

WCPFC Interim EM Standards:

Appendix 1: Terms and Definitions

Ancillary Logs - Data records from the EM system that are supplemental to the EM Records, such as a record of changes in system configurations and settings and a summary of system health checks performed.

Artificial Intelligence (AI) – A machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations or decisions influencing real or virtual environments. Artificial intelligence systems use machine and human-based inputs to (A) perceive real and virtual environments; (B) abstract such perceptions into models through analysis in an automated manner; and (C) use model inference to formulate options for information or action.

Control Centre - The EM control centre is a computer and software system that records and stores information from EM System components (e.g., video, sensor data, GPS data, system log data) and also controls the operation of onboard EM system components.

Data Review Centre (DRC) - A facility or entity with supporting software platform(s) used to analyse EM records and generate EM data. This could be a standalone facility or a designated space within the premises of the fisheries administration.

Designated Installer or Service Technician - A person or entity authorised by an EM Service Provider to install or service an EM System.

EM Analyst - A person qualified by the appropriate EM Program provider to analyse EM records and generate EM data in accordance with the EM standard and analysis procedures.

EM Analysis - See EM Records Analysis/Interpretation.

EM Analysis Rate - The proportion of EM records that are analysed to generate EM data.

EM audit requirements - the WCPFC agreed standards and procedures to be followed by an EM program in order to support the WCPFC agreed audit and assurance process. The requirements may include standards on processes such as EM record and EM data retention.

EM Certifier - An individual or organisation which has been approved by the appropriate authority to inspect and approve EM systems for use.

EM Coverage - The proportion of fishing effort (sets or trips) that is analysed through EM, calculated by multiplying the EM Installation coverage by the EM analysis rate].

EM Data - Data generated through analysis of EM records.

EM data requirements – the WCPFC agreed minimum data fields with associated data standards that must be generated from EM records and ancillary logs.

EM Installation Coverage - The proportion of vessels or fishing effort that have operational EM system installed and are recorded by the EM Program to collect EM Records to meet the EM Data Requirements.

EM Program - A CCM or regional program responsible for managing the use of EM systems to independently collect and generate fisheries data and information. This is different to the WCPFC EM Program.

EM Records - Footage (still images and video) and sensor data (if applicable) recorded by an EM System that can be analysed to generate EM Data to meet the EM Data Requirements. Sensors may include any number of sensors (e.g., hydraulic sensors) that are part of the EM equipment and whose data is recorded on the vessel as part of the EM system.

EM Records Analysis - The process of an EM Analyst reviewing EM records to generate EM Data.

EM Service Provider - A provider of EM technical and logistical services. An EM Program may have multiple EM Service Providers and they may provide different services within the program (e.g., onboard hardware, DRC software, DRC review services).

EM analysis software – any software used by an EM Analyst to generate EM data. This software is often provided by the EM Service Provider and can include a range of features that facilitates the efficient work of the EM Analyst.

EM System - All the vessel and shore-based components supporting the generation, storage, transmissions, analysis and reporting of EM Records.

Event - An occurrence in the EM Records that is enumerated into EM data.

Fishing - as defined in WCPFC Convention Article 2(d)

Fishing Trip – The period between either (a) a vessel's departure from port after unloading part or all of the catch to transit to a fishing area, or (b) a vessel recommences fishing operations or transits to a fishing area after transshipping part or all of the catch at sea, and the time that the vessel either (c) returns to port to unload part or all of its catch, or (d) ceases fishing operations to tranship part or all of its catch at sea.

Geolocation device - A device that is used to capture information on vessel position that can also be used to determine vessel speed and heading.

Independent - with respect to audits - no financial or current employment interest with the DRC

Regional Agency - A regional or sub-regional organisation that may support CCM national EM Programs and EM Systems.

Review for Data Quality - The verification process of re-analysing/interpreting a portion of previously analysed EM records to determine completeness, adherence to protocols, and accuracy of the EM Data produced by the EM Analyst.

Sensors - EM systems may be equipped with a variety of integrated sensors that can provide additional information on fishing activity, trigger activation or adjustment of configurations of cameras, and identify points of interest to expedite EM video review. This may include "synthetic sensors" that use camera imagery used to capture imagery of fishing activities.

Uninterruptible power supply (UPS) - Provides power to the system and enables controlled shutdown in the event of a power loss so as to preserve the security and integrity of data ¹.

User interface - A display that communicates EM system status messages and provides views of onboard cameras.

Vessel Monitoring Plan (VMP) - A document describing how an electronic monitoring system is specifically positioned and configured on a vessel (e.g. camera placement with images of camera views and types and locations of sensors) to allow effective monitoring of fishing activity and accurate generation of EM Data specified by the EM Program.

Vessel Operator - any person who is in charge of, directs or controls a vessel, charterer and master.

¹ [CMM 2014-02](#) Annex 1 (5) “ALCs fitted to fishing vessels must be protected so as to preserve the security and integrity of data referred to in para 1.”

Appendix 2: Technical EM standards

Onboard EM Systems

Onboard EM Systems comprise all vessel components supporting the acquisition of and reporting of EM Records. Onboard EM Systems MUST be configured such that they allow generation of the data fields set out in the EM data requirements. The core EM System components covered in these Specifications, Standards, and Procedures (SSPs) are: control centre, user interface, cameras, geolocation device, uninterruptible power supply, sensors, and communication system. Together, these components ensure that required information is collected, including system health status, to support fisheries management and enforcement objectives.

On-board EM System component	SSP
1. <i>Control centre</i>	<p>The EM system control centre:</p> <ol style="list-style-type: none"> a. MUST control all onboard EM hardware components. b. MUST be able to connect to the vessel's power source and sustain this power source throughout the duration of the fishing trip. c. MUST store and SHOULD transmit system health status information. d. MUST have sufficient storage capacity for all EM Records required to be generated [during a fishing trip] until EM Records are transmitted to a DRC for review. e. SHOULD have sufficient backup storage to mitigate potential data loss. f. SHOULD have unambiguous and unique identification of storage devices (e.g., barcode on hard drives). g. MUST allow EM records to be transmitted, stored or accessed securely. To secure EM records, the system SHOULD be equipped with applications such as user logins, EM record encryption and firewalls. h. MUST store all EM Records on storage devices and in formats that are compatible or can be readily translated into formats that are compatible with CCMs DRC hardware and EM review software.

On-board EM System component	SSP
<i>2. User interface</i>	<p>The onboard user interface:</p> <ul style="list-style-type: none"> a. MUST include a display on the vessel. b. MUST include software or hardware that shows EM system health status and real time images from installed cameras on the display. c. MUST allow only authorised users (e.g., EM Service Providers, EM service technicians) to adjust system configurations. d. COULD Include a keyboard, mouse, touchscreen, or other device to allow user inputs to the system.
<i>3. Cameras</i>	<ul style="list-style-type: none"> a. An EM system MUST be outfitted with cameras to capture imagery of fishing activity. b. The number and position of cameras MUST be sufficient to capture necessary imagery to allow generation of the data fields set out in the EM data requirements. c. Cameras MUST, capture imagery that meets image quality standards under typical fishing conditions that allow for an EM Analyst to generate the data fields set out in the EM data requirements. As a minimum standard²: <ul style="list-style-type: none"> 1. Frame rate MUST be no lower than 5 frames per second (fps) for any imagery requiring identification of species; and 2. Resolution MUST be no lower than 720p for any imagery requiring identification of species. d. SHOULD be capable of accommodating remote or onboard configuration of parameters to optimise camera functionality throughout a typical fishing trip; <p>Recorded imagery:</p> <ul style="list-style-type: none"> e. MUST be recorded in a widely used and accessible video or image file format, such as MP4 or JPEG, or other compression standards that are able to be viewed.

² Other camera configurations (e.g. shutter speed, bitrate etc.) may vary to balance collection of adequate footage versus storage and transmission costs

On-board EM System component	SSP
	<p>f. MUST include a timestamp, location, and vessel identification information on the video or image.</p>
<p><i>4. Geolocation data and device</i></p>	<p>a. A geolocation device³ MUST record vessel location coordinates and the associated date and time in a format capable of integration with EM Records</p> <p>b. The geolocation device MUST be installed and remain in a location in accordance with the manufacturer’s guidelines such that the device can reliably function.</p> <p>c. The EM system COULD transmit geolocation data and associated date and time, and vessel identification information to DRCs on a regular basis, as defined by the relevant program requirements, throughout the duration of a fishing trip in a format compatible with DRC software.</p> <p>d. The EM system COULD be able to verify whether transmissions of geolocation data and associated date and time, and vessel identification information to DRCs are successful.</p> <p>e. If the EM system is unable to transmit geolocation data due to a communication error, it SHOULD store geolocation data and automatically send it as soon as practically possible after communication is restored.</p>
<p><i>5. Uninterruptible power supply</i></p>	<p>The EM system SHOULD include a UPS in the event that the main source of power is interrupted.</p>
<p><i>6. Sensors</i></p>	<p>a. EM systems SHOULD be outfitted with sensors, which may include the use of camera imagery as a synthetic sensor, to determine whether fishing activity is occurring, e.g., hydraulic or drum rotation sensors. If the EM system is outfitted with sensors, then it SHOULD be capable of generating and recording a log file of readings from system sensors stored in a similar manner to time and geolocation information.</p>

³ The EM system may use an existing geolocation device on type-approved hardware on the vessel (e.g., VMS) or have its own geolocation device.

On-board EM System component	SSP
<p><i>7. Communication system</i></p>	<ul style="list-style-type: none"> a. The EM System SHOULD have or integrate with at least one network communication system that enables the reliable and regular transmission (e.g., daily or weekly, hourly) of near-real-time data on system health (including still images for EM system status verification when prescribed by the program requirements), sensors (if applicable), and geolocation to DRCs during all fishing activity, and to the extent possible, supports remote access to the EM system by the EM Service Provider or their designated service technicians. b. The network communication system(s) SHOULD be a widely used and globally recognized technology, such as <ul style="list-style-type: none"> i. 3G, 4G, or 5G cellular networks. ii. Wi-Fi iii. Satellite communications. c. The EM system COULD be able to verify whether transmissions of data on system health (including still images), sensors, and geolocation to DRCs are successful. d. The EM System SHOULD have ethernet or any other communication system allowing data transfer and remote access to the system via the onboard connection.

General Requirements for onboard EM Components	
1. <i>Weather Resistance</i>	EM hardware components that are utilized on deck and are exposed to the elements (e.g., sensors and cameras) MUST be sufficiently dust and water resistant (e.g., IP66) and durable (e.g., corrosion, impact, and vibration resistant) to operate reliably under the range of conditions expected in their location on fishing vessels. IP67 or IP68 SHOULD be used for those locations where significant water contact is expected.
2. <i>Tamper Resistant and Tamper Evident</i>	<ul style="list-style-type: none"> a. The onboard hardware MUST be robust and tamper evident to mitigate the risk of intentional sabotage or malfunctions. This MUST include physical and/or software features. b. The EM System SHOULD feature a login history tool which allows the tracking of information on when and by whom system configuration settings have been accessed offering insights into possible tampering attempts.
3. <i>Compatibility with Other On Board Equipment</i>	The EM System SHOULD be capable of functioning in close physical proximity to other onboard electrical and hydraulic equipment (i.e., EM System operations MUST not be materially impacted by the presence of other onboard electrical equipment and MUST not materially impact the proper functioning of other onboard electrical equipment).
4. <i>Compatibility with DRC Review Software</i>	All EM Records generated by the EM system MUST be in a compatible format or be able to be converted into a compatible format, to allow the ingestion of the EM Records into an analysis software being used.
5. <i>Capable of Spatial Calibration</i>	An EM system SHOULD have capability for spatial calibration for accurate image and fish length measurements.
6. <i>System Health Status</i>	<p>The system SHOULD execute a system health test either automatically or when initiated by user and MUST provide a visual signal on the display that the system is operational (i.e., it should be obvious, simply by looking at the display, whether or not the system is working properly).</p> <ul style="list-style-type: none"> a. The EM system MUST be able to generate a log file that allows an EM program to determine the operational health status of the system. The log file SHOULD include details of EM system processes, including, but not limited to: <ul style="list-style-type: none"> i. System power up ii. System shutdown planned

	<ul style="list-style-type: none"> iii. System shutdown unplanned (e.g., power cut) iv. Camera connectivity v. Camera recording start and stop times (planned) vi. Camera recording error⁴ vii. Available hard drive space viii. Sensor connectivity, if applicable ix. Sensor recording start and stop times (planned) , if applicable x. Sensor recording error, if applicable xi. Activation and deactivation of recording triggers (e.g., vessel speed, drum rotation sensors, geofencing, and time scheduled), if applicable <p>b. System SHOULD undertake regular system health checks throughout the duration of the fishing trip at a frequency defined by the EM Program and MUST show malfunction alerts (errors and warnings) on the display of the user interface (Onboard User Interface) of the control centre.</p> <p>c. The EM system COULD be able to capture and store single frame images from each onboard camera on a regular basis (e.g., timed intervals, such as hourly, or on event triggers such as geofences) to show that cameras are operational, not obstructed, obscured, or displaced.</p>
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⁴The appropriate time interval may require regular review and updating.

Installation, Operation, and Service of onboard EM Systems	
Requirement	SSP
1. <i>EM system installation</i>	<p>CCMs SHOULD ensure that their EM Service Provider or their designated installer complies with the relevant EM standards. To this end, CCMs are encouraged to refer to Annex 1 (voluntary guidelines for EM system installation).</p> <p>The vessel owner or their designated representative:</p> <ul style="list-style-type: none"> a. MUST provide information describing the vessel configuration and systems to facilitate EM system installation. b. MUST make the vessel and appropriate personnel (such as engineers, fishing master, multilingual staff, etc.) available and provide the EM Service Provider unfettered access, including to the ship’s power supply, to complete EM system installation.
2. <i>Vessel Monitoring Plan</i>	<ul style="list-style-type: none"> a. Vessel owner or EM Service Provider MUST complete a Vessel Monitoring Plan and submit it to the CCMs DRC for approval. b. A copy of the approved Vessel Monitoring Plan SHOULD be maintained aboard the vessel at all times during fishing operations. c. Vessel Monitoring Plans MUST be updated and submitted to the EM Program at a frequency determined by the EM Program and anytime changes are made to information or requirements outlined in the VMP (e.g., new vessel contact information, change in EM System configuration, change in catch handling guidelines). d. The Vessel Monitoring Plan: <ul style="list-style-type: none"> i. MUST include contact information for the EM Service Provider, vessel owner(s), and vessel operator(s), and base manager(s) (if applicable). ii. MUST include general vessel information as specified in the EM data requirements iii. MUST include a diagram, description, and photo(s) of the vessel layout that identifies where key fishing activities will occur on the vessel (e.g., hauling, sorting, discarding) and COULD include measurements of all items, tools, or areas on the vessel that EM to support estimation of lengths of fish caught.

Installation, Operation, and Service of onboard EM Systems	
Requirement	SSP
	<ul style="list-style-type: none"> iv. A description of the EM setup: <ul style="list-style-type: none"> ● MUST include the number and location of cameras including images of their installation location and an image from each camera’s perspective, and include nighttime images, as appropriate, to demonstrate sufficient lighting. ● MUST include a description and image of the location of all other components of the installed EM system (e.g., geolocations system, EM control system, sensors, power supply). ● MUST include relevant details of system configuration settings, including: <ul style="list-style-type: none"> ○ Camera configuration settings (e.g., frame rates, resolution, bitrate) ○ Sensor units and threshold values, if applicable ○ Data recording frequencies and/or sensor triggers for recording, if applicable ○ Software and Firmware versions ○ Spatial calibration settings, if applicable v. MUST include any catch handling procedures required to ensure that EM Records allow collection of the data fields set out in the EM data requirements (e.g., handling in view of cameras, allowable discard locations). See Annex 2 for references to existing catch handling procedures. vi. MUST include vessel duty of care responsibilities to prevent system malfunctions and ensure effective operation of the system, such as: <ul style="list-style-type: none"> ● Verifying system functionality at the beginning and at regular intervals throughout the duration of each trip ● Instructions for cleaning camera lenses vii. MUST include vessel responsibilities in the event of system malfunctions that describe the steps that must be taken. viii. MUST include details of what steps, if any, are required to ensure the transmission of the EM Records to the DRC.

Installation, Operation, and Service of onboard EM Systems	
Requirement	SSP
<p><i>3. Field and Technical Support Services</i></p>	<p>The vessel owner/operator:</p> <ul style="list-style-type: none"> a. MUST follow duty of care responsibilities described in the <u>Vessel Monitoring Plan</u>. b. MUST report EM system malfunctions to the appropriate contact as outlined in the Vessel Monitoring Plan. This should be done as soon as is practicable, and include details of the date, time, and, if possible, the geolocation when the malfunction was first detected. c. MUST follow vessel responsibilities outlined in the <u>Vessel Monitoring Plan</u> in the event of system malfunctions. <p>The EM Program:</p> <ul style="list-style-type: none"> a. MUST define vessel responsibilities in the event of system malfunctions that describe the steps that must be taken under different failure scenarios. b. SHOULD respond to EM Service Providers or vessel owners/operators in a timely manner.

SSP: Data Review Centres

A data review centre (DRC) is an entity with access to supporting EM analysis software used by EM analysts to analyse EM Records and generate EM Data. DRCs may serve individual CCMs, subregional groupings, or the entire WCPFC membership. They may also be administered by individual CCMs members, a sub-regional or regional body, or a third-party (commercial) provider. This SSP is not specific to any DRC structure and covers the required infrastructure (hardware and software) to analyse EM Records.

DRC Component	SSP
<p><i>1. EM Analysis Software</i></p>	<p>The DRC MUST use EM analysis software to facilitate the generation of EM Data from EM Records. The EM analysis software:</p> <ol style="list-style-type: none"> a. MUST be compatible with the file types, data structures, syntax, and semantics of EM Records that will be analysed with the software. b. SHOULD be the latest version of analysis software, including security patches c. SHOULD be able to display EM analysed output: <ol style="list-style-type: none"> i. Display the vessel track on a map based on geolocation data integrated in the EM Records, with an option to display the geolocation data of each vessel. ii. Display synchronised imagery from all cameras simultaneously with zoom capability and other relevant imagery features. iii. Display a visual timeline with sensor readings or status, if applicable. iv. Display synchronised sensor data (including vessel heading and speed) and video imagery simultaneously, if applicable. d. SHOULD be able to spatially calibrate an image and measure the length of species brought onboard as required by the EM Program (e.g. through a digital measuring tool in the EM analysis software). e. SHOULD allow the EM Analyst to create annotations to mark events where fishing activity occurred within the EM records.

DRC Component	SSP
	<ul style="list-style-type: none"> f. SHOULD be able to extract and save segments of video and sensor data, including extraction and saving of still images and the ability to extract short duration video clips of catch. g. MUST be able to produce EM Data into a format compatible (or that can easily made compatible) with agreed EM data requirements for incorporation into WCPFC databases. h. SHOULD be able to import EM records (and related sensor, if applicable, and annotated data) from systems of other EM Service Providers. i. SHOULD have the ability to change the playback speed of the footage (e.g., 0.5x, 1x, 2x, 6x, 8x, 10x)
<p><i>2. EM Analysis Workstations</i></p>	<p>The DRC MUST have EM analysis workstation(s) where EM Analysts will use EM analysis software to generate EM Data from EM Records. The EM analysis workstation:</p> <ul style="list-style-type: none"> a. MUST have hardware and software, or cloud-based platforms that enable effective EM analysis b. MUST have reliable data transmission capabilities sufficient for efficient streaming or download/upload of data required for EM Records analysis, reporting of EM Data, and storage of EM Records. c. MUST have proper ergonomics that support analyst well-being, quality, and efficiency. d. MUST be designed to minimize the risks to commercially sensitive information.
<p><i>3 EM Analysts</i></p>	<p>The use of EM software to generate EM Data from EM Records MUST be conducted by EM Analysts.</p> <p>The EM Analysts:</p> <ul style="list-style-type: none"> • MUST complete an appropriate training program which covers materials including (but not limited to): species ID, basic fishing practices, and EM review processes). • EM analysts MUST/MUST not be employees of a fishing company involved in the observed fishery or have other direct conflicts of interest.

DRC Component	SSP
	<ul style="list-style-type: none"> • Training should cover the EM analysis process and relevant topics identified from the Agreed Minimum Standards and Guidelines for the Regional Observer Program (https://www.wcpfc.int/wcpfc-regional-observer-program-standards%20latest ;pg 12).
<p><i>4. A system to monitor EM System health on vessels</i></p>	<ol style="list-style-type: none"> The EM Program SHOULD have a health monitoring system to receive and display near real-time information of onboard EM System health status (<u>System Health Status</u>), this SHOULD include still images to verify functionality of onboard cameras (<u>System Health Status</u>) and geolocation data (<u>Geolocation device</u>). This system may be part of the DRC. If applicable, the onshore health monitoring system MUST receive any malfunction alerts (errors and warnings) that have been generated from the onboard health monitoring system. The health monitoring system SHOULD be able to display the latest geolocation of all covered EM Systems on a map.
<p><i>5. Storage of EM records and EM data</i></p>	<p>EM records and associated EM data MUST be retained in accordance with any WCPFC audit requirements.</p>

Appendix 2, Annex 1: Guidelines for administration of an EM program

EM system installation

The EM Service Provider or their designated installer SHOULD:

- a. coordinate installation with the vessel owner or their designated representative.
- b. install an onboard EM system that meets the performance standards described in onboard EM System Component and General Requirements.
- c. ensure the onboard EM system meets the performance standards described in onboard EM System Component and General Requirements through system tests.
- d. provide the necessary information for the vessel owner/operator or their designated representative to complete a Vessel Monitoring Plan (Vessel Monitoring Plans) or complete the Vessel Monitoring Plan on behalf of the owner/operator.
- e. brief the vessel operator and crew member(s) and provide documentation on EM system operation, maintenance, and procedures to follow during regular operation and in the event of a system malfunction (Vessel Monitoring Plans).
- f. MUST submit notification to the relevant EM Program of system installation in the agreed form that attests to the system functionality and its conformance with the performance standards described in onboard EM System Component and General Requirements.

Field and technical support services

The EM Service Provider, in a timely manner, SHOULD:

- a. Communicate with vessel operators and the relevant EM Program to coordinate service needs, resolve specific program issues, and provide feedback on program services.
- b. Provide maintenance and support services, including software and firmware updates, such that all installed EM systems perform according to the performance specifications described in onboard EM System Component and General Requirements and that field services are scheduled and completed with minimal delays to minimise disruption to fishing operations.
- c. Provide technical assistance to vessels upon request on EM system operations, diagnosing causes of system malfunctions, and providing assistance for resolving malfunctions. This assistance SHOULD be available 24 hours a day, seven days a week, year-round. This service must be provided in the relevant languages as defined in the program specifications.
- d. Submit to the relevant EM Program, and the EM Certifier, where appropriate, reports of all requests for technical assistance from vessels and service calls that include:
 - i. The name and designation of the vessel point of contact
 - ii. The date(s) and time a request for service was made.
 - iii. The date(s) and time(s) when the EM Service Provider called or visited the vessel to provide technical assistance.
 - iv. A description of the issue.
 - v. A description of how the issue was resolved, including actions completed during all service calls or visits in response to the request for service.
 - vi. The date and time the issue was resolved.

Appendix 2, Annex 2: Existing WCPFC Catch handling procedures

Mandatory and non-mandatory catch handling practices are incorporated into several Conservation and Management Measures and also reflected in ‘Best handling practices and guidelines’.

These guidelines and requirements SHOULD be considered when determining camera number and positions.

At the time of preparing these EM Standards, these were some of the applicable requirements for WCPFC catch handling procedures:

CMM2022-04 [Sharks]

Para 19 *“CCMs shall ensure that sharks that are caught and are not to be retained, are hauled alongside the vessel before being cut free in order to facilitate a species identification. **This requirement shall only apply when an observer or electronic monitoring camera is present, and should only be implemented taking into consideration the safety of the crew and observer.**”*
 “[Emphasis added]

Para 20 *“Beginning on January 1, 2024, for sharks that are caught by longline vessels and are not retained, **CCMs shall require** their fishing vessels to release these sharks as soon as possible, taking into consideration the safety of the crew and observer, using the following guidelines:*

- (1) Leave the shark in the water, where possible; and*
- (2) Use a line cutter to cut the branchline as close to the hook as possible.”*

CMM2019-05 Mobulid rays

Para 4 *“**CCMs shall prohibit** their vessels from retaining on board, transshipping, or landing any part or whole carcass of mobulid rays caught in the Convention Area.”*

Para 5 *“**CCMs shall require** their fishing vessels to promptly release alive and unharmed, to the extent practicable, mobulid rays as soon as possible, and to do so in a manner that will result in the least possible harm to the individuals captured. **CCMs should encourage** their fishing vessels to implement the handling practices detailed in Annex 1, while taking into consideration the safety of the crew.”*

CMM2018-04 Sea turtles

Para 4 *“**CCMs shall require fishermen** on vessels targeting species covered by the Convention to bring aboard, if practicable, any captured hard-shell sea turtle that is comatose or inactive as soon as possible and foster its recovery, including giving it resuscitation, before returning it to the water. **CCMs shall ensure** that fishermen are aware of and use proper mitigation and handling techniques, as described in WCPFC guidelines.”*

CMM2018-03 Seabirds

Para 11 *“**CCMs are encouraged** to adopt measures aimed at ensuring that seabirds captured alive during longlining are released alive and in as good condition as possible and that wherever possible hooks are removed without jeopardizing the life of the seabird concerned. Research into the survival of released seabirds is encouraged.”*

Resolution 2005-03 Non-target species

Para 2 *“Any such non-target fish species that are not to be retained, shall, to the extent practicable, be promptly released to the water unharmed.”*

See also the following safe handling and/or release guidelines:

- Sharks
 - <https://cmm.wcpfc.int/supplementary-info/supplcmm-2022-04-2>
- Manta and mobulid rays
 - <https://cmm.wcpfc.int/supplementary-info/supplcmm-2019-05>
- Sea turtles
 - <https://cmm.wcpfc.int/supplementary-info/supplcmm-2018-04-1>
 - <https://cmm.wcpfc.int/supplementary-info/supplcmm-2018-04-1>
- Seabirds
 - <https://cmm.wcpfc.int/supplementary-info/supplcmm-2018-03>
- Cetaceans
 - <https://cmm.wcpfc.int/supplementary-info/supplcmm-2011-03-2>
 - <https://cmm.wcpfc.int/supplementary-info/supplcmm-2011-03-1>

Appendix 3: Minimum EM data requirements

The ROP minimum data fields were chosen to form the basis of the Minimum EM data fields (what is collected) and requirements (exactly how it is recorded, e.g., format). New fields have been proposed where there is the need for an EM-version of a ROP field which is no longer relevant (e.g., details of the EM analysts as a replacement for details of the ROP observer) or a clear gap in the ROP fields. **Those highlighted fields should be considered during the next review of EM data standards.**

Note: The current draft does not yet have all the technical detail necessary for EM data requirements (see https://www.wcpfc.int/doc/data-05/e-reporting_ssps for an example for ER standards for logbook reporting versus ROP data fields <https://www.wcpfc.int/system/files/Table-ROP-data-fields-instructions.pdf>), but this will be prepared once feedback has been received on the proposed EM data fields.

WCPFC ROP MINIMUM STANDARD DATA FIELD	DESCRIPTION	NOTES ON EM PROTOCOL	PROPOSED EM DATA FIELD
GENERAL VESSEL AND TRIP INFORMATION FOR ALL VESSEL TYPES			
Name of vessel	Name of vessel. This information would normally be linked to a VESSEL reference database (e.g. WCPFC RFV) which will ensure consistency/standardisation.	The EM system should have linkages to the information submitted to the WCPFC Record of Fishing Vessels to be consistent with these vessel registers.	YES
Flag State Registration Number		If the IMO or WCPFC VID is provided, then there is no need to provide the other vessel identification data. If the IMO, WCPFC VID and/or FFA VID are not provided, then the EM data provider needs to provide other data (Vessel Name, Flag State Registration and IRCS to uniquely identify the vessel).	NO
International Radio Call Sign			YES
Vessel Owner/Company			NO
Hull markings consistent with CMM 2004-03			NO
“WCPFC Identification number” WIN markings consistent with CMM 2004-03			NO

WIN format for markings consistent with CMM 2004-03			NO
International Maritime Organization 'IMO' or Lloyd's Register number 'LR'			NO
WCPFC RFV VID			YES

WCPFC ROP MINIMUM STANDARD DATA FIELD	DESCRIPTION	NOTES ON EM PROTOCOL	PROPOSED EM DATA FIELD
VESSEL TRIP INFORMATION			
EM trip ID	Trip identifier. This value must be unique.	generated by the source system and could for example be formatted as follow: VESSEL NAME + TRIP DEPARTURE DATE	YES
Date and time of departure from port	The UTC date and time the vessel DEPARTS a port to start its fishing trip. If the vessel is departing from a carrier vessel after an at sea transshipment, the UTC date and time of the departure from a carrier vessel will be used.	Dates must be ISO 8601 standard and UTC. Latitude and Longitude coordinates must be ISO 6709 standard. The international standard of Location Code (UNLOCODE) for PORTs must be used.	YES
Port of departure	Port of DEPARTURE (UNLOCODE) for when a vessel starts a new trip from a port. If the vessel is departing from a carrier vessel after an at sea transshipment, this field will be "AT SEA" and the coordinates of the 'at sea' departure MUST be provided.		YES

Date and time of return to port	YES		YES
Port of return	YES <i>If the vessel END the trip AT SEA (through transshipment), this field will be "AT SEA" and the coordinates of the 'at sea' MUST be provided.</i>		YES
Name of receiving vessel	For when the vessel is engaged in a transshipment activity. This field only required when start or end of trip is 'AT SEA' Consider vessel unique identifier. (<i>potentially could include WCPFC RFV VID</i>)	Entered into EM records analysis system by EM Analyst.	NO
Total number of sets	Total number of sets conducted by the vessel during the trip.	Generated by EM system based on sensors or vessel speed or by another method used by the EM service provider.	YES

WCPFC ROP MINIMUM STANDARD DATA FIELD	DESCRIPTION	NOTES ON EM PROTOCOL	PROPOSED EM DATA FIELD
OBSERVER INFORMATION			
Observer name			NO
Nationality of observer			NO
Observer provider -country and or organization			NO

Date, time and location of embarkation			NO
Date, time and location of disembarkation			NO
EM ANALYSIS INFORMATION			
EM Analyst (name and code)	EM Analyst's who produced EM data.	This SHOULD be generated by the EM analysis software to ensure standardization.	YES
EM program	EM program provider code e.g. FJEM (Fiji E-Monitoring Program).	Generated by the EM analysis soft. It should adhere to the format "xxEM" where xx is the ISO two-letter code of the CCM providing the data.	YES
EM analysis software	Software name and version of the system used to analyse the EM records.	Generated by the EM analysis software	YES
EM Service Provider	The name of the EM technical service provider for the EM records analysis software.	Generated by the EM analysis software	
EM analysis start date and time	The date and time when the analysis of the EM records STARTED [at the trip level]	This SHOULD be generated by the EM analysis software based on EM analyst activity	YES
EM analysis end date and time	The date and time when the analysis of the EM records ENDED [at the trip level]	This SHOULD be generated by the EM analysis software based on EM analyst activity	YES
EM review type	A place holder field to reflect that EM reviews may have different strategies with different fields collected (e.g., a full review vs a review to verify bycatch mitigation use)	This SHOULD be generated by the EM analysis software based on EM analysts tasking	YES

WCPFC ROP MINIMUM STANDARD DATA FIELD	DESCRIPTION	NOTES ON EM PROTOCOL	PROPOSED EM DATA FIELD
CREW INFORMATION			
Name of captain			NO
Nationality of captain			NO
Identification document			NO
Name of fishing master			NO
Nationality of fishing master			NO
Identification document			NO
Other crew			NO
Total number of crew			NO
VESSEL ATTRIBUTES			
Vessel cruising speed			NO
Vessel fish hold capacity			NO
Freezer type			NO
Length (specify unit)			NO
Tonnage (specify unit)			NO
Engine power (Specify unit)			NO
Radars			NO
Depth Sounder			NO

Global Positioning System (GPS)			NO
Track Plotter			NO
Weather Facsimile			NO
Sea Surface Temperature (SST) gauge			NO
Sonar			NO
Radio/ Satellite Buoys			NO
Doppler Current Meter			NO
Expendable Bathythermograph (XBT)			NO
Satellite Communications Services (Phone/Fax/Email numbers)			NO
Fishery information services			NO
Vessel Monitoring System			NO

WCPFC ROP MINIMUM STANDARD DATA FIELD	DESCRIPTION	NOTES ON EM PROTOCOL	PROPOSED EM DATA FIELD
LOGLINE INFORMATION			
VESSEL ATTRIBUTES			
Refrigeration Method			NO
GENERAL GEAR ATTRIBUTES			
Mainline material		May not be detectable depending on camera placement	NO
Mainline length			NO
Mainline diameter			NO
Branch line material(s)		May not be detectable depending on camera placement	NO
SPECIAL GEAR ATTRIBUTES			
Wire trace	The vessel uses wire traces on some or all their lines	Trip level: Indicate Yes, No, or 'Could not be determined' recognising it may not be detectable depending on camera placement	NO
Mainline hauler	Most long line vessel will have an instrument that hauls the lines in after it has been set- some very small vessels may haul line by hand.	Trip level: Indicate Yes, No, or 'Could not be determined' recognising it may not be detectable depending on camera placement -	NO
Branch line hauler	Some long line vessels may use special haulers to coil the branch lines.	Trip level: Indicate Yes, No, or 'Could not be determined' recognising it may not be detectable depending on camera placement	NO
Line shooter		See Deep setting line shooter below	NO
Automatic bait thrower	Most vessels manually throw the branch lines with the bait away from the wash, especially if the bait is vulnerable to bird strikes. However there are a number of vessels that use automatic bait throwers so the bait is constantly thrown away from the wash at a determined distance.	Trip level: Indicate Yes, No, or 'Could not be determined' recognising it may not be detectable depending on camera placement	YES

Automatic branch line attached	Most lines are attached manually at a regular distance along the mainline by a crewman, however some vessels may have an automatic branch line mechanisms that attaches the branch at regular intervals	Trip level: Indicate Yes, No, or 'Could not be determined' recognising it may not be detectable depending on camera placement	YES
Hook type		Set level: hook type or 'Could not be determined' recognising it may not be detectable depending on camera placement	NO
Hook size			NO
Tori Line (Changed WCPFC12)		Set Level: Yes, No, or 'Could not be determined' recognising it may not be detectable depending on camera placement if the vessel is using alternative seabird mitigation methods or is not required to use seabird mitigation	YES
Side setting with bird Curtain and weighted branch lines (Changed WCPFC12)		Set Level: Yes, No, or 'Could not be determined' recognising it may not be detectable depending on camera placement if the vessel is using alternative seabird mitigation methods or is not required to use seabird mitigation M	YES
Weighted branch lines- (Added WCPFC9)		Set Level: Yes, No, or 'Could not be determined' recognising it may not be detectable depending on camera placement if the vessel is using alternative seabird mitigation methods or is not required to use seabird mitigation	NO
Shark lines (Added WCPFC12)		Set Level: Yes, No, or 'Could not be determined' recognising it may not be detectable depending on camera placement	YES
Blue dyed bait		Set Level: Yes, No, or 'Could not be determined' recognising it may not be detectable depending on camera placement if the vessel is using alternative seabird mitigation methods or is not required to use seabird mitigation	YES
Distance between weight and hook (in metres),		Set Level: Estimate, or 'Could not be determined' recognising it may not be detectable depending on	NO

(Added WCPFC9)		camera placement if the vessel is using alternative seabird mitigation methods or is not required to use seabird mitigation	
Deep setting line shooter (Changed WCPFC12)		Set Level: Yes, No, or 'Could not be determined' recognising it may not be detectable depending on camera placement if the vessel is using alternative seabird mitigation methods or is not required to use seabird mitigation	YES
Management of offal discharge Added WCPFC12)	Dumping offal to attract seabirds away from hooks, or not dumping offal	Set Level: Yes, No, or 'Could not be determined' recognising it may not be detectable depending on camera placement if the vessel is using alternative seabird mitigation methods or is not required to use seabird mitigation	YES
Strategic offal disposal (Changed WCPFC12)		See management of offal discharge	NO
Hook shielding device		Set Level: Yes, No, or 'Could not be determined' recognising it may not be detectable depending on camera placement if the vessel is using alternative seabird mitigation methods or is not required to use seabird mitigation	YES

WCPFC ROP MINIMUM STANDARD DATA FIELD	DESCRIPTION	NOTES ON EM PROTOCOL	PROPOSED EM DATA FIELD
EFFORT INFORMATION FOR THE SET			
Date and time of start of set	When the first buoy is thrown into the water	Auto-generated by the EM system due to the linking of EM records to time and geolocation data	YES
Latitude and Longitude of start of set			YES
Date and Time of end of set	When the last buoy is thrown into the water		YES
Latitude and Longitude of end of set			YES
Total number of baskets or floats			YES
Number of hooks per basket, or number of hooks between floats		PROTOCOL is to count hooks from first 3 baskets, middle 3 baskets and last 3 baskets and the average HOOKS per BASKET (successive floats) can then be determined.	YES
Total number of hooks used in a set		Could be automatically derived from hooks per basket and number of baskets	YES
Line shooter speed			NO
Length of float-line			NO
Distance between branch-lines			NO
Length of branch-lines			NO
Time-depth recorders (TDRs)			NO
Number of light-sticks		Lights stick used: Yes, No, 'Could not be determined'	NO
Target species			NO
Bait Species		PROTOCOL is to review the BAIT used during the analyses conducted over the setting of the first 3 baskets, the middle 3 baskets and the last 3 baskets. This should be possible using appropriate placement of the camera mounted to view the SETTING process	YES
Date and time of start of haul	When the first buoy is thrown from the water		YES

Latitude and Longitude of start of haul		Auto-generated by the EM system due to the linking of EM records to time and geolocation data	
Date and time of end of haul	When the last buoy is retrieved from the water		YES
Latitude and Longitude of end of haul			
Total amount of baskets, floats monitored by observer in a single set	The total number of floats or baskets monitored by the EM Analyst in a single HAUL		YES

WCPFC ROP MINIMUM STANDARD DATA FIELD	DESCRIPTION	NOTES ON EM PROTOCOL	PROPOSED EM DATA FIELD
INFORMATION ON CATCH FOR EACH SET			
Hook number, between floats	The hook number that the animal is caught on count hooks from the last float hauled on board to next float hauled on board	Striped marlin, seabirds, sharks and rays, marine turtles, cetaceans	YES
Species code			YES
Length of fish		Estimate, or 'Could not be determined'. Not all vessels, EM systems and EM analysis software may have this capability. Further, this may require specific catch handling practices. It is recommended that the SSP provide advice on the coverage required for stock assessment catch verification purposes	YES
Length measurement code		Details of the length measurement approach, if applicable, should be included in the EM program description	YES
Gender		EM Analyst declaration. Not possible for most species (use U-unknown). Can collect sharks and rays sex, for example, if shown ventrally. Some other species may be possible (e.g. mahi mahi and opah).	YES
Condition when caught		EM Analyst declaration	YES
Fate		EM Analyst declaration	YES
Condition when released		EM Analyst declaration	YES
Tag recovery information			NO
Catch event date and time	UTC date and time (to the nearest second) of the catch event (as recorded by the EM equipment)	Field automatically generated by EM system when the EM analyst records the catch coming onboard or if landed at all, when it is struck off, released or discarded. In case the software does not allow recording this information, then this could be recorded as 'Not Available'.	NO

Catch event latitude and longitude	Latitude and longitude of each catch (ISO 6709 standard)	Field automatically generated by the EM system. Minimum resolution of position is 1/1000 of a minute. In case the software does not allow recording this information, then this could be recorded as 'Not Available'.	NO
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WCPFC ROP MINIMUM STANDARD DATA FIELD	DESCRIPTION	NOTES ON EM PROTOCOL	PROPOSED EM DATA FIELD
SPECIES OF SPECIAL INTEREST			
Marine Reptiles, Marine Mammals, Sea Birds, Designated Shark Species			
GENERAL INFORMATION			
Type of interaction	Details of the gear interaction with the SSI. For example, hooking position for marine turtles and sharks.	EM	YES
Date and time of interaction		Auto-generated by the EM system due to the linking of EM records to time and geolocation data	YES
Latitude and longitude of interaction			YES
Species code of marine reptile, marine mammal, or seabird.			YES
LANDED ON DECK			
Length		Estimate, or 'Could not be determined'. Not all vessels, EM systems and EM analysis software may have this capability. Further, this may require specific catch handling practices. It is recommended that the SSP provide advice on the coverage required for stock assessment catch verification purposes	YES

Length measurement code		Details of the length measurement approach, if applicable, should be included in the EM program description	YES
Gender		EM Analyst declaration. Not possible for most species (use U-unknown).	YES
Estimated shark fin weight by species			NO
Estimated shark carcass weight by species			NO
Condition when landed on Deck		EM Analyst declaration	YES
Condition when released		EM Analyst declaration	YES
Tag recovery information			NO
Tag release information			NO
INTERACTION WITH VESSEL OR GEAR ONLY			
Vessel's activity during interaction			NO
Condition observed at start of interaction			NO
Condition observed at end of interaction			NO
Description of interaction			NO
Number of animals sighted			NO

WCPFC ROP MINIMUM STANDARD DATA FIELD	DESCRIPTION	NOTES ON EM PROTOCOL	PROPOSED EM DATA FIELD
EM TRIP MONITORING SUMMARY (Did the vessel)			
Was an observer onboard the vessel		YES/NO	YES
Inaccurately record vessel positions on vessel log sheet for sets, hauling and catch; (Yes No)		EM programs could use EM data to verify ER data	NO
Inaccurately record retained 'Target Species' in the vessel logs; (Yes No)		EM programs could use EM data to verify ER	NO
Inaccurately record 'Target Species' discards; (Yes No)		EM programs could use EM data to verify ER	NO
Inaccurately record retained By catch species (Yes No)		EM programs could use EM data to verify ER	NO
Inaccurately record By-catch species discards; (Yes No)		EM programs could use EM data to verify ER	NO
record species inaccurately (Yes No)		EM programs could use EM data to verify ER	NO
Interact with a non-target species		Could be automatically populated from EM data	YES
high grade the catch; (Yes No)		EM programs could use EM data to verify ER	NO
Fail to comply with any Commission Conservation and Management measure; (Yes No)		YES/NO (details if YES)	YES
fish in areas where it is not permitted to fish; (Yes No)		This can be addressed using VMS	NO
fail to report vessel position to countries, where required, when entering and leaving an EEZ (crossing to or from an EEZ into or out of the High Seas (Yes No)			NO
transfer or tranship fish from, or to,			YES

another vessel (Yes No)			
request that an event not be reported by the observer; (Yes No)			NO
Did the operator or any crew assault, obstruct, resist, delay, refuse boarding to, intimidate or interfere with observers in the performance of their duties (Yes No)			NO
Did the operator fail to provide the observer, while on board the vessel, at no expense to the observer or the observer's government, with food, accommodation and medical facilities of a reasonable standard equivalent to those normally available and medical facilities of a reasonable standard equivalent to those normally available to an officer on board the vessel .(Yes No)			NO
use a fishing method other than the method the vessel was designed or licensed; (Yes No)			NO
lose any fishing gear; (Yes No)		YES/NO, 'Could not determine' based on camera placement	YES
abandon any gear; (Yes No)		YES/NO, 'Could not determine' based on camera placement	YES
dispose of any metals, plastics, old fishing gear or chemicals;(Yes No)		YES/NO, 'Could not determine' based on camera placement	YES
discharge any oil; (Yes No)		YES/NO, 'Could not determine' based on camera placement	YES
fail to stow fishing gear when entering areas where they were not authorized to fish; (Yes No)			NO

Appendix 4: Interim WCPFC EM program reporting requirements

CCMs SHALL report the presence of an EM system in the submission of vessel details to the WCPFC Record of Fishing Vessel.⁵

Any CCM using EM and submitting EM data to meet WCPFC requirements MUST provide the following reporting in their Annual Report Part 1⁶:

Description of the EM program

EM program component	Explanatory notes
Attestation	<i>EITHER</i> a confirmation that the EM program and EM system meets all the MUST requirements in the EM Standards <i>OR</i> a description of those components that do not and the intended steps to achieve the requirement in the EM Standards.
Vessel monitoring plans	Examples of the Vessel monitoring plans used in the program to be provided. Would show where camera number and placement differ across vessels in the program (e.g. different sized vessels or vessels fishing in different parts of the Convention Area where different camera configurations are required to achieve the monitoring objectives).
Vessel owner / crew responsibilities	A description of the obligations on the vessel owner/operator with respect to the EM system and program, e.g., cleaning or maintenance and how to respond to mechanical or technical failures of the EM system.
EM record transmission / retrieval	Description of how EM records are retrieved from the EM system.
WCPFC CMM procedures	If applicable, any specific features of the EM system and EM program put in place to monitor the implementation of, and compliance with, obligations under a WCPFC CMM.

⁵ An amendment to the CMM 2022-05 Standards, specifications and procedures for the WCPFC RFV would be required to support implementation.

⁶ For any CCM that **voluntarily** chooses to use EM for WCPFC fisheries and submits EM data to support the work of the Commission, it is recommended that this information be provided to allow the necessary context for the use of any EM data.

Description of the implementation of the EM program

EM program component	Explanatory notes
EM coverage levels	By year: EM coverage in terms of both vessel numbers (number and proportion of vessels with operating EM systems) AND Total fishing effort (number and proportion of fishing events for which EM records were collected)
EM analysis rates	By year: EM analysis rate expressed as a proportion of EM coverage for fishing events (i.e., proportion of EM records reviewed to generate EM data).
EM data submission summary	By year: Summary of key data included in the EM data submission, e.g., number of captures of species of special interest, number of size measurements.
EM data quality and review summary	Summary of observations where issues, which impacted the quality of the EM data, were noted by EM analysts e.g., technical, mechanical, specific circumstances and/or catch handling.