	The M49 is presented in the CWP handbook where it is mapped to ISO Alpha2 and ISO Alpha3 list of countries and areas		Area definitions		ISSCFG code corresponding to gear category and its standard abbreviation <a href="http://www.fao.org/3/a-bt988e.pdf">http://www.fao.org/3/a-bt988e.pdf</a>	Species reference	Catch types (gross catch, retained catch, landings, discards)	Quantitative value of catch	Unit of measure (weight kg tonnes, or number)	FAO Observation status codes (e.g "E" Estimate value, "R" Revised, "U" unknown, negligible, Official)	The degree of coverage of catch data for the fishing operations (not mandatory)
<b>Granularity level</b>	Aggregated codes (e.g Aggregated codes of countries)	(year, month, quarter	e.g ICCAT FMU (or sampling area)	Management unit; Sampling area;	Aggregations or extracodes created by the t-RFMO	Aggregations created by the t-RFMO					

## 2- Data Structure of Catch and Effort

Module	ADMINISTRATIVE/ POLITICAL ENTITY	TIME	GEOGRAPHIC AREA		FISHING PRACTICE		EFFORT		CATCH				
			Concept	Flag entity	Time	Fishing area	Area type	Fishing gear	Fishing mode	OBS_Measure	Descriptor	Aquatic species	OBS_Measure
<b>Classification system</b>	UN Standard country or area codes for statistical use (M49)		FAO major fishing area; EEZ or RFB competence area;	Statistical area; Jurisdictional area; grid coding system	The International Standard Statistical Classification of Fishing Gear (ISSCFG)	Gear Practice Qualifier		CWP definitions of concepts (For Fishing effort measures)/Proposal of t-RFMOs	ASFIS List of Species for Fishery Statistics Purposes		UCUM Unified Code for Units of Measure	FAO statistical standard for Observation status flags	
<b>Code List</b>	UN code	Time	Fishing area	Area type	Gear Category	Free school/associated schools		Effort descriptor	Inter-agency 3-alpha code		Units of measure	Observation Status Flag	
<b>Code-list_id</b>	UN_CODE	TIME	FISHING_AREA		ISSCFG_CODE				3ALPHA_CODE		UNIT	STATUS_FLAG	
<b>Description</b>	The M49 is presented in the CWP handbook list of countries and areas				ISSCFG code corresponding to gear category and its standard abbreviation	Gear relate fishing practice	The amount of fishing gear of a specific type used over time	Effort's categories: recommended and alternate (Table 2)	Species reference	Quantitative value of Catch	Unit of measure (weight kg, tonnes, or number)	FAO Observation status codes (e.g "E"Estimate value,..)	The degree of coverage of catch data for the fishing operations (not mandatory)
<b>Granularity level</b>		(year, month, quarter)	e.g ICCAT_FMU	Sampling area; Management unit; RFB grid system			Management unit; Sampling area;	Aggregations or extracodes created by the t-RFMO					

## **APPENDIX 5: DETAILED REVIEW OF CONCEPTS CONSTITUTING THE DATA STRUCTURES CAPTURE; NOMINAL CATCH; CATCH AND EFFORT**

### **FLAG STATE**

Mr. Aymen Charef presented the list of countries and areas available in the CWP handbook (<http://www.fao.org/3/bt978e/bt978e.pdf>). It includes MU49, ISO Alpha 2 codes, ISO Alpha 3 codes and the M49 standard (Standard Country or Area Codes for Statistical Use" originally published as Series M, No. 49). The latter is currently in use by FAO-FIAS with some modifications to include additional territories and states.

This concept defines the assignment of nationality to catch and landings. It was discussed extensively with illustrations on specific uses and participants highlighted that the country list ISO Alpha 2 and 3 do not include the code "NEI" which is essentially useful to comprise peculiar cases of flags, states and political entities.

ICCAT highlighted that "flag state" is too "state" oriented (e.g. EU is not a state). ICCAT is using the term "fishing entity" (CPC) / Cooperating party to match the complexity of global political situation. Mr. Carlos Palma presented concept of ICCAT chartered flag: a vessel from a CPC when is chartered by another country is marked as CPC - Chartered country. (e.g chartered: used as suffix of the flag CPC + Chartered Flag, Japanese boat chartered by Brazil = Japan-Brazil. Mr. Peter Williams indicated that WCPFC allows for chartering arrangements whereby the catch is allocated to the chartering state, not the flag state. The WCPFC data structures do not currently cater for reporting of catch breakdown by chartered state and flag state. Other t-RFMOs concurred that the term "flag state" cannot grasp definitions used by all t-RFMOs.

The chair of the session Mr. Marc Taconet recorded that FAO firstly started with concept of list of countries and provinces to report economic/food security importance. He pointed out that the title of the column (module and concept names) should capture the meaning of the cascading elements, including structure and content. It should also be useful to improve exchange and reporting across all levels in the data-chain. He suggested the "political entity" as major category then a more detailed level is required. He outlined that Concept\_type could accommodate the complexity of multiple dimensions in political designation. MU49 is a potential classification system to facilitate the harmonization across data structures and concept-types.

The group agreed to set a generic definition for this module as "Administrative or political entity". This will comprise the concept "Flag Entity" which corresponds specifically to the context of fisheries operations using flags to assign nationalities to catch or landings.

### **FISHING AREA**

The meeting highlighted the variety of fishing areas definitions (statistical area, grid system etc.) with different hierarchies and the complexities in aligning these definitions. It was underlined that overlapping exists between area definitions leading to different catches statistics and this makes reallocation of catches challenging.

Mr. Nick Vogel underscored the need of some t-RFMOs to report on one species at one fishing area level. He also pointed out that if it is required to use FAO fishing area instead of grid system then CPC need to first endorse this change. Mr. Miguel Herrera mentioned that it is often challenging to match the RFMO competence area, management area with FAO fishing areas. Mr. Peter Williams mentioned the overlapping of catch statistics between IATTC and WCPFC in the pacific areas.

Mr. Marc Taconet and Mr. Aureliano Gentile (FAO) presented the interlinked concepts of fishing areas, grid and management unit utilized under the Global Record of Stocks and Fisheries (GRSF) developed by BlueBRIDGE project. The GRSF has been developed with the aim to offer two key services: i) Stakeholders involved in global/regional/national state of stocks indicators, and ii) Public and private actors involved in eco-labelling, traceability and sustainable fisheries. The Fisheries and Resources

Monitoring System (FIRMS) partnership is one of the three data sources contributing to the GRSF together with the RAM Legacy Stock Assessment Database (Univ. of Washington) and FishSource (Program of the Sustainable Fisheries Partnership).

The concept of management Unit has been reused from ICCAT and IATTC definitions. ICCAT mentioned the use of the term sampling area as defined by scientists to estimate productivity.

The discussion converged to building a module “geographic area” made up of the concept “fishing area” and the concept “area type”. The latter complement the definition of the typology of area which could be for instance statistical area, jurisdictional area, management unit area, or grid coding system (Appendix 4).

### **CATCH TYPE**

The group went through definitions of catch and nominal catches used in data structures while referring to the CWP diagram on catch concepts ([www.fao.org/3/bt981t/bt981t.pdf](http://www.fao.org/3/bt981t/bt981t.pdf)).

There was a general agreement that the concepts of the CWP diagram characterizes (parameter discrimination and interaction levels) reasonably well the different biomass parcels that are involved in fishing operations allowing a simple formulation (positive/negative contributions) of nominal catches as being the live weight equivalent of the landings.

ICCAT triggered the discussion that revealed t-RFMOs use differently CWP concepts to define the nominal catch.

Nominal catches are often used as the best estimation of the biomass removals due to fishing activity. Some t-RFMOs (ICCAT, CCSBT) are starting to include the dead releases (live weight) parcel into the nominal catches. ICCAT is also foreseen to estimate mortality – biomass equivalent - of fish release alive as the best scientific estimates of harvested biomass.

An agreement was reached that most t-RFMOs are moving from nominal catches to gross catches collection (including dead and live discards).

Tuna RFMOs representatives provided their definitions of catches concepts as follows:

- CCSBT receives retained catch and discarded catch separately. Some countries submit retained + Discards Dead.
- IATTC: Gross catch= retained catch + discards.
- ICCAT: nominal catch= (Landings + discards dead + percentage of Discards live)
- IOTC: nominal catch = Landings + other non-explicitly discarded catches (e.g. used as bait, for crew consumption etc.). Discarded / released catch is handled separately.
- WCPFC do not use the term nominal catch and instead Annual catch estimate = retained catch + discarded dead.

CWP parties’ participants showed interest to update the definitions used in the diagram to accommodate these situations. Participants provided a proposal of an additional definition to the catch type discards deads relevant to the context of t-RFMOs statistics (Appendix 7). “Discarded dead” is the proportion of the discards from catch released live, for instance post-mortality of small tuna individuals caught for Tuna fattening/aquaculture. Transfers are reflected through retained catch and considered as unrecorded, rejected or dumped landings.

The group highlighted the opportunity for t-RFMOs and other CWP parties to review relevance and actuality of the existing CWP concept catch diagram (Annex M1) for discussion in the next CWP session.

### **EFFORT and FISHING GEAR**

The module effort in the previous version (V2.0) of data structure was based on the CWP handbook section on fishing effort which identifies three levels of precision (A, B, and C categories) of fishing effort in association with each gear. Annex N1 ([www.fao.org/3/BS245E/bs245e.pdf](http://www.fao.org/3/BS245E/bs245e.pdf)) presents the list of combinations of gear and effort in category A. While reviewing this module and effort categories,

the group acknowledged the need to review CWP definitions to include effort measures utilized by the t-RFMOs.

In concurrence with comments from other CWP parties, t-RFMOs suggested to combine the three categories into one list of fishing effort measure as there won't be need to separate two measures of effort (number of days fished and number of days on the ground) in two categories B and C.

The group proposed a contribution to the data structure as "fishing practice" module that combines two concepts namely fishing gear (ISSCFG) and fishing mode. The latter concept was added to define in particular the three fishing modes for purse seine (free-school/unassociated, associated, both).

A breakout group was dedicated to the five t-RFMOs representatives to:

- inventory commonly used effort measures across t-RFMOs towards a potential harmonized classification of effort measure descriptors by fishing practice.
- provide mappings of t-RFMOs codes with CWP ISSCFG and effort definitions. This would be presented in the granularity level in the data matrix.
- establish a common gear list to harmonize all t-RFMOs gear and map it to the CWP ISSCFG.

It was recalled that mapping between gears should not stay at the level of comparing names as some names can be misleading (Cf. in IOTC) compared to the international classification. The question of multi-purpose gear was raised. ICCAT recalled that this work was already done and available in the ICCAT website. [[www.iccat.int/en/ICCATManual.asp?mId=3](http://www.iccat.int/en/ICCATManual.asp?mId=3) chapter 3].

The results of the breakout group were presented in the last day, session 6 of the workshop. The comprehensive list of combinations of gears and associated effort is presented in Appendix 6.

t-RFMOs representatives will finalize remotely the definition used in the fishing practice and inventory of fishing mode.

### **OBS-VALUE**

The meeting recalled that t-RFMOs don't collect monetary value of catches for both data structure nominal catch and catch and effort. It was agreed that an additional attribute (column) is required to define its status: Mandatory / Optional. For the data structure capture (for economic purpose) value is mandatory whereas for other data structures (e.g nominal catch) information of the value is optional.

It has been suggested to have a price per species per t-RFMOs without geographical definition (no reference to country). A discussion followed on the sensitive issue of defining the reference to compute values. IOTC recalled that the price of a given product might depend on the target market and type of product, and therefore it could be misleading to only provide a "generic" price without reference to its destination market and the process applied to the fish.

Mr. Aymen Charef informed the group about the ongoing work conducted by FAO to improve market price collection on a more regular basis and recommended t-RFMOs to liaise with FAO Senior Statistician Mrs. Stefania Vannuccini.

### **COVERAGE**

The group suggested to add the concept coverage to indicate the degree of coverage of catch data for the fishing operations. It has been noted that this concept is not mandatory.

### **OTHER CONCEPTS**

The discussion was not triggered for several concepts namely Unit, Species and Observation status. These concepts were unchanged in the updated versions of data structures (Appendix 4).

## APPENDIX 6: ANNEX 2 TO CCSBT FIRMS PARTNERSHIP ARRANGEMENT

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### Annex 2

#### Information to be Contributed to FIGIS-FIRMS by the Commission for the Conservation of Southern Bluefin Tuna (CCSBT)

##### 1. Data and Statistical Information

The material to be provided to FIGIS-FIRMS by the CCSBT will include:

- a. a resource and fact sheet containing information on the structure of the southern bluefin tuna fishery and the current assessment of the stock's status.
- b. nominal global catch of southern bluefin tuna by year and major fishing nations.
- c. nominal catch (and effort) data of southern bluefin tuna, by major fishing nation, month and 5° square for longline, and 1° square for each other gear type<sup>1</sup>.

The CCSBT has mandated responsibility for the management and conservation of southern bluefin tuna and the information supplied will be for this species only. There is a shared responsibility with the IOTC but it is agreed that the CCSBT will have primary responsibility. Where relevant, the CCSBT will coordinate data provision to FIGIS/FIRMS with the IOTC.

Where relevant, links to scientific reports and the data section of the CCSBT website will be provided.

The information provided will, wherever possible, conform to the Information Management Policy of the FCS.

##### 2. Metadata and Information Management

The source of the data supplied will be summary data supplied from the fisheries of CCSBT members; information provided by cooperating non-members directly to the CCSBT; estimates from catch monitoring programs conducted at cooperating non-member ports; and other sources where appropriate.

The bibliographical source for the CCSBT resource and fact sheet will be the CCSBT Scientific Committee.

The information for a specific year will be provided within 6 months of the CCSBT's annual meeting following that year. In practice, this is usually within 16 months of the conclusion of the specific year.

The FIGIS-FIRMS system will identify the material provided as being the property of the CCSBT.

##### 3. Data and Information Security

As the source information will be in the public domain, there are no confidentiality requirements.

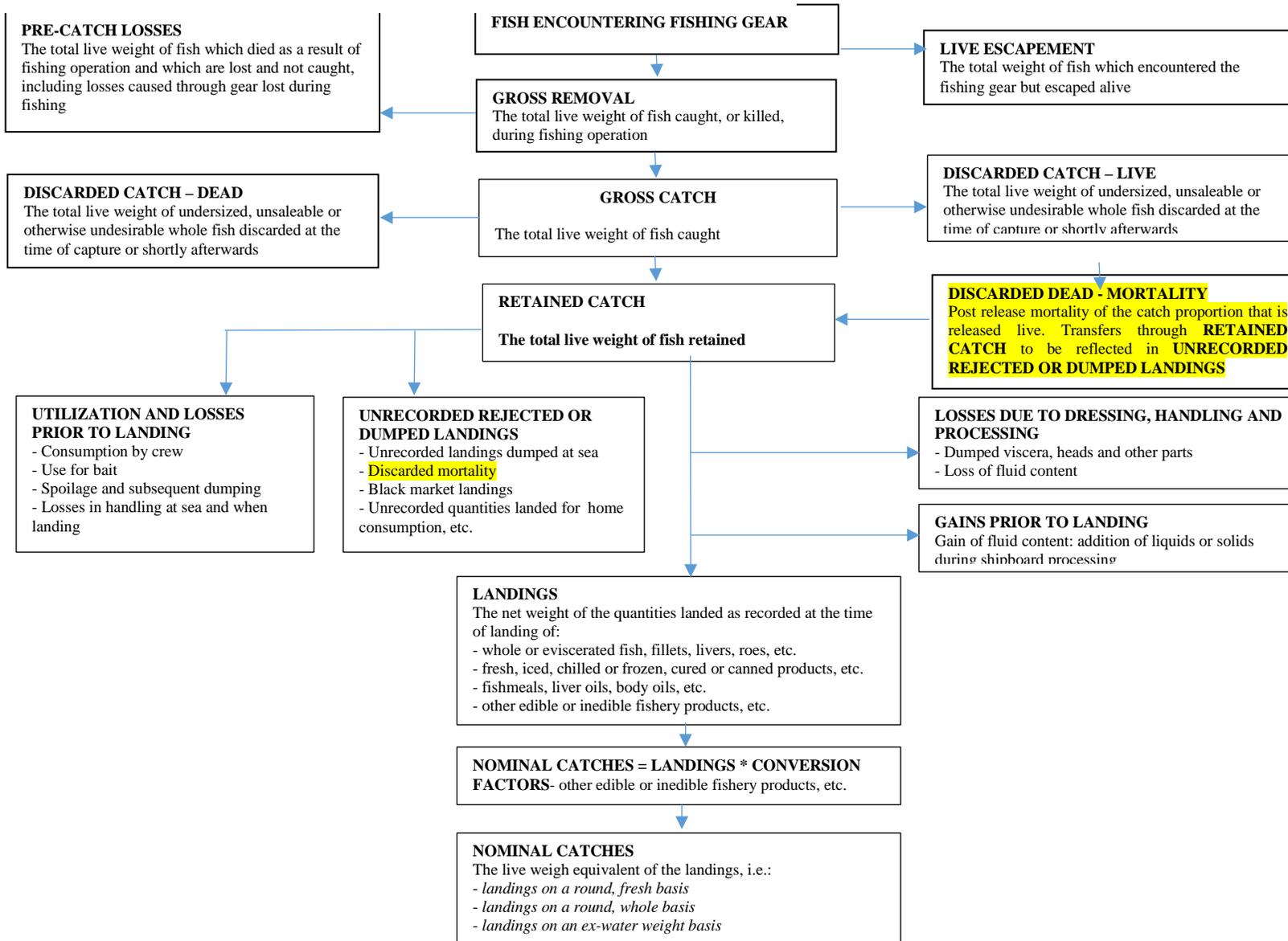
##### 4. Collaborative Institutions

There are no collaborative institutions involved.

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<sup>1</sup> This is a partial coverage data set. Precise details of these data in terms of length of time series, raising to total catches, units of catch, and treatment of missing strata are subject to further discussions.

**APPENDIX 7: PROPOSALS FOR REVISION OF CATCH CONCEPT DIAGRAM.** Proposed changes are highlighted in yellow.



**APPENDIX 8: COMBINATIONS OF GEAR AND EFFORT MEASURE IN USE BY T-RFMS**

<b>Fishing gear</b>	<b>Fishing Mode</b>	<b>Effort measure Descriptors</b>	<b>Definitions</b>
Longline		Hooks	Number of hooks set
Purse seine	All	Days/Hours fishing	Number of days/hours spent fishing
		Days fishing and searching	Number of days spent fishing and searching
		Searching hours	Number of hours searching
		Sets	Number of sets made
	Free School	Sets	Number of sets made on free schools
		Fishing hours	Number of hours calculated from the start of the set to the end of the set.
		Searching hours	Number of hours searching
Associated	Sets	Number of sets made on associated schools	
Pole-and-line		Days fishing	Number of days fishing
		Sets	Number of distinct fishing events (sets)
		Trips	Number of trips conducted
		No. of poles used	Number of poles used in fishing multiplied by the number of days fishing
		Fishing hours	Number of hours from the start of fishing event to the end of fishing event
Troll		Days fishing	Number of days fishing
		Trips	Number of trips conducted
		Vessels	Number of vessels active for the annual period
		No. of lines used	Number of lines in the water multiplied by the number of days fishing
Handline		Days fishing	Number of days fishing
		Trips	Number of trips conducted
		Hooks set	Total number of hooks used in fishing multiplied by the number of days fishing.
Drift Gillnet		Days fishing	Number of days fishing
		Trips	Number of trips conducted
		Days at sea	Number of days at sea
		Net length	Length of nets expressed in 100-metre units multiplied by the numbers of sets made.
Ring-net		Days fishing	Number of days fishing
		Trips	Number of trips conducted
		Sets	Number of sets made
		Fishing hours	Number of hours calculated from the start of the set to the end of the set.
Harpoon		Days fishing	Number of days fishing
Recreational (sport)		Days fishing	Number of days fishing
		Trips	Number of trips conducted
		Fishing hours	Number of hours spent fishing.
		Days at sea	Number of days at sea
Trawl		Days fishing	Number of days fishing
		Trips	Number of trips conducted
		Days at sea	Number of days at sea
		Fishing hours	Number of hours calculated from the start of the trawl event to the end of the trawl event.
Traps		Days fishing	Number of days fishing



This is the report of the technical workshop on global harmonization of Tuna fisheries statistics, organized by Food and Agriculture Organization of the United Nations, Fisheries and Aquaculture Department in collaboration with the Areas Beyond National Jurisdiction program, at FAO Headquarters in Rome from 19 to 22 March 2018.

The workshop was organized under the CWP ad-hoc Task Group (TG) on “Reference harmonization for capture fisheries and aquaculture statistics” with a focus on Tuna fisheries statistics. The TG aims at establishing the CWP standard for reference harmonization, to build unified data structures composed of harmonized statistical concepts and definitions to meet the needs of CWP parties for data exchange and reporting.

This report contains a record of the six sessions of the workshop, including summaries of presentations and contributions, related discussions in each session. The main topics presented and discussed were CWP activities, standards and formulation of proposals to review CWP handbook. Then, the revamped FAO Global Tuna Atlas with associated tools and services was reviewed. The workshop entailed other subjects of common interest to all tuna RFMOs such as improving small-scale fisheries data quality and e-reporting data collection systems.

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