Development of fishing effort concepts and measures

Prepared for 27th CWP Intersession Meeting

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

Nancie Cummings & David Ramm

Related to: Agenda item 5.3 (document CWP-IS/2022/2)
Content

Review

• Background TG-effort objectives, ToRs, timeframe, and workplan
• CWP historical fishing effort concepts and definitions (ToR 1)
• STATLANT QUESTIONNAIRES
  • CWP use of fishing effort
  • Nominal and effective effort and application
• CWP historical fishing effort concepts and definitions (again)

New since CWP IS/2021 (November 2021)

• Further development of fishing effort concepts (ToR 2)
• Diagrammatic presentation of fishing effort concepts with definitions and relationships
• TG-Effort (ToR 3) revisions and further development of fishing effort measures
• Development of new fishing effort measures in context of emerging technologies
CWP Task Group TG-Effort: Objectives, tasks and timeframe


- Five ad-hoc task groups (TGs) established by CWP-26 to progress work during the 2019-2022 intersessional period (CWP, 2019).
  - Membership 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 related to capture fisheries:
    - Fishing effort concepts (TG-effort)
    - Catch concepts (TG-catch)
    - Reference harmonization standard (TG-RH2).

Objectives: TG-Effort

- 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.
TG-Effort work (organization/group roles, work approach)

**TG Members**

- **Conveners:** Ms. Nancie Cummings and Mr. David Ramm
- **Membership:** 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.

**Member roles:**

- TG members 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 and sharing feedback to conveners and all members

**Work approach:**

Conveners carry out review of historical fishing effort concepts and definitions of fishing effort measures

*Share with TG-effort* via online google document ([Development of CWP fishing effort concepts and measures]), Propose revisions and seek inputs from members by email and shared document, **prepare draft reports** for IS review
**TG-effort work:**  
**Proposed tasks, Terms of Reference, and Timeframe**

<table>
<thead>
<tr>
<th>ToR</th>
<th>Task</th>
<th>Timeframe</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.</td>
<td>Develop draft ToRs and work plan in consultation with TG Convener and</td>
<td>Feb 2021</td>
<td>21 April 2021</td>
</tr>
<tr>
<td></td>
<td>circulate to members for validation. Call for TG participations and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>their contact details.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Finalize ToRs and establish TG membership</td>
<td>March 2021</td>
<td>July 2021</td>
</tr>
<tr>
<td>2.</td>
<td>Review, revise and where necessary further develop the CWP fishing</td>
<td>July/August 2021, 6-</td>
<td>Completed</td>
</tr>
<tr>
<td></td>
<td>effort concepts and associated diagram(s) and definitions including</td>
<td>July joint meeting</td>
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<tr>
<td></td>
<td>measures of nominal and standard effort, and elaborate their use in</td>
<td>catch/effort TGs</td>
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<td></td>
<td>informing STATLANT questionnaires</td>
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<tr>
<td>3</td>
<td>Concurrently with 2, review, further develop and define standard</td>
<td>July/August 2021</td>
<td>Completed</td>
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<tr>
<td></td>
<td>measures of effort for the categories of fishing gear in ISSCFG,</td>
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<td></td>
<td>taking account of opportunities for new measures based on emerging</td>
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<td></td>
<td>technologies such as AIS, SAR and VIIRS, and artisanal fisheries</td>
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<tr>
<td>4.</td>
<td>Circulate first draft of the revised fishing effort concepts and</td>
<td>September 2021</td>
<td>Completed</td>
</tr>
<tr>
<td></td>
<td>definitions</td>
<td></td>
<td></td>
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<tr>
<td>5.</td>
<td>Consider further development to the fishing effort concepts</td>
<td>Prior to CWP Intersessional</td>
<td>Ongoing</td>
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<tr>
<td></td>
<td></td>
<td>meeting (IS)</td>
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<tr>
<td>6.</td>
<td>Concurrently with 5, consider implications of the revised fishing</td>
<td>Prior to IS</td>
<td>TBD-at 28th CWP</td>
</tr>
<tr>
<td></td>
<td>effort concepts and definitions in the work of TG-catch and TG-RH2</td>
<td></td>
<td>IS Fisheries</td>
</tr>
<tr>
<td></td>
<td>and, if needed, convene a virtual joint-TG meeting</td>
<td></td>
<td>Subject meeting</td>
</tr>
<tr>
<td>7.</td>
<td>Present advanced version of revised fishing effort concepts and</td>
<td>TBD-at 28th CWP IS Fisheries</td>
<td></td>
</tr>
<tr>
<td></td>
<td>definitions at the CWP intersessional meeting (IS)</td>
<td>Subject meeting</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Consider further developments including intersessional meeting</td>
<td>Post IS</td>
<td></td>
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<tr>
<td></td>
<td>feedback and enlarging the scope of contributions to other CWP parties</td>
<td></td>
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<tr>
<td>9.</td>
<td>Incorporate relevant outputs of TG-catch and TG-RH2</td>
<td>Post IS</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Present final version of the revised fishing effort concepts,</td>
<td>By mid-2022</td>
<td></td>
</tr>
<tr>
<td></td>
<td>diagram(s) and definitions to CWP-27 for consideration and, if</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>possible, adoption</td>
<td></td>
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</tbody>
</table>
Intersessional progress to CWP-IS-2021 by TG-effort

- **Initiated 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 in July 2021.

- **Developed fishing effort concepts** (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.

- **CWP-IS-2021** agreed the following points:
  - Further consider the overall objective of the work
  - Further consider the types and definitions of fishing effort concepts and applications across all fishery sectors (i.e. industrial, small-scale/artisanal, sport/recreational)
  - Further consider the proposals from the t-RFMO workshop (FAO, 2019b)
  - Consider and further develop effort measures in the context of their intended use
  - Identify new efforts measures arising from emerging technologies and which are feasible/practical to implement with available tools
  - Convene another online meeting to progress its work
Intersessional progress since CWP-IS-2021 (November 2021)

• Continued work toward TG-effort overall objective, i.e. 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.

• This involved further development of fishing effort concepts and standard measures

• Reporting progress in CWP-IS/2022/2

• Highlights and main points for discussion presented here
Further development of fishing effort concepts

• 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
Fishing effort concepts and diagram (Fig.1, CWP-IS/2022/2)

**Fisher**
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.

**Fishing trip**
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 transferment or landing, and where a base is a designated port or other geographic location.

**Fishing vessel**
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).

**Métier**
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.

**Target species**

**Fishing mode**
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.

**Fishing gear**
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 (ISSCG).

**Fishing operation**
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.

**Searching (for fish)**
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.

**Catch Concepts**

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**Concepts**
- Fisher
- Fishing trip
- Fishing vessel
- Métier
- Target species
- Fishing mode
- Fishing gear
- Fishing operation
- Searching (for fish)

**Definitions**
- Fisher: Individual engaging in fishing activities.
- Fishing trip: Voyage for fishing.
- Fishing vessel: Craft for fishing.
- Métier: Sub-unit within a fishery.
- Target species: Dominant species caught.
- Fishing mode: Method of fishing.
- Fishing gear: Equipment for capture.
- Fishing operation: Routine tasks.

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**Related Concepts**
- Fishing effort
- Catch

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**Optional**
Proposed Standard measures of fishing effort

- **Re-casting** the STATLANT categories 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

  - **Measures A** primarily associated with a fishing operation
  
  - **Measures B** primarily associated with a métier
  
  - **Measures C** primarily associated with a fishing trip.

- **Replacing** the existing CWP standard measures of fishing effort by combined standard measures using a generic approach (based on the proposal from t-RFMO workshop, 2019)

  - **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)
### Proposed Standard measures of fishing effort (Table 1)

<table>
<thead>
<tr>
<th>Category (granularity)</th>
<th>Standard measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category A (primarily associated with fishing operations)</td>
<td>Number of fishing operations</td>
</tr>
<tr>
<td></td>
<td>Number of gear sub-units deployed</td>
</tr>
<tr>
<td></td>
<td>Number of gear.hours fished</td>
</tr>
<tr>
<td></td>
<td>Number of gear.days fished</td>
</tr>
<tr>
<td></td>
<td>Number of hours searching</td>
</tr>
<tr>
<td>Category B (primarily associated with métiers)</td>
<td>Number of days on a fishing ground</td>
</tr>
<tr>
<td>Category C (primarily associated with fishing trips)</td>
<td>Number of fishing trips</td>
</tr>
<tr>
<td></td>
<td>Number of days absent from base</td>
</tr>
<tr>
<td></td>
<td>Number of days fished</td>
</tr>
<tr>
<td></td>
<td>Number of fishers</td>
</tr>
<tr>
<td></td>
<td>Number of fishing vessels</td>
</tr>
</tbody>
</table>
## Combined standard measures of fishing effort by ISSCFG gear categories and fishing modes (Table 2)

<table>
<thead>
<tr>
<th>Fishing gear category (ISSCFG, 2016)</th>
<th>Fishing mode</th>
<th>Standard measure of fishing effort</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A1</td>
</tr>
<tr>
<td><strong>SURROUNDING NETS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purse seines</td>
<td>FREE</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ASSO</td>
<td>X</td>
</tr>
<tr>
<td>Surrounding nets without purse lines</td>
<td>ALL</td>
<td>X</td>
</tr>
<tr>
<td>Surrounding nets (nei)</td>
<td>ALL</td>
<td>X</td>
</tr>
</tbody>
</table>

*note - all ISSCFG sub-categories are listed above*

| SEINE NETS                          |              |    |    |    |    |    |    |    |    |    |    |
| All sub-categories                  | REC          | X  | X  |    |    | X  | X  |    |    |    |    |
|                                    | ALL*         | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  |

*note - ISSCFG sub-categories are: Beach seines, Boat seines, Seine nets (nei)*

**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 OR number of fishing vessels*  
  * depending on the fishery sector and whether or not fishing vessels are used

…continued
## Combined standard measures of fishing effort by ISSCFG gear categories and fishing modes (Table 2)

<table>
<thead>
<tr>
<th>Fishing gear category (ISSCFG, 2016)</th>
<th>Fishing mode</th>
<th>Standard measure of fishing effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRAWLS</td>
<td></td>
<td>A1  A2  A3  A4  A5  B1  C1  C2  C3  C4</td>
</tr>
<tr>
<td>All sub-categories</td>
<td>ALL</td>
<td>X    X    X    X    X    X    X    X    X</td>
</tr>
<tr>
<td></td>
<td>ALL*</td>
<td>X    X    X    X    X    X    X    X    X</td>
</tr>
<tr>
<td>note - ISSCFG sub-categories are: Beam trawls, Single boat bottom trawl, Trawl bottom trawls, Multiple bottom trawls, Bottom pair trawls, Bottom trawls (net), Single boat midwater trawls (net), Midwater trawl (net), Semi-pelagic trawls, Trawls (net)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DREDGES</td>
<td></td>
<td>REC  X    X    X    X    X    X    X    X    X</td>
</tr>
<tr>
<td>All sub-categories</td>
<td>REC</td>
<td>X    X    X    X    X    X    X    X    X</td>
</tr>
<tr>
<td></td>
<td>ALL*</td>
<td>X    X    X    X    X    X    X    X    X</td>
</tr>
<tr>
<td>note - ISSCFG sub-categories are: Towed dredges, Hand dredges, Mechanised dredges, Dredges (net)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIFT NETS</td>
<td></td>
<td>REC  X    X    X    X    X    X    X    X    X</td>
</tr>
<tr>
<td>All sub-categories</td>
<td>REC</td>
<td>X    X    X    X    X    X    X    X    X</td>
</tr>
<tr>
<td></td>
<td>ALL*</td>
<td>X    X    X    X    X    X    X    X    X</td>
</tr>
<tr>
<td>note - ISSCFG sub-categories are: Portable lift nets, Boat-operated lift nets, Shore-operated stationary lift nets, Lift nets (net)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FALLING GEAR</td>
<td></td>
<td>REC  X    X    X    X    X    X    X    X    X</td>
</tr>
<tr>
<td>All sub-categories</td>
<td>REC</td>
<td>X    X    X    X    X    X    X    X    X</td>
</tr>
<tr>
<td></td>
<td>ALL*</td>
<td>X    X    X    X    X    X    X    X    X</td>
</tr>
<tr>
<td>note - ISSCFG sub-categories are: Cast nets, Cover pots/Lantern nets, Falling gear (net)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gillnets and Entangling nets</td>
<td></td>
<td>REC  X    X    X    X    X    X    X</td>
</tr>
<tr>
<td>All sub-categories</td>
<td>REC</td>
<td>X    X    X    X    X    X    X</td>
</tr>
<tr>
<td></td>
<td>ALL*</td>
<td>X    X    X    X    X    X    X</td>
</tr>
<tr>
<td>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 (net)</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Fishing gear category (ISSCFG, 2016)</th>
<th>Fishing mode</th>
<th>Standard measure of fishing effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRAPS</td>
<td></td>
<td>A1  A2  A3  A4  A5  B1  C1  C2  C3  C4</td>
</tr>
<tr>
<td>All sub-categories</td>
<td>REC</td>
<td>X    X    X    X    X    X    X    X    X</td>
</tr>
<tr>
<td></td>
<td>ALL*</td>
<td>X    X    X    X    X    X    X    X    X</td>
</tr>
<tr>
<td>note - ISSCFG categories are: Stationary uncovered pound nets, Pots, Fyke nets, Slow nets, Barriers fences weirs etc., Aerial traps, Trawls (net)</td>
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<td></td>
</tr>
<tr>
<td>HOOKS AND LINES</td>
<td></td>
<td>REC  X    X    X    X    X    X    X    X    X</td>
</tr>
<tr>
<td>All sub-categories</td>
<td>REC</td>
<td>X    X    X    X    X    X    X    X    X</td>
</tr>
<tr>
<td></td>
<td>ALL*</td>
<td>X    X    X    X    X    X    X    X    X</td>
</tr>
<tr>
<td>note - ISSCFG sub-categories are: P hindlines and hand-operated pole-and-lines, Mechanised lines and pole-and-lines, Set longlines, Drifting longlines, Longlines (net), Vertical lines, Trolling lines, Hooks and lines (net)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MISCELLANEOUS Gear</td>
<td></td>
<td>REC  X    X    X    X    X    X    X</td>
</tr>
<tr>
<td>All sub-categories</td>
<td>REC</td>
<td>X    X    X    X    X    X    X</td>
</tr>
<tr>
<td></td>
<td>ALL*</td>
<td>X    X    X    X    X    X    X</td>
</tr>
<tr>
<td>note - ISSCFG categories are: Harpoons, Hand implements, Pumps, Electric fishing, Pushnets Scoopnets, Drive-In nets, Diving, Gear (net)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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 vessels OR number of fishing vessels*  
* depending on the fishery sector and whether or not fishing vessels are used
Development of fishing effort measures in context of emerging technologies

Emerging technologies (e.g., satellite-based Automatic Identification System (AIS), Synthetic Aperture Radar Systems (SARS) and Visible Infrared Imaging Radiometer Suite (VIIRS) may 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)
- **Support the development and application of new measures** of effort which may be integrated with existing measures defined by CWP.
Value added benefits: Development of fishing effort measures in context of emerging technologies

RECOGNIZING: Emerging technologies may allow further development of measures of fishing effort (e.g.,)

**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 transhipments
- 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 km²)
- **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.
Items for consideration at CWP-27

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 measures in the STATLANT questionnaires.
Next Steps

• Request CWP consider progress since IS (November 2021) in context of ToRs
• Request CWP endorse revised concepts and effort measures definitions previous slide
• Request CWP indicate further work needed and calendar for new work from TG-effort
Thank you • Merci
Благодарю • ¡Muchas gracias!
謝謝 • شكرا

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