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## COORDINATING WORKING PARTY ON FISHERY STATISTICS

### Intersessional Meetings of Aquaculture and Fisheries Subject Groups

#### Twenty-ninth meeting of the Fisheries Subject (FS)

**20 – 23 June 2022**

(Online, Zoom platform + FAO HQ Queen Juliana Room – B323)

#### Progress report of the CWP ad-hoc Task Group on effort concepts

**Author: *ad-hoc* Task Group  
on fishing effort concepts (TG-Effort)**

#### Document Summary

CWP-26 established the *ad-hoc* task group on fishing effort concepts (TG-effort) to review, revise and where necessary further develop CWP fishing effort concepts and standard measures. Progress on this work ([CWP-IS/2021/2](#)) was reported at the intersession meeting of CWP in November 2021. That meeting provided further guidance to TG-effort ([CWP-IS report, 2021](#)) including *inter alia* to further consider: the overall objective of the work, fishing effort concepts and applications across all fishery sectors, effort measures in the context of their intended use, the proposals from the t-RFMO workshop (2018), and new efforts measures arising from emerging technologies and which are feasible/practical to implement with available tools.

TG-effort has reviewed and further developed fishing effort concepts for a [fisher](#), [fishing vessel](#) and [fishery-support vessel](#), [fishing ground](#), [fishing trip](#), [fishing gear](#), [searching](#) (for fish), [fishing operation](#) and [fishing mode](#), the overarching concept of [métier](#) and a fishing effort concept diagram ([Fig. 1](#)). TG-effort also reviewed the three main levels of precision/granularity used in reporting fishery statistics in the STATLANT system of questionnaires (categories A, B and C) and re-cast these at the levels of three effort concepts: fishing operation (A), métier (B) and fishing trip (C). TG-effort also reviewed and developed standard measures of fishing effort ([Table 1](#)): Measures A - number of fishing operations, number of gear sub-units deployed, number of gear.hours fished, number of gear.days fished, number of hours searching, Measures B - number of days on a fishing ground, and Measures C - number of fishing trips, number of days absent from base, number of days fished, number of fishers and number of fishing vessels. TG-effort also developed the proposal of the t-RFMO workshop (FAO, 2019b) to use combined measures for all gear categories in the International Standard Statistical Classification of Fishing Gear (ISSCFG) and all fishing modes ([Table 2](#)).

TG-effort also considered the use of emerging technologies such as satellite-based Automatic Identification System (AIS), Visible Infrared Imaging Radiometer Suite (VIIRS) and Synthetic Aperture Radar systems (SAR) in developing measures of fishing effort. TG-effort concluded that such technologies can provide opportunities *inter alia* to validate existing measures or provide improved

estimates of these measures, provide new technologies in addition to AIS and VMS such as VIIRS for use in monitoring fishing as well as illegal, unregulated and unreported fishing (IUU) activities, and support the development and application of new measures of effort which may be integrated with existing measures defined by CWP. New measures for use by CWP will need to be derived from readily available, low-cost data and TG-effort noted that the accessibility of emerging technologies is evolving rapidly and data which may have limited or restricted availability today may become readily available/public domain in the near future.

## Table of Contents

1. Background .....	3
2. Further development of fishing effort concepts.....	4
2.1 Fishing effort concept: Fisher .....	4
2.2 Fishing effort concept: Fishing vessel .....	5
2.3 Fishing effort concept: Fishing ground.....	6
2.4 Fishing effort concept: Fishing trip.....	7
2.5 Fishing effort concept: Fishing gear .....	9
2.6 Fishing effort concept: Searching .....	9
2.7 Fishing effort concept: Fishing operation .....	10
2.8 Fishing effort concept: Fishing mode .....	10
2.9 Fishing effort overarching concept: Métier .....	11
2.10 Fishing effort concepts diagram.....	12
3. Review of nominal and effective effort and their application in STATLANT questionnaires.....	13
4. Further development of standard measures of fishing effort .....	15
5. Development of new fishing effort measures using emerging technologies .....	16
6. Items for consideration at CWP-27.....	18
References.....	20
Appendix 1: TG-effort objectives, tasks and timeframe.....	26
Appendix 2: List of TG-effort participants including participants at joint-TG meetings.....	27

## 1. Background

1. CWP-26 (FAO, 2019a) established an ad-hoc task group on fishing effort concepts (TG-effort) to: (1) Review, revise and where necessary further develop CWP fishing effort concepts and associated diagram(s) and definitions including measures of nominal effort and effective effort, and elaborate their use in informing STATLANT<sup>1</sup> questionnaires, further building on the effort measures harmonization work initiated by the t-RFMOs (FAO, 2019b); (2) Review, further develop and define standard measures of effort for the categories of fishing gear in the International Standard Statistical Classification of Fishing Gear (ISSCFG), taking account of emerging remote-sensing technologies and opportunities to develop new measures of effort. TG-effort worked in a global context and considered all capture fishery sectors (i.e. industrial, small-scale/artisanal<sup>2</sup>, sport/recreational) as well as fishing activities which do not involve the use of vessels (i.e. land-based fishing) or designated ports. The TG's objectives, tasks and timeframe are given in [Appendix 1](#) and TG participants are listed in [Appendix 2](#).
2. TG-effort initiated its work with a review of the development of CWP fishing effort concepts and measures and a joint online meeting with the *ad-hoc* Task Group on catch concepts (TG-catch). The joint online meeting was held in July 2021 to initiate the program of work and tasks required for both TGs and to ensure any overlap in activities or discussions between these TGs was fully noted. Following that meeting, TG-effort further developed fishing effort concepts<sup>3</sup> (objective 1) and detailed measures of effort (objective 2). Progress was reported at the intersession meeting of CWP ([CWP-IS/2021/2](#)) in November 2021 and work continued in the period to CWP-27 in June 2022.
3. The November 2021 intersession meeting of CWP reviewed progress in the work of TG-effort and agreed the following actions and work plan for the remainder of the intersession period to June 2022:

### Group agreement and actions required:

- Further consider the overall objective of the work (paragraph 4 below)
- Further consider the types and definitions of fishing effort concepts and applications across all fishery sectors (i.e. industrial, small-scale/artisanal, sport/recreational) (Section 2 below)
- Further consider the proposals from the t-RFMO workshop (FAO, 2019b) (Sections 3 and 4)
- Consider and further develop effort measures in the context of their intended use (Section 4)
- Identify new effort measures arising from emerging technologies and which are feasible/practical to implement with available tools (Section 5)
- Convene another online meeting to progress its work

<sup>1</sup> STATLANT system of questionnaires is a long-standing standardized statistical inquiry developed by 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/>).

<sup>2</sup> Small-scale/artisanal fisheries refer to fisheries which operate on a small spatial scale and/or use relatively low levels of technology (artisanality) (refer for example <http://www.oceansatlas.org/subtopic/en/c/1421/>).

<sup>3</sup> The CWP Handbook (<https://www.fao.org/cwp-on-fishery-statistics/handbook/en/>) defines a 'statistical concept' as a representation of a notion or entity based on a unique set of characteristics which defines a statistical measure, dimension or domain, and which has been developed by CWP or recommended by CWP for use.

Work plan:

- Receive written feedback from CWP members (by end of December 2021)
  - Convene an online bilateral or joint meeting to further progress the work of TG-effort for final delivery at CWP-27 (tentatively Q1 2022).
4. In considering the overall objective of its work, TG-effort recalled that the historic work of CWP focused on the development of effort concepts and measures applicable to large-scale industrial fisheries. Taking into context the recent operational changes in fisheries worldwide, TG-effort agreed that the overall objective of its work was to develop a comprehensive set of fishing effort concepts and standard measures which can be applied across all capture fishery sectors (i.e. industrial, small-scale/artisanal, sport/recreational) and ISSCFG fishing gears (FAO, 2021a). TG-effort's terms of reference ([Appendix 1](#)) were cast within that overall objective and work continued in 2022 by online consultation and email<sup>4</sup>.

**2. Further development of fishing effort concepts**

5. Towards the need to more accurately characterize capture fisheries and aquaculture from a global/regional view, statistical programs of national fisheries must utilize a common set of regional/interregional standards which apply internationally recognized definitions, classifications and codes. The current version of the [CWP handbook](#) refers to various statistical concepts associated with fishing effort, including fishing vessel, fishing ground, fishing trip, fishing day, fishing gear and searching (for fish). These concepts have been used *inter alia* to develop commonly used measures of fishing effort (refer [CWP-IS/2021/2](#) Appendix 3). TG-effort reviewed these fishing effort concepts and provided additional clarification and development in the following section while recognizing the underlying and inter-related needs to: 1) maintain continuity and consistency in the reporting of effort statistics; 2) ensure comprehensive coverage of fishing effort across all capture fishery sectors (e.g., industrial, small-scale/artisanal), fishing gears and fishing modes; and 3) facilitate the integration of any new concepts and measures with current and established reporting practices. The concepts considered by TG-effort are detailed below and revisions proposed by TG-effort are listed at the end of each subsection.

**2.1 Fishing effort concept: Fisher**

6. CWP has focused on the socio-economic statistics from fishers who derive a livelihood or revenue from fishing activities, and has recommended that employment for fishers be defined in accordance with the [International Standard Classification of Occupations ISCO-08](#) (ILO, 2012). The [sub-section of the classification](#) relevant to fisheries and aquaculture is summarised in the Handbook. CWP defines full-time, part-time and occasional fishers as follows (CWP Handbook section on [Fishers](#)): full-time fishers receive at least 90% of their livelihood from fishing or spend at least 90% of their working time in that occupation; part-time fishers receive at least 30% but less than 90% of their livelihood from fishing or spend at least 30% but less

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<sup>4</sup> The final round of consultations was completed 15 June 2022 and this report is a clean version of the original document which is available with comment history and track change at the following link: <https://docs.google.com/document/d/1-GZ32n7QgMYs0sZ8icbjcQy9AwegopzDqLk-11VJclg/edit?usp=sharing>

than 90% of their working time in that occupation; occasional fishers: receive under 30% of their livelihood from fishing or spend under 30% of their working time in that occupation.

7. It is generally recognized that fishing activities encompass a broad range of methods and practices and, for example, the Northwest Atlantic Fisheries Organization (NAFO) defines fishing activities as ‘the harvesting or processing fishery resources, landing or transshipping of fishery resources or products derived from fishery resources, or any other activity in preparation for, in support of, or related to the harvesting of fisheries resources in the Regulatory Area, including the actual or attempted searching for, catching or taking of fishery resources; any activity that can reasonably be expected to result in locating, catching, taking, or harvesting of fishery resources for any purpose; and any operation at-sea in support of, or in preparation for, any activity described in this definition, but does not include any operations related to emergencies involving the health and safety of the crew members or the safety of a vessel’ (NAFO Conservation and Enforcement Measures, Article 1.5).
8. In addition, it is also recognized that fishing activities may be carried out for other purposes such as sport and recreation/pleasure which may not generate a revenue (to the fisher). However the sport and recreational fishery sector does generate revenue (e.g. headboats and charterboats/six packs).
9. Based on these considerations, TG-effort proposes to define a fisher as follows:

**Fisher (revised concept):** an individual who engages in fishing activities for the purpose of deriving a livelihood, generating a revenue or pursuing sport or recreation. A full-time, part-time or occasional fisher receives some or all of their livelihood from fishing or spends some or all of their working time in that occupation. A sport or recreational fisher (or angler) conducts fishing in pursuit of sport or recreation.

## 2.2 Fishing effort concept: Fishing vessel

10. CWP developed the International Standard Statistical Classification of Fishery Vessels ([ISSCFV](#)) (FAO, 2021b) which provides a global structure for the classification of fishery vessels including fishing vessels. In doing so, CWP distinguishes between a fishery vessel (or fishery fleet) and a fishing vessel, and these concepts are defined as follows (CWP Handbook section on [fishery fleet](#)): fishery vessel is a mobile floating platform of any kind and size, operating in fresh, brackish or marine waters which is used for catching, harvesting, searching, transporting, landing, preserving and/or processing fish, shellfish and other aquatic organisms, residues and plants; and fishing vessel is a [fishery] vessel engaged only in catching operations (i.e. a subset of fishery vessel).
11. The subset of fishery vessels which perform functions other than catching operations (e.g. supply vessels and motherships, patrol vessels, fishery research and training vessels) are referred to by CWP as non-fishing vessels.
12. Fishery vessels are characterized *inter alia* by their type (ISSCFV), tonnage, length, powered or unpowered, and decked or undecked (CWP Handbook). In the context of CWP, a fishery vessel type refers to a specific ISSCFV category or sub-category. A fishing vessel type refers to the subset of ISSCFV categories and sub-categories related to fishing vessels only.

13. The ISSCFV also incorporates terminology aligning with international instruments such as the Port State Measure Agreement (PSMA). For example, PSMA defines a fishing vessel as any vessel, ship or other type of boat used for, equipped to be used for, or intended to be used for, fishing or fishing related activities.
14. Other agencies may use broader definitions. For example, the [FAO glossary](#) (refer also [FAO fact sheets](#)) defines a fishing vessel as ‘any vessel, boat, ship, or other craft that is equipped and used for fishing or in support of such activity. For management purpose, particularly for monitoring and surveillance, a fishing vessel may be considered to include any vessel aiding or assisting one or more vessels at sea in the performance of any activity relating to fishing, including, but not limited to, preparation, supply, storage, refrigeration, transportation, or processing (e.g. mother ships)’.
15. Based on these considerations and noting that ‘fishing operation’ is a concept defined in Sub-section 2.7 below, TG-effort proposes to define a fishing vessel as follows:

**Fishing vessel (revised concept):** a vessel, ship, boat or other type of craft used for, equipped to be used for, or intended to be used for, fishing operations. A fishing vessel may be powered or unpowered, and decked or undecked and a classification of fishing vessel types is provided in the International Standard Statistical Classification of Fishery Vessels (ISSCFV).

16. Based on ISSCFV, TG-effort also proposes to define a fishery-support vessel as follows:

**Fishery-support vessel:** a vessel, ship or boat performing non-fishing operations related to fisheries, such as re-supply, transportation of catch, factory processing, fishery patrol, search and rescue, research or training.

17. TG-effort noted that the term ‘**fishery vessel**’ includes both fishing vessels and fishery-support vessels (as defined above).

### 2.3 Fishing effort concept: Fishing ground

18. A fishing ground is generally understood to represent a geographic location where fishing takes place. This location may be further defined by the depth range or zone where fishing occurred and whether fishing was pelagic, semi-pelagic or on the bottom (sea floor). For example, a fishing ground may represent a local reef, a patch of water, or a fishing zone or management area.
19. For statistical purposes, CWP uses the [FAO major fishing areas](#). These fishing areas or statistical areas (including related sub-units referred to as statistical subareas, divisions and subdivisions) are arbitrary areas with boundaries determined in consultation with international fishery agencies on various considerations, including: the boundary of natural regions and the natural divisions of oceans and seas; the boundaries of adjacent statistical fisheries bodies already established in inter-governmental conventions and treaties existing national practices; national boundaries; the longitude and latitude grid system; the distribution of the aquatic fauna; the distribution of the resources; and the environmental conditions within an area. The rationale of the FAO major fishing areas has been that the areas should, as far as possible, coincide with the areas of competence of Regional Fisheries Management Organizations or Arrangements (RFMO/As) when existing. This system facilitates comparison of data and improves the

possibilities of cooperation in statistical matters in general. For statistical purposes, 27 major fishing areas have been internationally established to date: 8 major inland fishing areas covering the inland waters of the continents, and 19 major marine fishing areas covering the waters of the Atlantic, Indian, Pacific and Southern Oceans with their adjacent seas.

20. CWP also recognizes other fishing areas which may be considered as ‘grounds’ including marine waters (oceans and seas including adjacent saltwater areas), inland waters (lakes, rivers, brooks, streams, ponds, inland canals, dams, and other land-locked usually freshwater waters such as the Caspian Sea, Aral Sea, etc.) and water jurisdiction areas.
21. CWP follows the UNCLOS definitions for water jurisdiction areas (United Nations, 1982) which are summarized in the CWP Handbook (section on [main water areas](#)) as follows:
- Internal waters and archipelagic waters (waters of the sea on the landward side of the baseline used by the national authorities of the coastal country to measure further seawards the width of the territorial sea and any adjacent marine waters, whether salt, brackish, or fresh in character)
  - Territorial sea (a band of 12 nautical miles in width seaward calculated from the baseline<sup>5</sup>. Internal waters/archipelagic waters are not part of a territorial sea)
  - Contiguous zone (a band extending from the outer limit of the territorial seas up to a limit of 24 nautical miles from the baseline)
  - Exclusive economic zone (EEZ) (an area beyond and adjacent to the territorial sea and up to a limit of 200 nautical miles seaward. EEZs give nations sovereign rights for exploring and exploiting marine resources below the level of the sea, including fishing activities)
  - International waters, high seas and Areas Beyond National Jurisdiction (ABNJ) (the water column beyond the EEZs).
22. Based on these considerations, TG-effort proposes to define a fishing ground as follows:

**Fishing ground (revised concept):** a geographic location where fishing takes place. This location may be further defined by the water jurisdiction area, FAO major fishing area or sub-unit, depth range, zone or feature where fishing occurs.

#### 2.4 Fishing effort concept: Fishing trip

23. The concept of a fishing trip is implied in the CWP definitions of the fishing effort measures ‘number of fishing trips’ and ‘number of days absent from port’ (refer [CWP-IS/2021/2](#) Appendix 3). According to these definitions, a fishing trip may be defined as follows.

**Fishing trip (historical definition):** a voyage during which fishing took place, beginning on the day the vessel sailed from port and ending on the day the vessel returned to port, excluding the day(s) of landing if landing [occurred] after the day of return to port.

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<sup>5</sup> In some cases a territorial sea may extend to 3 miles only.

24. This historical definition of a fishing trip focused on industrial fishing and assumed that a trip begins and ends in a port<sup>6</sup> and that a fishing vessel is used for the trip. However, this definition does not include fisheries such as some small-scale/artisanal or sport/recreational fisheries which do not operate from ports and/or do not use fishing vessels.
25. In addition, the beginning or end of a fishing trip may be defined in accordance with specific regulatory requirements. For example a trip may be defined as ‘the time from [a vessel’s] entry into until its departure from the Regulatory Area and continues until all catch on board from the Regulatory Area is unloaded or transhipped’ (NAFO Conservation and Enforcement Measures, Article 1.7, 2022). This specific NAFO definition recognizes that some vessels are authorized to fish by both NAFO and the North-East Atlantic Fisheries Commission (NEAFC) and these vessels may fish in both jurisdictions in one continuous voyage. As another example, a fishing trip may be deemed to end at the point of beginning a transshipment (to a carrier vessel at sea) in order to facilitate the independent monitoring of the transhipped catch. Further and in the case of industrial fishing, consideration may also need to be given to the use of ‘motherships’ and the application of a fishing trip in that context.
26. The NAFO example above may also be interpreted in the context of métier (refer sub-section 2.9 below) where a fisher or fishing vessel practices a different métier on each fishing ground or, in this particular case, each regulatory area (e.g. NAFO and NEAFC) during a fishing trip.
27. Small-scale and recreational fisheries generally operate from a (home) base which may be a port, marina or another geographic location (private or public) such as a dock, berth, ramp, beach, seawall or pier which is used repeatedly by a fishing vessel or a fisher. In addition, some small-scale/artisanal or sport/recreational fisheries do not involve the use of fishing vessels, such as land-based/shore-operated fisheries including diving from shore, beach seining, ice fishing, angling from shore, fishing from bridges or piers, using stationary lift nets etc. These land-based fisheries may involve fishing trips where, for example, a fisher commutes/drives/walks from a base to a fishing ground.
28. Recreational fishing trips can be further characterized as fishing during part or all of a trip in one or more fishing modes (refer to fishing mode in sub-section 2.8 below). For example in the USA (refer [footnote 8](#)), an angler who fished from both a pier and a beach on the same day would be counted as having made one fishing trip since the pier and the beach are both in the shore mode. However, an angler who fished from a head boat in the morning and from a pier in the afternoon would be counted as having made two fishing trips (i.e. a head boat trip and a shore trip).
29. Based on these considerations, TG-effort proposes to define a fishing trip as follows:

**Fishing trip (revised concept):** a voyage during which fishing may take place, beginning on the day the fisher or fishing vessel departs from a base and ending on the day the fisher or fishing vessel returns to a base or initiates a transshipment or landing, and where a base is a designated port or other geographic location.

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<sup>6</sup> Industrial fisheries generally operate from a designated port or ports, where a port is a location with permanent facilities at which vessels can load or discharge cargo moving in maritime traffic.

## 2.5 Fishing effort concept: Fishing gear

30. CWP has developed the ISSCFG (FAO, 2021a) which provides a global structure for the classification of fishing gear and provides for national or regional variations in gear to be included at sublevels of the classification. In this context, a fishing gear type refers to a specific ISSCFG category or sub-category to which a particular fishery gear belongs. Although this classification was initially designed to improve the compilation of harmonized catch and effort data in the STATLANT questionnaires and fish stock assessment exercises, it has also been found useful for fisheries technology development and training. The ISSCFG has been used in particular for reference in work dealing with the theory and construction of gear and for the preparation of specialized catalogs on both artisanal and industrial fishing methods.

31. While CWP does not specifically define fishing gear, it is generally understood that the meaning of fishing gear is as follows:

Fishing gear: the equipment used for fishing, e.g. baitboat, gillnet, handline, harpoon, haul seine, longline, midwater trawl, purse seine, rod-and-reel, trap, and trawl. Each of these gears can have multiple configurations ([FAO glossary](#), refer also [FAO fact sheets](#)).

32. Based on these considerations, TG-effort proposes to define a fishing gear as follows:

**Fishing gear (revised concept):** any equipment used to capture fish or other aquatic organisms during the course of fishing. A classification of fishing gears is provided in the International Standard Statistical Classification of Fishing Gear (ISSCFG).

## 2.6 Fishing effort concept: Searching

33. CWP has long recognized that searching for fish<sup>7</sup> is an integral part of fishing and it has recommended that ‘searching time’ be reported as a stand-alone measure which is subsequently included as a component of ‘fishing time’ when the latter is expressed in ‘days fished’ (e.g. FAO, 1972, refer also [CWP-IS/2021/2](#)). Various techniques and tools are used for searching for fish, ranging from the use of bird radars and long-range sonars to the use of spotter aircraft, identification of weed mats, dissemination of information from vessel to vessel and remote sensing. In recent developments, fishing companies and vessels may also employ analysts to remotely monitor sonar buoys on Fishing Attracting Devices (FADs) and relay information to vessels at sea.

34. While CWP does not specifically define searching, it is generally understood that the meaning of searching for fish is as follows:

Searching (for fish): actively investigating a location for the presence of fish or suitable fish habitat using visual or electronic methods prior to deploying fishing gear.

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<sup>7</sup> In the general context of fishery statistics, the term ‘fish’ may be interpreted as meaning all species of aquatic organisms, whether processed or not (e.g. PSMA definition). CWP has requested that ad-hoc TG-catch further consider a definition and use of the term ‘fish’ in the context of the catch concepts.

35. Based on these considerations, and noting that the term ‘fish’ is used in a general context of fishery statistics (i.e. fish or other aquatic organisms, refer [footnote 7](#)), TG-effort proposes to define searching for fish as follows:

**Searching for fish (revised concept):** any activity which investigates a location for the presence of fish, other aquatic organisms or their habitat using visual or electronic methods or remote technology prior to deploying fishing gear.

## 2.7 Fishing effort concept: Fishing operation

36. The concept of a fishing operation involving fishing gear is implied in the CWP definitions of fishing effort measures such as the number of sets and number of operations (refer [CWP-IS/2021/2](#)). While CWP does not specifically define a fishing operation, it is generally understood that a fishing operation in the context of CWP is a set of routine (repeated) tasks required to operate fishing gear. Fishing operations may involve for example deploying and retrieving a trawl, longline or gillnet, casting a pole or handline, diving to harvest shellfish, throwing a spear and clearing the gear (i.e. removing the catch from the gear). In addition, a fishing operation may be associated with a fishing mode (Section 2.8 below) such as operating a purse seine in association with floating objects or casting a line from a charter boat. Fishing operations may also be associated with searching for fish (Sub-section 2.6 above) or practicing a métier (Sub-section 2.9 below).
37. Based on these considerations TG-effort proposes to define fishing operation as follows:

**Fishing operation (revised concept):** A set of routine tasks required to operate fishing gear including the deployment and retrieval of fishing gear ~~and the removal of catch from the gear.~~

*[note: ‘removal of catch from the gear’ was deleted (~~strikethrough~~) following feedback received during the final consultation 10-15 June and focus the definition on the operation of fishing gear]*

## 2.8 Fishing effort concept: Fishing mode

38. The concept of fishing mode was proposed for consideration by the t-RFMO technical workshop (FAO, 2019b). The t-RFMO workshop proposed that fishing mode, in the context of tuna fisheries, could be used in association with fishing gear to account for situations where purse seines are used to target: 1) free-swimming schools (i.e. fishing on schools of fish not associated with floating objects); 2) schools associated with floating objects (e.g. FADs, logs or associations with large-sized pelagic species). When both modes are used during a single fishing trip or reporting period then the t-RFMO workshop proposed combining these modes into a general/mixed mode.
39. TG-effort noted that the fishing modes proposed by the t-RFMO workshop describe/characterize specific types of fishing modes in purse seine fisheries. Other fishing modes have been documented such as fishing on schools of fish associated with large-sized pelagic species (e.g. cetaceans or whale sharks), and some modes may involve the use of ancillary/support vessels. Such fishing modes may be characterized by the type of school associations (e.g. ecological or operational associations with floating objects) and the effort involved in locating (searching for) the schools and/or floating objects and whether the floating objects are tracked by location beacons or satellite-tracked buoys.

40. TG-effort noted that fishing modes have also been defined for recreational fishing such as the fishing modes associated with the type of place or platform from which recreational fishing occurs. For example, in the USA NOAA identifies three main modes for sport and recreational fishing including fishing from: (1) shore (beach, bank, bridge, pier, dock, causeway, seawall), (2) private or rental boat, and (3) for hire-sectors charter boats and headboats<sup>8</sup>.
41. Based on the examples above, a fishing mode is a specific practice or method of conducting a fishing operation or searching which may apply in some fisheries (e.g. tuna fisheries) or fishing sectors (e.g. sport and recreational fishing), and may be species-specific or apply in a local context. A fishing mode may also be associated with a *métier* (Section 2.9).
42. Based on these considerations and noting that ‘searching’ and ‘fishing operation’ are concepts defined in Sub-sections 2.6 and 2.7 respectively, TG-effort proposes to define fishing mode as follows:

**Fishing mode (revised concept):** A specific practice or method of conducting a fishing operation or searching for fish within a fishery, fishing sector or region. A fishing mode may also be associated with a *métier*.

## 2.9 Fishing effort overarching concept: *Métier*

43. TG-effort noted that heterogeneity in fishing practices has long been recognized. In early work. Mesnil and Shepherd (1990) and Laurec *et al.* (1991) proposed the concept of *métier* as ‘... the use of a given fishing gear in a given area, in order to target a single species or group of species, e.g. inshore shrimp trawling, offshore flatfish trammel netting’ and that within each *métier* the fishing pattern could be considered as constant. This concept is used *inter alia* by FIRMS partners ([FIRMS Information Management Policy](#)).
44. The concept of *métier* combines the effort concepts of fishing gear, fishing ground and fishing mode and the catch concept of target species<sup>9</sup>. The combination of these concepts under *métier* may facilitate analysis of effort statistics which represent the true state of a fishery. For example, Deporte *et al.* (2012) and Parsa *et al.* (2020) have developed analytical classification methods that identify homogeneous groupings or *métiers* that accurately describe fishing practices for groups of vessels. TG-effort also noted that *métier* may be used to characterize a sub-unit within a fishery (i.e. sub-fishery).
45. TG-effort proposes that a *métier* be considered an overarching concept within a fishery and be defined as follows:

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<sup>8</sup> NOAA defines charter boats as vessels that take a group of anglers—usually six or fewer—on a fishing trip with a licensed captain and crew. The anglers hire or charter the vessel, and pay a fee for the captain’s services. Charter boats engage in a full range of fishing techniques, including drift fishing, trolling, and bottom fishing. Headboats are vessels that take multiple individual and/or small groups of anglers on a fishing trip with a licensed captain and crew. Headboats are generally larger than charter boats, and almost always take more than six anglers on a given trip.  
[https://www.fisheries.noaa.gov/recreational-fishing-data/recreational-fishing-data-glossary#type-of-fishing-\(mode\)](https://www.fisheries.noaa.gov/recreational-fishing-data/recreational-fishing-data-glossary#type-of-fishing-(mode)).

<sup>9</sup> Catch concepts including target species are being developed by TG-catch and will be further considered at CWP-27.

**Métier (overarching concept):** A sub-unit within a fishery (e.g. sub-fishery) characterized by a combined set of fishing effort and catch concepts including fishing gear, fishing ground, fishing mode and target species.

## 2.10 Fishing effort concepts diagram

46. A diagrammatic presentation of fishing effort concepts (Fig. 1) was developed for use in the CWP handbook and to complement the handbook diagram on [catch concepts](#) (being revised by TG-catch). The diagram illustrates the interconnectedness of fishing effort concepts and presents the revised fishing effort concepts and relationships developed by TG-effort. This diagrammatic presentation may be applied at the level of a fishery or a sub-fishery.

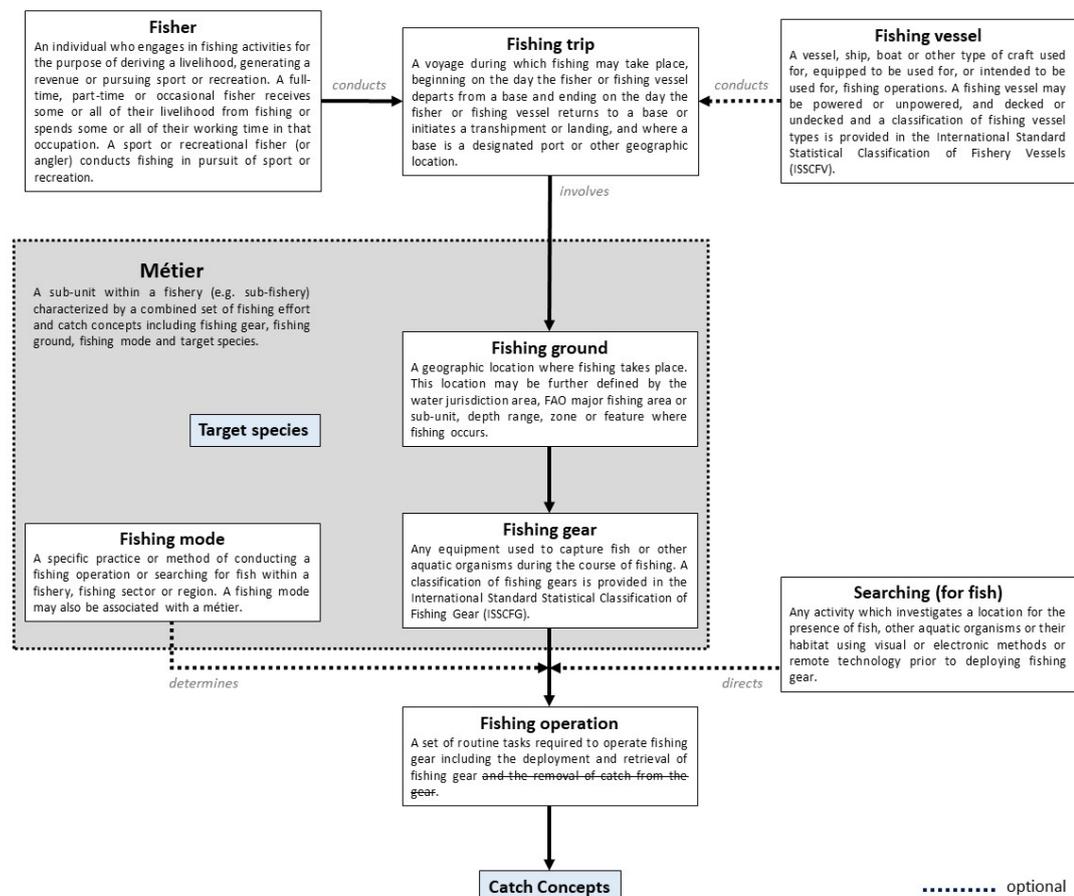


Figure 1: Diagrammatic presentation of fishing effort concepts with definitions and relationships which may apply to a fishery or a sub-fishery. The catch concepts (including target species) are being reviewed by TG-catch and the [original catch concepts diagram and definitions](#) are published in the CWP Handbook. Note that the term ‘fish’ in these diagrams is used in the general context of fishery statistics (i.e. fish and other aquatic organisms, refer to [footnote 6](#)).

### 3. Review of nominal and effective effort and their application in STATLANT questionnaires.

47. The CWP Handbook defines fishing effort in capture fisheries *inter alia* in terms of the amount of fishing gear of a specific type used on the fishing grounds over a given time period (e.g. fishing day or the duration of a fishing operation, fishing activity or fishing trip). The time spent searching for fish is also taken into consideration. The term **nominal fishing effort** (or nominal effort) is generally used to quantify the unadjusted (i.e. unstandardized) total effort units exerted on a stock in a given time period. In general such measures of effort are reported in logbooks or readily derived from available statistics and have a meaning that is easily understood by fishers, fisheries managers and other users of fishery statistics. However, the impact of a unit of fishing effort on fish populations and the ecosystem varies amongst vessels and/or fishers and depends on the gear deployed and the methods of fishing. As a result, effort measures are often adjusted (i.e. standardized) to take account of such variations including differences in fishing power and efficiency in order to better quantify the impact of fishing on fishing mortality (e.g. Millischer *et al.*, 1999; Marchal *et al.*, 2002). When two or more types of gear are used or when the same gear is used for example by different classes of vessels, the respective measures of efforts must be adjusted to some common standard before such measures can be aggregated. The adjusted measure of effort is termed **effective fishing effort** (or effective effort, also referred to as standardized effort). Unlike nominal fishing effort, effective fishing effort is a means to account for variability in the efficiency of fish capture, such as differences in fisher skill or technological differences among vessels (e.g. engine size, vessel length, etc.) or fleets/métiers (from McCluskey and Lewison, 2008).
48. Measures of fishing effort and associated catch per unit of effort generally underpin advice on the sustainable development and management of capture fisheries and these measures provide key inputs into stock assessment models and management strategy evaluation simulations. CWP recognizes that fishing effort statistics are often required as detailed data (e.g. broken down by fishing fleet, gear, season, target species and fishing ground) and national and regional fisheries organizations publish effort statistics in various forms. Thus, it is recognized that the concepts and definitions used to quantify fishing effort may differ between organizations. In addition, fishing effort may be under-reported or not reported at all in some fisheries. As a result, varying measures of fishing effort may be compiled at national or regional levels and differences between measures may limit the compatibility of effort statistics and the exchange and wider use of these data in regional and global contexts.
49. The CWP Handbook currently defines nominal and effective effort as follows:
- Nominal fishing effort: general measure of effort used to quantify the unadjusted, total effort units exerted on a stock in a given time period by a fishery, gear or métier
  - Effective fishing effort: adjusted measure of effort to take account of differences in fishing power and efficiency and ensure proportionality with fishing mortality, and when two or more kinds of gear are used or when the same gear is used for example by different classes of vessel or métier, the respective efforts are adjusted to some common standard before being aggregated across all classes (strata).
50. Measures of fishing effort may also be dependent on, or independent of the type of fishing gear used. Gear-dependent measures are specific to the type of fishing gear used, e.g. number of

hooks set, trawl tow duration, while gear-independent measures apply generally to all types of fishing gear, e.g. number of days fished, number of fishing trips. In addition, some measures may apply to aggregated data (e.g. number of sets made) while other measures apply to disaggregated (e.g. per set or per haul) data (e.g. longline or gillnet soak time).

51. Measures of nominal fishing effort are generally reported in fishery statistics including STATLANT questionnaires. Measures of nominal fishing effort include the number of fishing vessels, number of fishing trips, searching time, number of fishing gear units and number of fishing operations. Some of these measures of effort may also be standardized and/or form the basis for measures of effective fishing effort and used in fishery analyses including stock assessment and resource management.
52. CWP developed the STATLANT system of questionnaires to report fishing effort statistics at three main levels of precision (i.e. levels of granularity). These levels were referred to as categories A, B and C and were initially defined as follows:
  - Category A referred to detailed units of measure (e.g. hours fished or number of sets)
  - Category B referred to the number of days fished, i.e. the number of days on which fishing took place (gear-independent measure). For those fisheries in which searching is a substantial component of fishing, days in which searching occurred but no fishing took place should be included in the number of days fished.
  - Category C referred to the number of days on the fishing ground in addition to days fishing and searching (gear-independent measure); here all other days while the vessel was on the fishing ground should be indicated.
53. The t-RFMO workshop (FAO, 2019b) proposed combining the three STATLANT categories A, B and C into a single comprehensive list of fishing effort measures which would include the number of days fished (category B) and number of days on the fishing ground (category C). For example, the most appropriate unit of effort to use in a purse seine fishery was proposed to be a combination of multiple effort measures (e.g. number of sets together with the number of days fished and the number of hours spent searching) to provide an improved estimate of the actual effort levels. CWP-IS (2021) also highlighted the need for composite measures of fishing effort that may contain more than one fishing effort measure such as the use of combined measures for purse seine fishing operations (e.g. number of sets + days fished + days searching). The t-RFMO workshop also considered the need for more detailed measures applicable to the fishing modes for purse seine (e.g. fishing on free-swimming schools, fishing on schools associated with floating objects).
54. TG-effort proposes that the STATLANT categories above be re-cast based on the revised fishing effort concepts and the levels of detail/granularity required and/or capacities (e.g. in small scale fisheries) in reporting statistics, as follows:
  - Measures A primarily associated with a fishing operation
  - Measures B primarily associated with a métier
  - Measures C primarily associated with a fishing trip.

Further consideration of standard measures of fishing effort in STATLANT questionnaires and the proposal from the t-RFMO workshop is elaborated in Section 4.

#### 4. Further development of standard measures of fishing effort

55. TG-effort considered a generic approach to the t-RFMO workshop proposal to combine the three STATLANT categories such that fishing effort for each type of fishing gear and/or fishing mode would be defined by a detailed standard measure(s) of fishing effort (category A) + measure(s) from category B + measure(s) from category C. The detailed standard measure(s) would be primarily associated with a fishing operation and several detailed measures may be needed depending on the type of gear used in each operation, the number of gear sub-units deployed where applicable (e.g. number of hooks, net panels, refer paragraph 57 below) and fishing mode. The selection of detailed measures would also need to reflect the reporting requirements for, or availability of, data in each fishery or sub-fishery. Importantly, each individual standard measure in a combined measure would be reported separately (i.e. as disaggregated data) in the STATLANT questionnaires.
56. TG-effort proposes that the existing CWP standard measures of fishing effort be replaced by combined standard measures based on the following generic approach:

**Combined standard measure of fishing effort =**

- Measure(s) primarily associated with a fishing operation (Measures A)
- + Measure(s) primarily associated with a métier (Measures B)
- + Measure(s) primarily associated with a fishing trip (Measures C)

57. TG-effort reviewed and further developed gear-specific combined standard measures of fishing effort for all ISSCFG gear categories. Most of these measures apply to the operation of individual fishing gear units such as a single trawl, longline or purse seine, however some measures apply to fishing gear sub-units such as the number of 100m panels in a driftnet or the number of hooks set on a longline. Generic measures were also developed so as to include all fishing gear types (e.g. number of fishing operations, number of gear sub-units deployed, number of gear.hours fished).
58. TG-effort also proposes to use the fishing modes identified by the t-RFMO workshop for purse seine ([paragraph 38](#)):
- fishing on free-swimming schools (i.e. schools not associated with floating objects)
  - fishing on schools associated with floating objects (e.g. FADs, logs).

In addition, TG-effort proposes including the following fishing modes for sport/recreational fishing (refer [paragraph 40](#)):

- fishing from shore (e.g. beach, bank, bridge, pier, dock, causeway, seawall)
  - fishing from a private boat or uncrewed (bareboat) rental boat
  - fishing from a crewed charter boat or headboat.
59. TG-effort proposes a revised list of standard measures of fishing effort and definitions which includes all ISSCFG gear categories, fishing modes and fishery sectors ([Table 1](#)). This list is based on measures and definitions which have been used by the CWP and in the STATLANT

questionnaires (refer [CWP-IS/2021/2](#) Appendix 3). Various edits and additional definitions are proposed to facilitate the broader application of standard measures to all fisheries and fishing sectors. In doing so, consideration was given to any proposed change to a measure and its definition which may have a consequential change to its intended application and the compilation of effort statistics. The standard measures in Table 1 are grouped under the proposed revised STATLANT categories, i.e. Measures A, B and C ([paragraph 54](#)). **Proposed edits and additional definitions for standard measures are shown in Table 1 in bold (new text) and strikethrough (deletions).**

60. TG-effort also proposes a matrix of combined standard measures of fishing effort by ISSCFG gear categories and fishing modes ([Table 2](#)). This matrix also integrates the t-RFMO proposal (FAO, 2019b). The standard measures in this matrix (Table 2) are grouped under the revised measure categories A, B and C. Where a combined standard measures apply to all sub-categories within a major ISSCFG gear category, these measures have been identified in Table 2 as applying to ‘all sub-categories’. For simplicity in displaying the matrix, each standard measure of effort was coded using the revised measure categories as a prefix (refer to the caption in Table 2).
61. The level of granularity required for reporting the standard measures listed in Tables 1 and 2 will be determined by the [CWP standard for reference harmonization](#) and specified dimensions of the data structure where each measure is reported.

## 5. Development of new fishing effort measures using emerging technologies

62. While electro-optical (EO) visible imagery has been readily available from a growing number of sources since LandSat was launched in 1972 by NASA and NOAA, and is well understood by most law enforcement and regulatory agencies, use of this technique in fishing effort estimation is a recent application. Recent research in this area has focused on newer and emerging remote sensing technologies (Anon, 2021). Emerging technologies such as satellite-based Automatic Identification System (AIS), Visible Infrared Imaging Radiometer Suite (VIIRS) and Synthetic Aperture Radar systems (SAR) can provide opportunities to:
- Validate existing measures of effort or provide improved estimates of these measures
  - Provide advanced technologies for enhanced safety-at-sea including search and rescue and minimizing vessel collisions (AIS, VMS)
  - Provide new technologies in addition to AIS and VMS, such as VIIRS for use in monitoring fishing as well as illegal, unregulated and unreported fishing (IUU) activities
  - Provide tools to track compliance in fishery closures and/or closed areas
  - Provide tools for forecasting vessel interactions and probability of fatal encounters with at risk marine mammal populations (remotely sensed data and information RSDI)<sup>10</sup>
  - Support the development and application of new measures of effort which may be integrated with existing measures defined by CWP.

<sup>10</sup> Earth Observations Can Enable Cost-Effective Conservation of Eastern North Pacific Blue Whales <https://appliedsciences.nasa.gov/our-impact/story/monitoring-whales-and-ships-satellites-could-save-millions-dollars>

63. For example, a pilot study by Taconet *et al.* (2019) demonstrated the use of AIS tracks from industrial fishing vessels to provide estimates of fishing activity and effort in near real time. A global database of AIS data from fishing vessels reported for 2017 indicated these data tracked the majority of the world's large fishing vessels (above 24m LOA) especially those from upper and middle-income countries and territories, distant water fleets and vessels operating on the high seas. AIS performed less well on smaller vessels as only a small fraction of vessels under 24m, which account for the vast majority of fishing vessels globally, used AIS. Of the 60000 vessels reported in the data, some 22000 vessels were matched to publicly available vessel registries. Classification algorithms performed well at classifying the most common fishing gears used among large vessels such as longlines, trawls and purse seines. The algorithms did less well at differentiating gears commonly used by small coastal vessels, such as set gillnets, trolling lines, pots and traps. Algorithms assigned only single gear categories which limited the ability to classify the type of fishing when vessels switched gears during, or between, fishing trips. Catch reconstruction generally indicated that areas with high catch also recorded high activity by vessels with AIS. The authors concluded that the study helped improve AIS methods and align AIS-based metrics (e.g. fleet capacity, active fleet, fishing presence, fishing vessel activity, fishing intensity and fishing effort) with fishery statistical standards.
64. Other advanced technologies include exploring the potential of SAR and VIIRS to quantify the movements and activities of fishing vessels (e.g. [Global Fishing Watch](#) ). SAR combines the technology of AIS and/or VMS with use of high-resolution radar images. SAR provides high-resolution data for wide ocean area surveillance under all weather conditions. The intrinsic capability of this instrument is to provide a quick view of the oceanic surface features such as vessels, waves and currents, oil spills, laver aquaculture facilities and wind fields (Chaturvedi 2019). Stimson (1983) provided detailed background on SAR and its early use in: 1) Sea and ice monitoring, 2) Oil pollution and environment monitoring, 3) Vessel monitoring and surveillance, 4) Snow and sea ice monitoring, 5) Classification of earth terrain, 6) Wave spectra and significant wave height measurements, and 7) Marine laver cultivation monitoring.
65. Previously, Krumme *et al.* (2013) and Al-Abdulrazzah and Pauly (2014) described the use of satellite images to enumerate fixed fishing gear. Krumme *et al.* (2015) extended that work further describing the use of SAR in combination with aerial photos to characterize artisanal fishing gear metrics providing added levels of resolution needed to quantify gear specific catchability. Specifically, these tools enabled researchers and managers to better monitor/track the spatial and temporal distribution of large tidal weirs in areas not routinely sampled, in vast and remote areas of the Amazonia. This study also highlighted the use of SAR in surveillance operations.
66. TG-effort noted that any new measures of fishing effort derived from emerging technologies and intended for use by CWP need to be based on readily available, low-cost data. TG-effort noted that emerging technologies are evolving rapidly and data which may have limited or restricted availability today may become readily available/public domain in the near future. Further, certain technologies such as AIS are limited to vessels fitted with AIS transponders and are therefore only applicable to specific fishery sectors (e.g. mainly industrial fleets).
67. TG-effort noted that emerging technologies may allow further development of existing measures of fishing effort as well as use of new measures, including those listed below:

Existing measures

- Number of vessels, days and hours fished in an area of interest
- Identification and quantification of the spatial extent of fishing modes and fishing operations
- Identification and quantification of fishing trips, including departure and arrival locations and transshipments
- Identification and quantification of loss in fishing grounds and fishery habitats
- Identification and quantification of fishery sectors, fishing fleets and sub-units and fleet including vessel behaviors and interactions within or between fleets and sectors

New measures

- Intensity of fishing activities and operations (e.g. hours fished per km<sup>2</sup>)
- Active fleet as a nominal effort measure of the size of the fleet that is active in a given water area over a given time period
- Fishing presence as a measure of the presence or absence of fishing vessel activity or fishing operations in a given area and given time frame.

68. TG-effort recognized that the implementation of new measures may require the development of methodologies and/or capacity building which, in turn, may incur funding considerations.

**6. Items for consideration at CWP-27**

69. CWP-27 is kindly requested to review the work of TG-effort and endorse the following proposals or provide guidance where further consideration may be required:

- Revision and further development of fishing effort concepts
  - Endorse the revised fishing effort concepts and definitions
    - Fisher ([paragraph 9](#))
    - Fishing vessel and fishery-support vessel (paragraphs [15](#) and [16](#))
    - Fishing ground ([paragraph 22](#))
    - Fishing trip ([paragraph 29](#))
    - Fishing gear ([paragraph 32](#))
    - Searching ([paragraph 35](#))
    - Fishing operation ([paragraph 37](#))
    - Fishing mode ([paragraph 42](#))
    - Métier ([paragraph 45](#))
  - Endorse the fishing effort concept diagram ([Figure 1](#))
  - Endorse subsequent revision and update of the CWP Handbook
- Revision and further development of standard measures of fishing effort
  - Endorse the revised STATLANT categories (A, B, C) based on revised fishing effort concepts and levels of detail/granularity required and/or capacities in reporting statistics (paragraphs [54](#) and [61](#)).
  - Endorse the revised measures and definitions ([Table 1](#))
  - Endorse the use of combined standard measures A+B+C ([paragraph 56](#))

- Endorse the implementation of standard measures by ISSCFG gear category and fishing mode ([Table 2](#))
- Endorse subsequent revision and update of the CWP Handbook
  
- Development of new or improved fishing effort measures using emerging technologies
  - Acknowledge possible improvements to existing measures and development of new measures ([paragraph 67](#)) noting that possible increases in capacities to implement would likely require increases in resources
  
- STATLANT questionnaires
  - Endorse the implementation of agreed fishing effort concepts and combined standard measures in the STATLANT questionnaires.

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**Table 1: Proposed list of standard measures of fishing effort.** Standard measures and definitions are based on the work of CWP and others (refer [CWP-IS/2021/2](#) Appendix 3) and edits and additions (shown in **bold** and ~~struck through~~, refer [paragraph 59](#)) are proposed to facilitate the broader application of standard measures across all fishery sectors and fishing modes. The measures are grouped under the revised measure categories A, B and C ([paragraph 54](#)) and the level of granularity required for each measure will be determined by the relevant CWP data structure where the measure is reported ([paragraph 61](#)).

<b>Standard measure of fishing effort</b>	<b>Definition</b>								
<b>Category A (primarily associated with fishing operations)</b>									
Number of <del>sets</del> <b>fishing operations</b>	<b>Total number of times the each fishing gear type has been operated set or shot (e.g. set, cast, shot or deployed) during the reporting period, whether or not a catch was made (unit: count). (CWP synonyms: number of sets, number of casts).</b>								
Number of <del>effort units</del> <b>gear sub-units deployed</b>	<p><b>Total number of gear sub-units deployed (or set, cast, shot) for each fishing gear type operated during the reporting period, whether or not a catch was made. This measure only applies to gear types which are constructed from repeated sub-units as follows<sup>11</sup>:</b></p> <table border="1" data-bbox="560 1037 1267 1263"> <thead> <tr> <th><b>Fishing gear</b></th> <th><b>Gear sub-unit</b></th> </tr> </thead> <tbody> <tr> <td><b>Gillnets and entangling nets</b></td> <td><b>100-meter net panel</b></td> </tr> <tr> <td><b>Pot lines</b></td> <td><b>Pot</b></td> </tr> <tr> <td><b>Hooks and lines</b></td> <td><b>Hook</b></td> </tr> </tbody> </table> <p><b>(unit: count). (CWP synonyms: number of effort units, number of hooks).</b></p>	<b>Fishing gear</b>	<b>Gear sub-unit</b>	<b>Gillnets and entangling nets</b>	<b>100-meter net panel</b>	<b>Pot lines</b>	<b>Pot</b>	<b>Hooks and lines</b>	<b>Hook</b>
<b>Fishing gear</b>	<b>Gear sub-unit</b>								
<b>Gillnets and entangling nets</b>	<b>100-meter net panel</b>								
<b>Pot lines</b>	<b>Pot</b>								
<b>Hooks and lines</b>	<b>Hook</b>								
Number of <del>gear</del> <b>hours fished</b>	<b>Total number of hours each fishing gear type was in the water and fishing during the reporting period, whether or not a catch was made. (unit: gear.hour).</b>								
Number of <del>line days</del> <b>gear.days fished</b>	<b>Total number of days (24-hour periods, reckoned from midnight to midnight) each fishing gear type was in the water and fishing during the reporting period, whether or not a catch was made. (unit: gear.day).</b>								
Number of hours searching	<b>Total number of hours during the reporting period spent investigating a location for the presence of fish, other aquatic organisms or their habitat using visual or electronic methods or remote technology during the reporting period. (unit: hour).</b>								

...continued

<sup>11</sup> These gear sub-units are aligned with, and expand on, the t-RFMO proposal in Table 2 of the 2019 [workshop report](#).

<b>Category B (primarily associated with métiers)</b>	
Number of days on a fishing ground	<b>Total</b> number of days (24-hour periods, reckoned from midnight to midnight) <b>when a fisher or</b> <del>in which a fishing vessel was on the a</del> fishing ground <b>practicing a métier, including</b> <del>and includes in</del> <b>addition to the days when fishing operations were conducted, and days searching and also all the other days when while the fisher or</b> vessel was on the <b>fishing ground</b> (e.g. days steaming, hove to, at anchor). <b>(unit: day).</b>
<b>Category C (primarily associated with fishing trips)</b>	
Number of fishing trips made	<b>Total number of fishing trips made during the reporting period. (unit: count).</b> Any voyage during which fishing took place in only one fishing area is to be counted as one trip. When in a single trip craft visits more than one fishing area, an appropriate fraction of the trips should be apportioned to each fishing area in proportion to the number of days spent fishing in each, so that the total number of trips for the Statistical Area as a whole will be the same as the sum of trips to each fishing area.
Number of days absent from port-base	<b>Total number of days absent from base whilst on fishing trips during the reporting period.</b> The number of days absent on any one trip should include the day <b>the fisher or</b> fishing vessel departed but not the day of landing. Where it is known that fishing <b>operations</b> took place on each day of the trip, the number of “days absent from <b>base port</b> ” should include not only the day of departure but also the day of arrival back in port <b>return to base. (unit: day).</b> Where on any trip a fishing vessel visits more than one fishing area (as defined for statistical purposes), an appropriate fraction of the total number of days absent from port should be allocated to each fishing area in proportion to the number of days spent in each, so that the total number of days absent on the trip will be <del>to</del> the sum of the number of days allocated to all of the different fishing areas visited.
Number of days fished	<b>Total</b> number of days (24-hour periods, reckoned from midnight to midnight) <b>during the reporting period,</b> <del>on which any</del> <b>when fishing operations and/or searching</b> took place, including days when no catch was taken and days during which searching took place without fishing. <b>(unit: day).</b>
Number of fishers	<b>Total number of individual fishers involved in fishing trips made during the reporting period. (unit: count).</b>
Number of fishing vessels	<b>Total number of individual fishing vessels involved in fishing trips made during the reporting period. (unit: count).</b>

**Table 2: Proposed matrix of combined standard measures of fishing effort by ISSCFG gear categories and fishing modes.** The matrix is based on the requirements of CWP (refer [CWP-IS/2021/2](#) Appendix 3) and integrates the t-RFMO proposal (FAO, 2019b). Measures A, B and C are primarily associated with fishing operations, métiers and fishing trips respectively.

The standard measures of effort are defined in Table 1 and are coded in the matrix as follows:

Category A	A1: number of fishing operations A2: number of gear sub-units operated A3: number of gear.hours fished A4: number of gear.days fished A5: number of hours searching
Category B	B1: Number of days on a fishing ground
Category C	C1: number of fishing trips C2: number of days absent from base C3: number of days fished C4: number of fishers <b>OR</b> number of fishing vessels*
	* depending on the fishery sector and whether or not fishing vessels are used

The code list for fishing modes in the matrix is as follows:

Code	Name	Description
ALL	All modes	All modes combined or not specified (ALL*: all modes nei)
FREE	Free	Fishing on free-swimming schools not associated with floating objects
ASSO	Associated	Fishing on schools associated with floating objects
REC	Sport and recreational	Sport/recreational modes (combined)
DIVE	Diving	Fishing with one or more divers

### Matrix of standard measures of fishing effort by ISSCFG gear categories and fishing modes

Fishing gear category (ISSCFG, 2016)	Fishing mode	Standard measure of fishing effort											
		A1	A2	A3	A4	A5		B1		C1	C2	C3	C4
<b>SURROUNDING NETS</b>													
Purse seines	FREE	X		X		X		X		X	X	X	X
	ASSO	X		X		X		X		X	X	X	X
Surrounding nets without purse lines	ALL	X		X		X		X		X	X	X	X
Surrounding nets (nei)	ALL	X		X		X		X		X	X	X	X
<i>note - all ISSCFG sub-categories are listed above</i>													
<b>SEINE NETS</b>													
All sub-categories	REC	X			X					X			X
	ALL*	X		X		X		X		X	X	X	X
<i>note - ISSCFG sub-categories are: Beach seines, Boat seines, Seine nets (nei)</i>													

...continued

Fishing gear category (ISSCFG, 2016)	Fishing mode	Standard measure of fishing effort											
		A1	A2	A3	A4	A5		B1		C1	C2	C3	C4
<b>TRAWLS</b>													
All sub-categories	ALL	X		X		X		X		X	X	X	X
<i>note - ISSCFG sub-categories are: Beam trawls, Single boat bottom otter trawls, Twin bottom otter trawls, Multiple bottom otter trawls, Bottom pair trawls, Bottom trawls (nei), Single boat midwater otter trawls, Midwater pair trawls, Midwater trawls (nei), Semi-pelagic trawls, Trawls (nei)</i>													
<b>DREDGES</b>													
All sub-categories	REC	X			X					X			X
	ALL*	X		X		X		X		X	X	X	X
<i>note - ISSCFG sub-categories are: Towed dredges, Hand dredges, Mechanized dredges, Dredges (nei)</i>													
<b>LIFT NETS</b>													
All sub-categories	REC	X			X					X			X
	ALL*	X		X				X		X	X	X	X
<i>note - ISSCFG sub-categories are: Portable lift nets, Boat-operated lift nets, Shore-operated stationary lift nets, Lift nets (nei)</i>													
<b>FALLING GEAR</b>													
All sub-categories	REC	X			X					X			X
	ALL*	X						X		X	X	X	X
<i>note - ISSCFG sub-categories are: Cast nets, Cover pots/Lantern nets, Falling gear (nei)</i>													
<b>GILLNETS AND ENTANGLING NETS</b>													
All sub-categories	REC	X			X					X			X
	ALL*	X	X	X		X		X		X	X	X	X
<i>note - ISSCFG sub-categories are: Set gillnets (anchored), Drift gillnets, Encircling gillnets, Fixed gillnets (on stakes), Trammel nets, Combined gillnets-trammel nets, Gillnets and entangling nets (nei)</i>													
<b>TRAPS</b>													
All sub-categories	REC	X			X					X			X
	ALL*	X	X	X		X		X		X	X	X	X
<i>note - ISSCFG categories are: Stationary uncovered pound nets, Pots, Fyke nets, Stow nets, Barriers fences weirs etc., Aerial traps, Traps (nei)</i>													
<b>HOOKS AND LINES</b>													
All sub-categories	REC	X			X					X			X
	ALL*	X	X		X	X		X		X	X	X	X
<i>note - ISSCFG sub-categories are: Handlines and hand-operated pole-and-lines, Mechanized lines and pole-and-lines, Set longlines, Drifting longlines, Longlines (nei), Vertical lines, Trolling lines, Hooks and lines (nei)</i>													
<b>MISCELLANEOUS Gear</b>													
All sub-categories	REC	X			X					X			X
	DIVE	X			X					X			X
	ALL*	X		X		X		X		X	X	X	X
<i>note - ISSCFG categories are: Harpoons, Hand implements, Pumps, Electric fishing, Pushnets Scoopnets, Drive-in nets, Diving, Gear (nei)</i>													

## Appendix 1: TG-effort objectives, tasks and timeframe

The objectives of TG-effort were 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 STATLANT questionnaires
- Review, further develop and define standard measures of effort for the categories of fishing gear in ISSCFG taking account of emerging remote-sensing technologies and opportunities to develop new measures of effort.

Proposed tasks and timeframe for the work of TG-effort are outlined below.

Task		Timeframe
0.	Develop draft ToRs and work plan in consultation with TG Convener and circulate to members for validation. Call for TG participants 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 CWP-IS
7.	Present advanced version of revised fishing effort concepts and definitions at the CWP intersessional meeting (IS)	CWP-IS
8.	Consider further developments including intersessional meeting feedback and enlarging the scope of contributions to other CWP parties	Post CWP-IS
9.	Incorporate relevant outputs of TG-catch and TG-RH2	Post CWP-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

**Appendix 2: List of TG-effort participants including participants at joint-TG meetings**

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