联合国粮食及农业组织 Food and Agriculture Organization of the United Nations | Organisation des Nations Unies pour l'alimentation et l'agriculture | Продовольственная и сельскохозяйственная организация Объединенных Наций | Organización de las Naciones Unidas para la Alimentación y la Agricultura | منظمة الأغذية والزراعة للأمم المتحدة

COORDINATING WORKING PARTY ON FISHERY STATISTICS

Intersessional Meetings of Aquaculture and Fisheries Subject Groups Joint Session

Eighth Meeting of the Aquaculture Subject Group (AS)

Thirty meeting of the Fisheries Subject Group (FS)

28- 30 June 2023

Meeting place: Hybrid - NEAFC headquarters London, United Kingdom/WebEx

Progress report of the CWP ad-hoc Task Group on Reference harmonization (TG-RH)

Author: *ad-hoc* Task Group on reference harmonization (TG-RH)

Executive Summary

The present progress report summarizes the activities pursued through the CWP *ad hoc* task group on Reference Harmonization. This includes the review and extension of the CWP RH implementation guidelines with the provision of a technical specification as proposed standard for digital implementation guidelines, encompassing a set of digital reference data resources (serving as data catalogue for CWP) and the specification of data exchange formats in support of CWP RH case studies. Based on case studies driven by FAO with other parties, feedback was collected in order to improve existing CWP standards (such as ASFIS, ISSCFG). Finally, an activity was started to inventory emerging needs of statistical standards of potential interest for CWP.

Table of content

1. Revision and consolidation of the implementation guidelines 3
2. Digital resources in support of implementation guidelines 3
2.1. Rationale & guiding principles 3
2.2. Structure 3
2.3. Pilot case studies 4
3. Standard data exchange format 4
4. Feedback from CWP RH case studies on CWP standards 5
4.1. ASFIS 5
4.2. ISSCFG 6
4.3. ISSCAAP 9
5. Progress on emerging needs for new statistical standards 9
6. Early recommendations from TG-RH 9

1. Revision and consolidation of the implementation guidelines

The implementation guidelines version 1.0 were reviewed with a second version 1.1 (CWP-IS_2023/5.4.b). This review includes:

- A reference to the digital implementation guidelines in support to CWP RH case studies. summary is part of the implementation guidelines update (v2) and a technical specification was provided in separate document as standard proposal (CWP-IS_2023/5.4.c)

The below sections 2 and 3 summarize these specifications which consist in:

- A set of digital resources in support of implementation guidelines
- A data exchange format specification

2. Digital resources in support of implementation guidelines

2.1. Rationale & guiding principles

As extension of the pending revision (version 2.0) of the CWP Reference Harmonization guidelines, as continuum with the general need of cataloguing CWP reference data, and a general need to interoperate CWP RH case studies with reference data material, digital resources have been progressively made available through public repositories under the Github *fdiwg* main repository. Digital resources may target resources already stamped as CWP standards (e.g., ASFIS, ISSCFG, etc;), new code lists to be draft as part of CWP TG activities (e.g., catch types, effort units), but also ad hoc reference data material not yet proposed nor endorsed by CWP but needed to operate CWP RH case studies (e.g., FIRMS Global Tuna Atlas *fishing fleet* code list), as well as other fishery non-specific standards that may be needed. For this reason, a base repository name without mention of CWP was used, i.e., fdiwg – standing for *Fisheries Data Interoperability ad hoc working group*).

The open repository approach aims to foster the collaboration from CWP parties and beyond (e.g., collaborating partners identified the FIRMS partnership), and hence, to foster the participation of CWP parties to CWP Reference harmonization task group activities, in relation with other TGs (e.g., TG-Catch, TG-Effort).

Digital resources were made available under the overall concern to implement FAIR (Findable Accessible Interoperable and Reusable) data principles[1], and follow a pragmatic cataloguing approach to guarantee that CWP RH pilot case studies could exploit easily these digital resources.

2.2. Structure

These repositories are structured as follows:

- *fdi-terms* (https://github.com/fdiwg/fdi-terms): referencing a list of fishery preferred terms to be used as basis for data exchange; together with their definitions.
- *fdi-codelists* (https://github.com/fdiwg/fdi-codelists): referencing all code lists (including CWP standard codelists) and their metadata. Two main sub-directories are set to distinguish between:
    - *global* codelists and
    - *regional* codelists.
- *fdi-mappings* (https://github.com/fdiwg/fdi-mappings): aims to reference all mappings between codelists.

[1] https://www.nature.com/articles/sdata201618

- *fdi-formats* (https://github.com/fdiwg/fdi-formats): aims to reference format specifications to be used as basis for data templating, validation & submission in data collection frameworks (e.g., FIRMS Global Tuna Atlas data calls, WECAFC-FIRMS DCRF, RECOFI MDR)

2.3. Pilot case studies

As proof-of-concept, digital resources made available through the *fdiwg* ad hoc repositories were proven to foster implementation of CWP Reference harmonization in . for different case studies. * indicates the resources are planned to be developed

	fdi-terms	*fdi-codelists*	*fdi-mappings*	*fdi-formats*
FIRMS Global Tuna Atlas (GTA)	Yes	Yes	Yes	Yes
Global Record of Stocks and Fisheries (GRSF)	Yes	Yes	-	-
WECAFIS (WECAFC-FIRMS DCRF)	Yes	Yes	Yes*	Yes
RECOFI MDR PILOT	Yes*	Yes*	-	Yes*
FCWC regional database (Gulf of Guinea) - Industrial data	Yes*	Yes*	Yes*	-
FAO Calipseo platform (reporting component)	Yes	Yes	-	Yes
FAO Yearbook of Fishery and Aquaculture Statistics	-	Yes*	Yes*	-
FIRMS dcf-shiny platform	Yes	Yes	Yes*	Yes

3. Standard data exchange format

Based on the digital resources described before, a technical specification document for data exchange formats was written (available in meeting document: CWP-IS_2023/5.4.c) to drive CWP RH case studies in particular those with the need of data calls. The specification proposes two format structures: 1) one *generic* providing a measurement-agnostic tabular data structure, 2) one *simplified* provided a measurement-dependent structure aims to facilitate data entry in some use cases (e.g., National data clerks for regional DCRFs).

The standard data exchange format specifications have been tested so far in support to:

- WECAFIS (former WECAFC Regional Data Base) and the WECAFC DCRF[2]
- FIRMS Global Tuna Atlas[3] and data submissions by tRFMOs for yearly updates

Digital interoperable format specifications applicable to these use cases were made available through the *fdi-formats* repository (https://github.com/fdiwg/fdi-formats) for data validation & submission purpose through the pilot FIRMS *dcf-shiny* tool.

[2] https://www.fao.org/wecafc/data/dcrf/en/
[3] https://www.fao.org/fishery/en/collection/firms-tuna-atlas

4. Feedback from CWP RH case studies on CWP standards

4.1. ASFIS

Based on the experience of the FIRMS Global Tuna Atlas 2023 update and an activity to align the latter on updated CWP standards in close interaction with the IOTC Secretariat, several issues were highlighted related to the ASFIS list of species:

- No clear procedure seems to be in place to inform publicly on the way of managing changes in species codes (updates, additions, removals) for propagation in national fisheries statistics databases:
  - The official webpage for ASFIS[4] only presents the updated classification without any change log available to see what changed from the previous version.
  - Illustration of a common issue:
    - The code RMJ (*Mobula japonica*) has been removed from the ASFIS.
    - By relying on external taxonomic information systems (e.g., https://www.marinespecies.org/aphia.php?p=taxdetails&id=399771), it appears that the valid species name for this is *Mobula mobular* (RMM in ASFIS). From, ASFIS users who pay attention to align with the new ASFIS have to follow such a hypothesis and change the ASFIS code from RMJ to RMM.
  - This example illustrates that there are concrete needs:
    - To have at least a change log with each version of ASFIS, or at best the sharing of a master file that gives the status of each code (deprecated, approved, etc.), and associated notes,
    - To rely on taxonomic specialized information systems to consolidate the classification
- The current ASFIS code list includes some fields of taxonomic nature (Author, Family, Order) which could be retrieved from authoritative taxonomic databases based on the scientific name of each taxon (e.g., ITIS, WORMS, GBIF, or NCBI). This would enable (i) the expansion of the taxonomic information to more fields of interest to end-users, (ii) the automation of the updates, (iii) the alignment of the fields with other systems, and (iv) addressing potential debates about species identification by pointing to the proper references available from the taxonomic information systems
- Furthermore, the field *Order* may be misleading as it "does not include only orders but also other high taxonomic levels (e.g., divisions, classes, suborders, etc.)" according to ASFIS data structure. Example: For the species retained for the FIRMS Global Tuna Atlas, SCOMBROIDEI, which is the **sub-order** is indicated as order instead of PERCIFORMES.
- The TAXOCODE and Stats_data field seem to be internal to FAO use and might not be required to be disseminated with the code list. In terms of digital resources, the ASFIS data file shared publicly results into a composite data file that extends the actual ASFIS 3-alpha code list with taxonomic information and the codes mentioned above.
  - Considering these alternate codes mapped in the public ASFIS data file, it would be of added value for users to add additional external codes / identifiers from external taxonomic specialized systems (e.g., ITIS, WORMS, GBIF, or NCBI), while not affecting the backward compatibility as it deals with complementary information, and to allow users to inherit more fields of interest on species through interoperability mechanisms.

[4] https://www.fao.org/fishery/en/collection/asfis/en

  - While the ASFIS data file is a composite data file, it would be useful to maintain codelist mappings (TAXOCODE, Stats_data, other system Identifiers) as separate digital resources.
- Also, authors are not consistently formatted (i.e., brackets are not used in a consistent manner), and the bibliographic references do not seem to be available from FAO.
- Finally, a total of 44 English names in ASFIS are a combination of two different names, including *Little tunny(=Atl.black skipj)* in the case of the GTA. It might be better to consider the use of a single, most common English name for consistency (see https://fishbase.mnhn.fr/manual/english/FishBaseThe_COMMON_NAMES_Table.htm)

4.2. ISSCFG

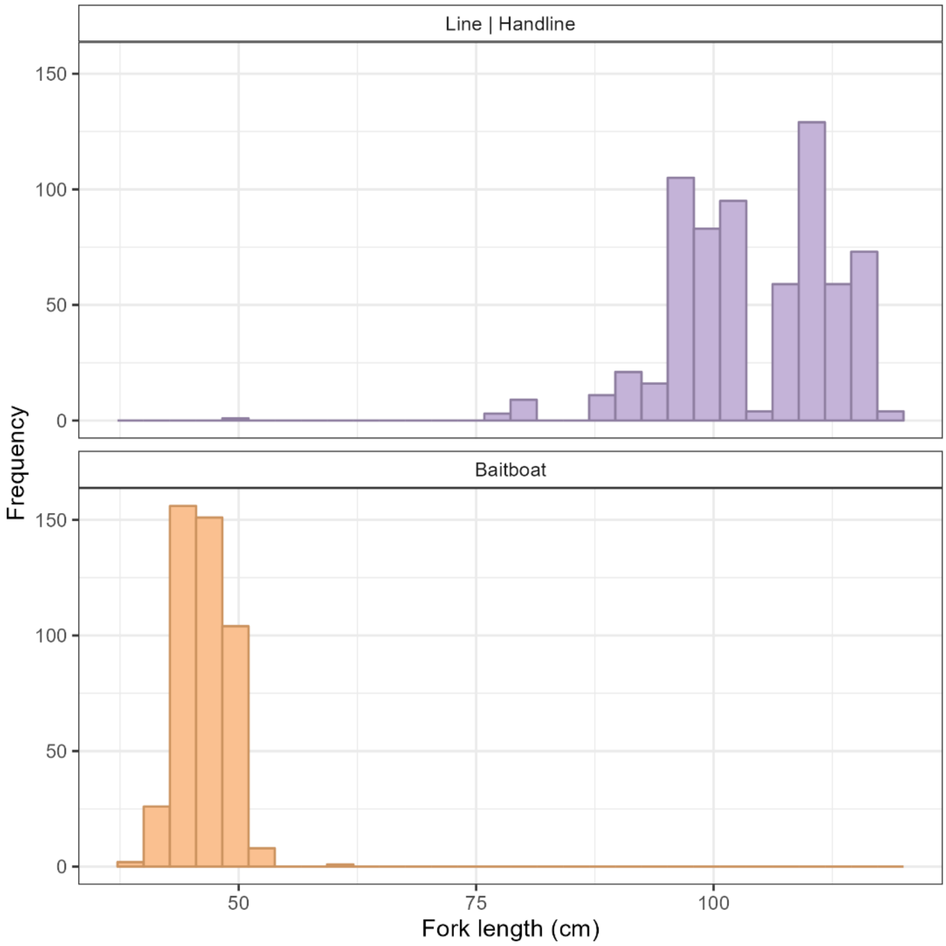
The International Standard Statistical Classification of Fishing Gear (ISSCFG) was last revised by the CWP in 2016 and adopted by the FIRMS Global Tuna Atlas as one of the core parts of the CWP Reference Harmonization guidelines.

The current ISSCFG classification has a resolution that is adequate to cover most of the gears described at regional level, at least in terms of those fisheries whose information is submitted by the tRFMOs to the Global Tuna Atlas.

An exception to this is represented by *pole-and-line* which is a type of gear / fishery widely practiced in the areas of competence of all tRFMOs and for which the ISSCFG does not currently provide an explicit and unique reference code.

In fact, *pole-and-lines* are currently combined in the ISSCFG with *handlines* (either hand-operated or mechanized) and included with ISSCFG code 09.1 (‘*Handlines and hand-operated pole-and-lines*') and 09.2 (*'Mechanized lines and pole-and-lines'*) under the ‘*Hooks and lines*’ level-1 categorisation (ISSCFG code 09). However, key characteristics of pole-and-line gears, such as their selectivity, configurations, and target species highly differ from those of all other handlines currently included under the codes 09.1 and 09.2. For a same target species for instance, the size composition of the catch taken in a same stratum may highly differ between the two fishing gears, as evidenced for the Maldivian fisheries catching yellowfin tuna in the Indian Ocean (**Figure 1**).

Figure 1. Example of distribution of fork lengths of yellowfin tuna (*Thunnus albacares*) caught with handlines (top panel) and pole-and-lines (bottom panel) in a same stratum (November 2007 in the 1-degree grid area of code 5100073) of the Maldivian fisheries of the western Indian Ocean



The importance of the pole-and-line fisheries *per se* is evident among several tRFMOs, including the Indian Ocean Tuna Commission (IOTC) where these gears have reached the same order of magnitude of catches reported by industrial longline fisheries (**Figures 2 and 3**). Hence, the lack of distinct codes for the two types of gears (regardless of their mechanisation status) is of greater concern to the Global Tuna Atlas as it sensibly reduces the resolution of the disseminated information.

Figure 2. (a) Total cumulative catches (metric tonnes; t) by gear group and (b) contribution of each gear group to the total catches of the 16 species under the IOTC mandate. Baitboat = pole-and-lines; line = handlines, trolling lines, and coastal longlines

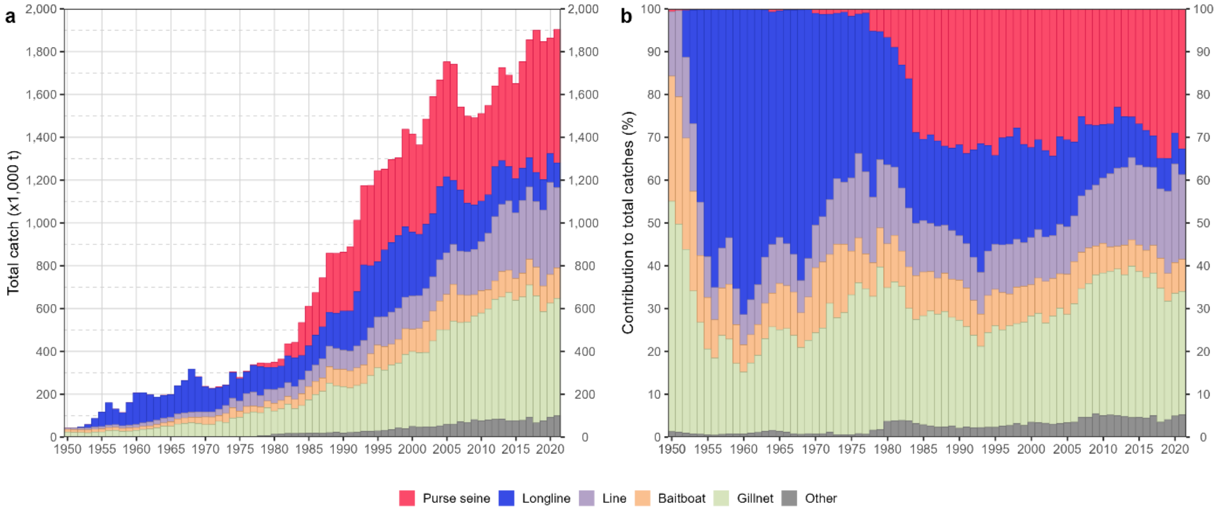
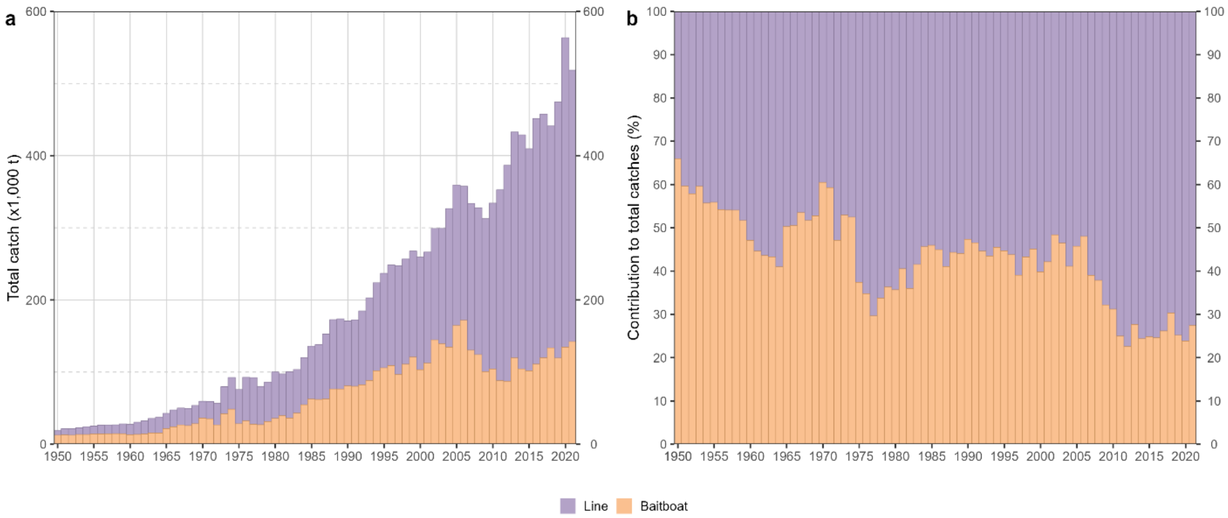


Figure 3. (a) Total cumulative catches (metric tonnes; t) of line and pole-and-line fisheries and (b) contribution of each gear group to the catches of the 16 species under the IOTC mandate. Baitboat = pole-and-lines; line = handlines, trolling lines, and coastal longlines



Another potential differentiation of hooks and lines (group 09) may include the *rod and reel* (RR), a fishing artifact composed of a rod (mechanical) and a unique line with one or more hooks (using natural or artificial baits), that can be used on-board a vessel or not. The RR is usually manually handled. The catches using RR are observed in both commercial and recreational fishing activities (example: USA bluefin tuna catches of the two well differentiated RR fishing fleets). ICCAT classifies the RR gear inside the generic "*hooks and lines (nei)*" (code 09.9) under the '*Hooks and lines*' level-1 categorisation (ISSCFG code 09). The RR gears specific characteristics (multiple configuration possibilities foreseeing direct/indirect targeting a species, selectivity attributes, bait types, vessel support, etc.) may be properly differentiated in a specific "hooks and lines" (09) category, separated from handlines/pole-and-lines (09.1), and trolling lines (09.5).

4.3. ISSCAAP

The new FAO Yearbook of Fisheries and Aquaculture statistics is one case study from where CWP code lists have to be pulled and accessed to automate the annotation of statistical figures; including the ISSCAAP code lists. Through the yearbook, a systematic change is applied to the label “Aquatic plants” replaced by “Algae”. CWP TG-RH recommends:

- At short-term to put at disposal a digital code list slightly modified to facilitate its implementation in case studies and avoid any hard coding of the accepted labels.
- At longer term, to evaluated whether this modification could be done as revision of the ISSCAAP code list.

5. Progress on emerging needs for new statistical standards

A task has been started on identifying potential standards that could be used as international standards to advance knowledge of fisheries and aquaculture at the global level. CWP-27 identified several knowledge areas with increasing demands for harmonized data and statistics. This increasing demand for timely and associated increasing spatial resolution necessitates a review of existing standards as to determining global data and statistics needs performance. This work first provides a set of potential criteria for use in evaluating adoption of recommended standards at national, regional and global level. Results are presented for one area of consideration, for adoption of length frequency standards as indicators of stock status. Challenges and obstacles and anticipated benefits associated with using length frequency standards are also provided.

6. Early recommendations from TG-RH

- On the overall implementation guidelines, TG-RH **calls for the support** from CWP to pursue consolidation of implementation initiated:
  - With a breakdown of implementation guidelines aimed to distinguish well conceptual guidelines from digital implementation guidelines
  - With further development of the digital implementation guidelines in abstraction of software technologies

- On the digital implementation guidelines:
  - On the digital resources:
    - TG-RH **calls for the support from CWP**: to adopt and continue using the *fdiwg* working environment (https://github.com/fdiwg) as basis for:
      - digital resources registration and cataloguing, interactive collaboration among TG-RH members to improve resources, especially terms, code lists and mappings,
      - enabling fisheries data interoperability for CWP RH use cases, including but not limited to CWP RH case studies
    - TG-RH **SUGGESTS** using the *DublinCore* metadata standard to fulfil minimum metadata requirements and associate metadata to all digital resources made available so far
    - TG RH **RECOMMENDS** continuing the effort to describe geospatial code lists with ISO 19115 geographic information metadata standard (recommended by CWP).

  - On the data exchange formats:
    - TG-RH **REQUESTS** support from CWP to adopt on an *ad interim basis* the data exchange formats specifications (including the *generic* and

simplified structures) and **RECOGNIZES** the need for further consolidation during the next CWP-IS exercise.

- TG-RH **ENCOURAGES** CWP parties to provide their feedback to consolidate these technical specifications

- On the feedback on existing CWP standards:
  - On ASFIS
    - The CWP RH **RECOGNIZES** the need to keep the consolidated ASFIS composite data table as disseminated so far, and the need (as a matter of principle and a best practice) to ensure *backward compatibility* to guarantee the functionality of existing workflows based on this table.
    - Furthermore, the group **RECOMMENDS**:
      a. To produce a minimal change log file to attach to each ASFIS release (through the zip archive https://www.fao.org/fishery/static/ASFIS/ASFIS_sp.zip)
      b. To disseminate a consolidated master data file to manage the status of each record (e.g., deprecated, validated, etc.) accompanied with accompanying notes in human-readable format (e.g., RMJ with status *deprecated* – note *"replaced by RMM*").
      c. To enrich the ASFIS with mappings towards codes/identifiers others than the ASFIS 3-alpha codes
      d. To extend the publicly disseminated current composite data table with additional unique identifiers coming from other key information systems relevant to taxonomy.
      e. To add a column "SPECIES_RESOLUTION" to indicate if the taxon is available at species level or at lower aggregate taxonomic level (e.g., *Istiophoridae*, *Auxis spp.*).
    - **ACKNOWLEDGING** that materials may already exist that could be used to build and automatically maintain ASFIS code list mappings (R scripts, routines, remote services, etc.), the CWP RH **SUGGESTS** this task be considered as part of the overall ASFIS maintenance rather than as a derivative work of the CWP RH.

  - On ISSCFG:
    - **ACKNOWLEDGING** the request from the FIRMS GTA Technical Working Group, the CWP RH **RECOMMENDS** that at the next revision of the ISSCFG classification:
      - *pole-and-lines* (be them hand-operated or mechanized) be kept separate from *handlines* and assigned distinct codes to increase the level of resolution for the information associated to these specific gears.
      - *rod and reel* (RR) be differentiated into a specific "hooks and lines" (09) category, separated from handlines/pole-and-lines (09.1), and trolling lines (09.5)

- On the emerging standards:
  - TG-RH **RECOGNIZES** the need to continue on the ongoing exercise to inventory needs for emerging standards.