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**COORDINATING WORKING PARTY ON FISHERY STATISTICS**

**Intersessional Meetings of Aquaculture  
and Fisheries Subject Groups –  
Joint Session**

**Seventh Meeting of the Aquaculture Subject Group (AS)  
and  
Twenty-eighth meeting of the Fisheries Subject Group (FS)**

**2 – 5 November 2021**

**Terms of Reference of the CWP ad-hoc Task Group  
on “fishing effort concepts” (TG-effort)**

# CWP ad-hoc Task Group on “fishing effort concepts” (TG-effort)

## Terms of Reference Version 2.0

### 1. Background

Fishing effort in capture fisheries is generally defined in terms of the amount of fishing gear of a specific type used on the fishing grounds over a given unit of time e.g. a fishing operation, fishing activity, day or fishing trip. The time spent searching for fish (search duration) is also taken into consideration. The measure of effort (unit of fishing effort) depends on the fishery and type of gear used. The impact of a unit of fishing effort on the fish populations and the ecosystem generally differs amongst vessels and/or fishers and depends on the gear deployed and the mode of fishing. As a result, effort statistics often need to be qualified (e.g. by vessel type, engine power, seasonal effect). When two or more kinds of gear are used or when the same gear is used for example by different classes of vessel, the respective efforts must be adjusted to some common standard before being aggregated across all classes. This common standard is sometimes referred to as effective fishing effort. Standard measures of effort for categories of fishing gear defined in the International Standard Statistical Classification of Fishing Gear (ISSCFG, CWP Handbook, Annex M) are listed below (Appendix 1).

CWP has identified varying levels of precision of fishing effort in reporting forms used in STATLANT<sup>1</sup> questionnaires and statistical organizations are requested to provide data for each of these levels. There are three main levels of precision (categories A, B and C) and an additional level (D) where:

- Category A refers to a detailed unit of measure, e.g. hours fished or number of sets, etc. These units of measure will vary with the gear used.
- Category B refers to the number of days fished, i.e. the number of days on which fishing took place. For those fisheries in which searching is a substantial part of the fishing operation, days in which searching occurred, but no fishing took place should be included in the number of days fished.
- Category C refers to the number of days on the fishing ground in addition to days fishing and searching; here all other days while the vessel was on the fishing ground should be indicated.
- Category D (in STATLANT form B21) uses the percent of pro-rated effort to estimate the percentages of the catches when data are incomplete.

The effort may be nominal, reflecting the simple total of effort units exerted on a stock in a given time period. Effort may also be standard or effective when corrected to take account of differences in fishing power and efficiency and ensure direct proportionality with fishing mortality and this relates usually to a specific fishery and gear. If more than one gear is considered, standardization in relation to one of them is necessary. For biologists, a good measure of fishing effort should be proportional to fishing mortality. For economists it should be proportional to the cost of fishing.

Statistics on fishing effort and associated catch per unit of effort often underpin advice on the sustainable development and management of capture fisheries. Fishing effort statistics are for many purposes required as detailed data (e.g. broken down by fishing fleet, gear, season, target species and geographic

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<sup>1</sup> STATLANT system of questionnaires is a long-standing standardized statistical inquiry developed by the CWP for the submission of national catch and effort data to international organizations by national statistical offices (<http://www.fao.org/cwp-on-fishery-statistics/handbook/introduction/data-collection-systems/en/>).

area or fishing zone) and national and regional fisheries organizations publish effort statistics in various forms. Importantly, the concepts and definitions used to quantify fishing effort may differ between these organizations, and fishing effort may be under-reported or not reported in some fisheries. As a result, the compilation of effort statistics may differ at national or regional levels and such differences may limit the compatibility of effort statistics and the exchange and wider use of these data in regional and global contexts.

## **Context/Purpose**

The technical workshop on global harmonization of tuna fisheries statistics (FAO, 2019a) proposed revisions to the CWP definitions for fishing effort to include and harmonize effort measures utilized by the t-RFMOs (included in Appendix 2 below). The workshop suggested specific tasks to:

- i. Combine the three categories A, B and C above and to combine two measures of effort (number of days fished and number of days on the fishing ground) in categories B and C
- ii. Develop a fishing practice data structure module (refer reference harmonization, CWP 2019) that combines the concepts of fishing gear (ISSCFG) and fishing mode.

The 26<sup>th</sup> session of CWP (CWP-26) welcomed the proposal from the t-RFMOs which allows these organizations to better harmonize their collection and sharing of fishing effort data, and CWP requested that this work be extended to the other RFBs with particular consideration of small-scale fisheries (FAO, 2019b).

CWP-26 established five ad-hoc task groups (TGs) to progress its work during the 2019-2022 intersessional period (FAO, 2019b). Membership of the ad-hoc TGs is open to all CWP parties, and CWP-26 identified a lead organization for each TG to convene and lead that TG with support from the CWP Secretariat. Three of these TGs involve capture fisheries:

- Fishing effort concepts (TG-effort)
- Catch concepts (TG-catch)
- Reference harmonization standard (TG-RH2).

While the task of developing the concept of ‘fishing activity’ information was initially proposed as part of the work of TG-effort, CWP-26 referred the development of a suitable standard for the fishing activity concept to TG-RH2 (FAO, 2019b). CWP-26 identified WECAFC as the lead organization for TG-effort, noting that WECAFC is a FAO Body and that a co-lead would be sought intersessionally. WECAFC has advised that Nancie Cummings is available to convene TG-effort, with David Ramm and support from the CWP Secretariat. Draft terms of reference (ToRs) for TG-effort were developed in consultation with the TG Convener and are elaborated below (Section 2. Objectives, tasks and timeframe and Section 3. Organization of work).

## **2. Objectives, tasks and timeframe**

The objectives of TG-effort are to:

- Review, revise and where necessary further develop CWP fishing effort concepts and associated diagram(s) and definitions including measures of nominal and standard effort, and elaborate their use in informing STATLAT questionnaires

- Review, further develop and define standard measures of effort for the categories of fishing gear in ISSCFG (refer Appendixes 1 and 2), taking account of emerging remote-sensing technologies (refer below) and opportunities to develop new measures of effort.

Emerging remote-sensing technologies such as satellite-based Automatic Identification System (AIS), Synthetic Aperture Radar (SAR) systems and Visible Infrared Imaging Radiometer Suite (VIIRS) provide opportunities to develop new measures of fishing effort which may be integrated with existing measures defined by CWP. A recent study of AIS-based fishing activity has demonstrated the use of AIS tracks from industrial fishing vessels to provide estimates of fishing activity and effort in near real time (Taconet *et al*, 2019). Other studies are demonstrating the potential of technologies such as SAR and VIIRS to quantify the movements and activities of fishing vessels (e.g. Global Fishing Watch).

It is anticipated that the work of TG-effort will be reviewed and further developed during an intersessional meeting of the CWP Fisheries Subject Group and subsequently presented to CWP-27 in 2022 for consideration. Some outputs from TG-effort could have implications for the work of TG-catch and TG-RH2 and vice-versa (e.g. fishing activity information and fishing effort module), and collaboration between TGs may be required to ensure overall consistency in advice to CWP and may require a virtual joint-TG meeting. In addition, some outputs of TG-effort may be implemented in the CWP Handbook section on fishing effort. Proposed tasks and timeframe for the work of TG-effort are outlined in Table 1.

**Table 1: Proposed tasks and timeframe for the work of TG-effort**

	<b>Task</b>	<b>Timeframe</b>
0.	Develop draft ToRs and work plan in consultation with TG Convener and circulate to members for validation. Call for TG participations and their contact details.	Feb 2021
1.	Finalize ToRs and establish TG membership	March 2021
2.	Review, revise and where necessary further develop the CWP fishing effort concepts and associated diagram(s) and definitions including measures of nominal and standard effort, and elaborate their use in informing STATLANT questionnaires	July/August 2021
3.	Concurrently with 2, review, further develop and define standard measures of effort for the categories of fishing gear in ISSCFG, taking account of opportunities for new measures based on emerging technologies such as AIS, SAR and VIIRS	July/August 2021
4.	Circulate first draft of the revised fishing effort concepts and definitions	September 2021
5.	Consider further development to the fishing effort concepts	Prior to the CWP Intersessional meeting (IS)
6.	Concurrently with 5, consider implications of the revised fishing effort concepts and definitions in the work of TG-catch and TG-RH2 and, if needed, convene a virtual joint-TG meeting	Prior to IS
7.	Present advanced version of revised fishing effort concepts and definitions at the CWP intersessional meeting (IS)	IS

8.	Consider further developments including intersessional meeting feedback and enlarging the scope of contributions to other CWP parties	Post IS
9.	Incorporate relevant outputs of TG-catch and TG-RH2	Post IS
10.	Present final version of the revised fishing effort concepts, diagram(s) and definitions to CWP-27 for consideration and, if possible, adoption	By mid-2022

### **3. Organization of work**

#### **3.1. Convener**

CWP-26 identified WECAFC as the lead organization for TG-effort and WECAFC has advised that Nancie Cummings is available to convene the TG, with David Ramm and support from the CWP Secretariat. Meetings will be called by the Convener and supported by the CWP Secretariat which will also ensure the progress of work and development of outputs, as stipulated by the CWP work plan and these ToRs.

#### **3.2. Membership**

TG-effort is open to all CWP parties and those interested in this work are encouraged to actively contribute. At CWP-26, the following parties indicated initial interest in participating in the TG: GFCM ICCAT, ICES, IOTC, NAFO, SEAFDEC and FAO/WECAFC.

Interested CWP parties are requested to provide the name of the person(s) who will be actively involved in the work of TG-effort. To the extent practicable, if a member of the TG is unable to attend a meeting, a substitute will be nominated to participate in the meeting, and inform the convener of this substitution prior to the scheduled meeting.

#### **3.3. Role of group members**

TG-effort will make decisions in the spirit of consensus and cooperation. TG members will decide on the detailed work plan and may propose revisions of the ToRs for approval by the Coordinator of the CWP Fisheries Subject Group and the CWP Secretariat.

Each TG participant is encouraged to engage actively in the work of the TG, including by:

- Attending all web calls and meetings
- Sharing knowledge and practical examples to illustrate CWP needs
- Reviewing working documents co-prepared by the TG.

As a whole, the TG will develop the documents fulfilling its objectives including recommendations for presentation, discussion and decision at the CWP intersessional and session meetings.

#### **3.4. Meeting agenda items**

Meeting agendas, with attached meeting material, will be distributed at least five working days prior to a scheduled meeting, in coordination with the CWP Secretariat. At the end of each meeting, the TG will consider requirements for any follow-up meeting and, if required, will identify draft agenda items to be addressed at that meeting together with a proposed meeting schedule (date, time, duration).

### **3.5. Minutes and meeting papers**

The minutes of each meeting will be prepared by the convener with support from the CWP Secretariat, or any other member on a voluntary basis, and shared with the TG members no later than ten working days following each meeting.

### **3.6. Working conditions**

Most TG activities will be conducted through email exchange and online meetings; however, face-to-face meetings may be held as appropriate if deemed necessary and upon available resources. The frequency of the meetings will be determined by the TG work and progress.

### **3.7. Collaboration with other TGs**

Some outputs from TG-effort could have implications for the work of TG-catch and TG-RH2, and vice-versa. Collaboration between TGs may be required to ensure overall consistency in advice to CWP and may require a virtual joint-TG meeting.

## **References**

**CWP.** CWP Handbook. [Cited 1 January 2021, under revision]. <http://www.fao.org/cwp-on-fishery-statistics/handbook/introduction/en/>

**FAO.** 2019a. *Report of the technical workshop on global harmonization of Tuna fisheries statistics. Rome, Italy, 19–22 March 2018.* FAO Fisheries and Aquaculture Report No. 1239. Rome, FAO. 52 pp. (also available at <http://www.fao.org/3/ca3132en/ca3132en.pdf>).

**FAO.** 2019b. *Report of the twenty-sixth session of the Coordinating Working Party on Fishery Statistics. Rome, Italy, 15–18 May 2019.* FAO Fisheries and Aquaculture Report No. 1293. Rome, FAO. 51 pp. (also available at <http://www.fao.org/3/ca6684en/ca6684en.pdf>).

**Global Fishing Watch (GFW).** *Identification of ‘dark vessels’.* [Cited 8 February 2021]. <https://globalfishingwatch.org/research/viirs/>

**Taconet, M., Kroodsma, D., & Fernandes, J.A.** 2019. *Global Atlas of AIS-based fishing activity - Challenges and opportunities.* Rome, FAO. (also available at <http://www.fao.org/3/ca7012en/ca7012en.pdf>).

## Appendix 1: Selected combinations of gear and effort (CWP Handbook, Annex N1)



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Coordinating Working Party on Fishery Statistics (CWP)

Handbook of Fishery Statistics

### Selected combinations of gear and effort

Fishing gear	Effort measure descriptors	Definitions
Surrounding nets (purse seines)	Number of sets	Number of times the gear has been set or shot, whether or not a catch was made. This measure is appropriate when school size and packing density is related to stock abundance or sets are made in a random manner.
Beach seines	Number of sets	Number of times the gear has been set or shot, whether or not a catch was made.
Boat seines (Danish, etc.)	Hours fishing per day	Number of times the gear was set or shot per day, times the estimated mean set or shot duration.
Trawls	Number of hours fished	Number of hours during which the trawl was in the water (midwater trawl), or on the bottom (bottom trawl), and fishing.
Boat dredges	Number of hours fished	Number of hours during which the dredge was on the bottom and fishing.
Gillnets (set or drift)	Number of effort units	Length of nets expressed in 100-metre units multiplied by the numbers of sets made (= accumulated total length in metres of nets used in a given time period divided by 100).
Gillnets (fixed)	Number of effort units	Length of net expressed in 100-metre units multiplied by the number of times the net was cleared.
Traps (uncovered pound nets)	Number of effort units	Number of days fished times the number of units hauled.
Covered pots and fyke nets	Number of effort units	Number of lifts times the number of units (= total number of units fished in a given time period).
Longlines (set or drift)	Thousands of hooks	Number of hooks fished in a given time period divided by 1 000.
Handlines, (pole, troll, jig, etc.)	Number of line days	Total number of lines used in the given time period.
Harpoons	-----	(Report effort levels B and C only)

**Appendix 2: Standard measures of effort for categories of fishing gear in ISSCFG**  
(CWP revised Handbook, under development; based on the report of technical workshop on global harmonization of tuna fisheries statistics, FAO 2019a)

Fishing gear category (ISSCFG, 2016)	Standard measures of effort	
	Haul-by-haul data	Aggregated data
Surrounding net (01)	Soak time	Number of sets Number of days fished
Seine (02)	Soak time	Number of sets Number of days fished
Trawl (03)	Tow duration Tow length, volume, swept area	Number of tows Tow duration Number of days fished
Dredge (04)	Tow duration Tow length, volume, swept area	Number of tow Tow duration Number of days fished
Lift net (05)	Soak time	Number of sets Soak time Number of days fished
Falling gear (06)	Soak time	Number of sets Soak time Number of days fished
Gillnet and Entangling net (07)	Soak time Length of net set	Number of nets set Number of sets Length of net set Number of days fished
Trap (08)	Soak time	Number of traps set Number of sets Soak time Number of days fished
Hook and line (09)	Soak time Number of hooks set Length of line	Number of fishers Number of reels/machines Number of hours reels/machines operated Number of hooks set Number of lines set Length of line set
Dive (10.8)	Dive time	Number of hours dived Number of days fished