



**TECHNICAL AND COMPLIANCE COMMITTEE
TWENTIETH REGULAR SESSION**

25 September to 1 October 2024
Pohnpei, Federated States of Micronesia (Hybrid)

Summary of feedback from SC20 on “*Development of interim Electronic Monitoring (EM) standards for the WCPFC*” and a proposed way forward

**WCPFC-TCC20-2024-20
2 September 2024**

Paper prepared by Chair of the ER and EM IWG

Overview

This paper summarizes feedback received at SC20 that was held in August in Manila (and online), a summary of the Chair's insights from other relevant SC20 papers relevant, and a proposed approach to continue the work of the ER and EM IWG in the margins of TCC in September 2024 and prior to WCPFC21.

Feedback received

Detailed feedback on the SC20 WP was received from FFA members (Appendix 1) and the United States of America (Appendix 2). Written comments on the current draft proposed interim EM technical standards were provided by FFA members (<https://www.wcpfc.int/erandem-iwg>). Further, the Republic of Korea emphasized the importance of completing the work and Japan noted the magnitude of the work ahead of the IWG.

Both FFA members and the USA cautioned about proposing too narrower scope for the objectives of the WCPFC EM program, but otherwise were generally supportive of the recommendations within the paper. FFA members and the USA differed slightly on the expected completion of work on minimum EM data standards, with FFA members seeing the opportunity (with some hard work) to achieve something for December 2024 whereas the USA considered it more realistic for the work to be completed in 2025.

Both FFA members and the USA acknowledged the importance of an assurance and reporting framework.

Other relevant information considered at SC20

There were three papers submitted to SC20 which are relevant to the work of the ER and EM IWG and I briefly describe the relevant parts from these papers below.

SC20-ST-WP-04 Update from the Intersessional Working Group for the Regional Observer Programme ([link](#))

It is generally agreed that the starting point for considering minimum EM data fields should be the minimum ROP data fields. This paper pointed out that the minimum ROP data fields were themselves under review. Including, whether changes or additions are required in relation to non-target and associated and dependent species to help distinguish between interactions of a scientific interest and those that are a possible infraction. Further, there are reporting requirements in recent CMMs for sea turtles, seabirds, and mobulids that are currently not included in the minimum ROP data fields.

An important consideration for the ER and EM IWG, the ROP IWG, and the Commission is to how this work is progressed, i.e., should it be done independently, sequentially, or together?

SC20-ST-WP-09 Interim steps for evaluating increases in bigeye longline catch limits under CMM 2023-01 - A discussion paper ([link](#))

This paper provided several useful insights for developing the assurance and reporting processes that would accompany the use of EM in the WCPFC.

This paper notes the likely delay between collecting EM records and submitting EM data to the Commission and implications for determining whether obligations of coverage have been met. This suggests that Appendix 3 of my Chair's paper may require further nuance to reflect this.

The paper also provided further details around how EM coverage might be calculated and provided some thoughts on which ROP data fields might be more important to collect with EM (e.g. a MUST) than others.

Finally, the discussion around audit points mirrors the discussion around assurance processes in the Chair's paper.

SC20-ST-IP-12 Data Collectable Using Electronic Monitoring Systems Compared to At-Sea Observers in the Hawai'i Longline Fisheries ([link](#))

This paper specifically focusses on the Pacific Islands Region Observer Program data fields it provides an example of the types of considerations necessary for any exercise focusing on the ROP minimum data fields as a starting point for determining EM data standards.

Proposed approach for the margins of TCC

As signaled in the workplan presented to WCPFC20, TCC20 provides the perfect opportunity for an in-person meeting of the ER and EM IWG.

A meeting of the IWG is scheduled for 1:00-3:30pm on Tuesday 24th September and will be held at the COM/FSM China Friendship Sport Center, in Palikir (and in hybrid format).

There may be further opportunities to meet in the margins of TCC and then there is the actual TCC-proper report back on progress to be considered under TCC Agenda Item 9.2. Further details may be provided in the lead up to TCC.

I propose that the following be the priorities (in order) for work during and in the margins of TCC:

1. Achieving an agreed set of interim EM technical standards. I propose we start from the version presented in the Chair's SC/TCC paper including comments received from FFA members. Note: while I welcome further comments from any CCM or observer, I will not have the time to include these prior to TCC.
2. Achieving an agreed set of reporting requirements that would support an assurance process for those CCMs that use EM.
3. Determining a proposed process for establishing minimum EM data standards.
4. Determining the proposed approach for further engagement of the ER and EM IWG between TCC and WCPFC21.
5. Consideration of the ER and EM IWG workplan for 2025.

Appendix 1: Interventions made on behalf of FFA members

Australia

FFA Members thank the Chair of the ER and EM Working Group for his paper.

In response to the three specific issues on which the Chair has requested feedback on, FFA Members provide the following perspectives:

Regarding **Monitoring Objectives**, we acknowledge the primary and secondary objectives proposed by the Chair. However, we wish to emphasize that the WCPFC in 2019 endorsed specific objectives for the Commission's EM Program, as outlined in paragraph 555 of the WCPFC19 Summary Report where it states:

“The objectives of the Commission Electronic Monitoring Programme (EMP) shall be to collect verified catch and effort data, other scientific data, and additional information related to the fishery from the Convention Area and to monitor the implementation of the conservation and management measures adopted by the Commission”. This mirrors the objective of the ROP in paragraph 4 of the ROP measure (CMM 2018-05) .

We are concerned that the primary and secondary objectives currently proposed may inadvertently narrow the scope of data collection, focusing primarily on verifying catch limits under certain CMMs such as Swordfish (CMM 2009-03 paragraph 2), for NP Striped Marlin (CMM 2010-05 paragraph 1), for Bigeye (CMM 2023-01 paragraph 38) and for Pacific Bluefin (CMM 2023-02 paragraphs 03 and 04).

This narrow focus risks excluding the collection of catch-related data for other species not subject to these specific limits. Consequently, FFA Members advocate for adhering to the broader objectives endorsed by WCPFC19.

Regarding scope, FFA Members support recommendations 1 and 2 of the Chair's paper, particularly the proposal to initially focus the scope of the WCPFC EM program on longline fisheries, with a specific emphasis on activities in the high seas.

Federated State of Micronesia

On **EM Data requirements**, in principle, FFA Members believe that data generated from Electronic Monitoring (EM) should be largely equivalent to that collected under the Regional Observer Programme (ROP). We agree that the ROP Minimum Standard Data Fields should serve as the starting point for this effort.

Regarding the Chair's Proposed Options: Of the three options proposed by the Chair for advancing this issue, FFA Members support Option 1 as the most ideal approach. This option proposes adopting minimum EM data requirements based on the ROP requirements (plus any others identified) but associated with a 'MUST / SHOULD / COULD / WON'T' assessment. We also emphasize the importance of discussing data that cannot be collected via EM and exploring alternative methods for obtaining such data when necessary.

We acknowledge that this option will require additional work leading up to December and we are committed to engaging in this process. Fortunately, existing resources can help inform these discussions, such as the ST-IP12, which was tabled at this meeting that compares data

collected by EM against ROP standards. Additionally, we recall the Information Paper tabled by FFA Members at SC in 2020 (SC16-ST-IP-07) on Draft Longline EM Minimum Data Field Standards. We are currently reviewing this document and believe it could significantly contribute to the discussion on EM data requirements.

We consider the work on establishing EM data requirements to be both crucial and urgent, particularly for CCMs wishing to use EM to meet the increased observer coverage requirement above 5%, as outlined in the footnote of Table 3 in CMM 2023-01.

On the **proposed Annual Report Part 1 reporting requirements**: We agree on the necessity for relevant CCMs to report implementation of EM and other related information as stated in Appendix 3 of the paper. We believe further consideration is needed on this, including the mechanism and frequency of providing this information, and we will continue to deliberate on this issue.

In addition to the three issues above, regarding the **interim EM SSPs in Appendix 2 of the paper**: FFA Members have specific comments on this which we have sent to the Chair. FFA Members will continue to review the draft interim SSPs and provide any further comments on this in due course.

Appendix 2: Intervention made by the United States of America

The United States generally supports the Chair's recommendations. On the recommendations related to management and monitoring objectives which were recommendations 3 and 4, we wonder if recommendation 4 should be made a little broader. We will probably discuss this more in the next working paper, but there are other requirements such as those in CMM 2023-01 for coverage where we may want the EM program to help us validate. Suggest the text be edited as follows:

The Commission agree that secondary objectives of the WCPFC EM program for longline be to collect appropriate information and verify other relevant requirements including but not limited to CMM 2022-04 (sharks), CMM 2019-05 (mobulid rays), CMM 2018-04 (sea turtles), CMM 2018-03 (seabirds), and CMM 2023-01.

On EM data requirements for longline, we strongly support the Chair's recommendation to develop minimum EM data requirements, and recommend that the Commission also task this for the ERandEM IWG to complete next year [emphasis added by Chair]. We note that the United States submitted ST-IP-12, which compared data collectable using EM with data collected by at-sea observers in the Hawaii longline fisheries. Many of the fields currently collected by at-sea observers can be collected through EM, but acknowledge that not all ROP fields will be feasible or practicable for EM to collect.

The United States also supports Recommendations 8 and 9 from the Chair related to assurance around the operation of EM programs within the WCPFC. We strongly support establishment of a verification system so data generated by EM meets CMM obligations and provides data of adequate quality. Developing a reporting template for TCC will also help the Commission be able to assess whether an EM program is meeting the requirements of the Commission.

The United States appreciates the Chair's continued leadership in this IWG especially in progressing the EM SSPs. We understand that there is not time to go over the SSPs in this forum in any great detail, and will reach out if there are additional comments we wish to provide.



**SCIENTIFIC COMMITTEE
TWENTIETH REGULAR SESSION**

14-21 August 2024
Manila, Philippines

Development of interim Electronic Monitoring (EM) standards for the WCPFC

**WCPFC-SC20-2023-/ST-WP-05
27 July 2024**

Paper prepared by Chair of the ER and EM IWG

Executive Summary

The purpose of this document is to seek feedback from the Commission's subsidiary bodies and other relevant Intersessional Working Groups, on work undertaken to support the Commission adopting Interim standards for Electronic Monitoring (EM) at its regular session in December 2024. This paper responds to the task from WCPFC20, in WCPFC20 Summary report paragraphs 618 and 619.

As was foreshadowed at the virtual ER and EM IWG meeting held 31 May 2024, this is a 'Chairs' paper that reflects feedback received from many CCMs and Observer delegates over the past 12 months through the ER and EM IWG. Note that the draft (a) does not reflect each CCMs positions as the IWG did not have the opportunity at that time to achieve resolution on those areas where differing initial positions were expressed; and (b) includes some [] and/or **Chair's comments** for areas where I believe that further discussion is warranted.

In adopting these interim standards, the Commission will be making decisions on, and/or setting a direction towards, the following:

- (1) the scope of the EM program (e.g. fleets to be covered);
- (2) the objectives for the EM program (what it is wanting the EM to achieve on these fleets);
- (3) a set of interim standards for EM;
- (4) associated minimum EM data requirements;
- (5) requirements for reporting to the WCPFC on the use of EM; and
- (6) any process that Commission may choose to establish to have assurance that CCMs are implementing EM programs in line with adopted EM standards.

This paper also includes a set of proposed 'Chair's' recommendations for each area.

For the Scientific Committee I would be grateful for feedback on any aspects of the paper, but in particular:

- (1) the monitoring objectives;
- (2) EM data requirements required to reflect the EM Program objectives. In particular, alternative data collection mechanisms, and data requirements that may not yet being achieved through the current ROP minimum data standards; and
- (3) proposed Annual Report Part 1 reporting requirements in *Appendix 3*.

For the Technical and Compliance Committee I would be grateful for feedback on any aspects of the paper, but in particular:

- (1) monitoring objectives;
- (2) EM data requirements required to reflect the EM Program objectives. In particular, alternative data collection mechanisms, and data requirements that may not yet being achieved through the current ROP minimum data standards;
- (3) CCM reporting on EM program specification and the extent to which future audit points may require verification; and

(4) additional information that might support an assurance process (e.g., EM record storage and retention standards).

This information would be integrated to reflect interim arrangements to support implementation of a monitoring and reporting program for the Commission's consideration based on the proposed draft recommendations to the Commission set out in this paper.

This paper does not cover some of the finer details of how the Commission may choose to operate an EM Program and should not be seen as impacting on the ability of individual coastal states, or groups of coastal states, to set alternative EM standards for vessels that operate in their waters. Further, at this time the standards do not include potential requirements around interoperability (i.e., EM records and associated meta-data are created in a format that can be used in different EM analysis software packages) or how trips that cover both the high seas and waters of coastal states might be treated.

Following the review of this paper by the SC and TCC, and hopefully a further session(s) of the ER and EM IWG in the margins of the TCC meeting, I propose to prepare a paper for the Commission with a final set of recommendations. These recommendations will likely include:

- items that it is proposed that the Commission adopt;
- as appropriate, items to be included in the work plans for SC/TCC/ER and EM IWG for any outstanding tasks needed for establishing EM standards for longline; and
- Items to be included in the work plans for SC/TCC/ER and EM IWG for further development of the WCPFC EM program.

Background

Since taking over the role of Chair of the ER and EM IWG in mid-2023, the following engagement has occurred in the development of the interim EM standards¹.

- 17th August 2023: a circular from the Chair highlighting key documents produced within the IWG to date and seeking both written feedback and opportunities to speak with interested CCMs or Observers on future directions for the work of the IWG.
- 16th November 2023: WCPFC20 paper summarizing feedback received, general observations and a proposed Schedule of Work.
- WCPFC20: the Commission adopted the Schedule of Work and tasked the IWG to develop a set of interim EM standards for adoption at WCPFC 21 in December 2024.²
- 5th March 2024: an initial draft set of proposed interim EM standards was circulated for comment. These were based on parts of a broader set of Standards provided to the Commission in late 2022³.

¹ Please see <https://www.wcpfc.int/ERandEM-IWG> for further details

² WCPFC20 Summary Report:

618. The Commission noted the Report of the ER&EM WG (WCPFC20-2023-ERandEM-IWG-02) and agreed to adopt the Schedule of Work set out in Appendix 1 of the report (Attachment 5).

619. The Commission tasked the ER&EM WG to develop a set of interim EM standards for adoption at WCPFC21 in 2024

³ <https://meetings.wcpfc.int/node/17866>

- 3rd May 2024: the initial draft set of proposed interim EM standards was recirculated incorporating all feedback received. Further, IWG members were informed that a virtual session of the IWG would be held on 31 May 2024.
- 22 May 2024: further supporting information on more general EM-standard related matters was provided ahead of the virtual session.
- 31 May 2024: a virtual meeting of the IWG was held and included participants from 14 CCMs and 12 observer delegations.

The current ‘Chair’s’ paper draws on feedback received through these engagements.

WCPFC EM Program (Interim standards and approach)

To support the Commission in adopting a set of interim EM standards at WCPFC21 in December 2024, I propose the high-level framing for a WCPFC EM program, along with interim technical standards, and a reporting and assurance framework.

Scope

As a starting point for EM in the WCPFC, there has been clear direction from the Commission and its subsidiary bodies that increased data collection, monitoring and verification is required for longline fishing, in particular longline fishing that occurs on the high seas. Further, that any use of EM would be in addition to current observer requirements.

SC19 recommended ([SC19 outcomes paragraph 19](#)) that the Commission explore options to expand the observer coverage on longline vessels through both human and electronic approaches in the WCPO so that the SC can provide better estimates of bycatch levels and other metrics from these fleets. Likewise, TCC19 reaffirmed ([TCC19 outcomes paragraph 20](#)) the importance of increasing monitoring and observer coverage in the longline fishery, including through the implementation of electronic monitoring.

Therefore, as the first stage in developing an EM program, the following section focuses on the use of EM in longline fisheries. It is recognized that there is also strong interest in the potential use of EM for monitoring both longline and purse seine transshipment activities and these could be tackled during 2025.

It is proposed that the SC and TCC discuss and recommend the following to the Commission:

Recommendation 1: The Commission agree that the initial scope of the WCPFC EM program is for longline, with a particular focus on high-seas activities.

Recommendation 2: The Commission agree that subject to agreement of interim EM standards, including minimum EM data requirements, for longline, that work be initiated to extend the WCPFC EM program to longline transshipment activities.

Management or monitoring objectives for longline

Clearly defining the management or monitoring objectives for EM is critical. These objectives will help determine many of the technical requirements at the operational or system level, for example, the number and position of cameras, the quality (e.g., framerate and resolution) of the EM records collected, the timeliness of footage submission and review (e.g., is it needed in near

real time or can it be reviewed after a trip is complete), and the rate and nature of footage review (e.g., is it a census review, an audit checking against fisher reporting, or a random sample).

Generally, there are four potential monitoring objectives for a longline fishery (paraphrased from the [SC project 93 report](#)):

1. Verification of retained catch, in particular, those species subject to catch limits. This objective is typically met with a camera directed at the processing area on the deck of a vessel.
2. Estimation of non-retained catches, in particular protected species. This objective is typically met with one or more cameras directed over the side of the vessel as these animals are often not brought on-board the vessel.
3. Verification of use of required mitigation approaches. Depending on the requirement and the layout of the vessel, this may require a specific camera to be directed at the setting area on a vessel (e.g., tori line use) and/or may best be verified using another monitoring tools (e.g., vessel inspections to check branch line weighting)
4. Collection of size information for retained catch. This may be achieved using the same camera for 1 above but could require one or more specific cameras and either specific deck markings or another approach to allow calibration for size estimation.

Catch limits are in place and apply to most CCMs under CMMs for Swordfish ([CMM 2009-03 paragraph 2](#)), for NP Striped Marlin ([CMM 2010-05 paragraph 1](#)), for Bigeye ([CMM 2023-01 paragraph 38](#)) and for Pacific Bluefin (CMM 2023-02 [paragraphs 03](#) and [04](#)). The Commission has noted the general limitation of TCC's assessments of compliance by CCMs with all billfish CMM limits, because they are based on self-reported information, and further noted that there will continue to be limited data available to the Secretariat to independently verify the reporting by CCMs of compliance with these limits until the levels of independent monitoring are improved significantly through increased observer coverage and implementation of E-monitoring (WCPFC20 Summary Report paragraph 704).

The Commission has also adopted several CMMs to mitigate the impacts of fishing for tuna and billfishes, on these non-target, dependent and associated species (NTADs).]

- [CMM 2022-04](#) - Conservation and Management Measure for Sharks
- [CMM 2019-05](#) - Conservation and Management Measure on Mobulid Rays caught in association with fisheries in the WCPFC Convention Area
- [CMM 2018-04](#) - Conservation and Management of sea turtles
- [CMM 2018-03](#) - Conservation and Management Measure to mitigate the impact of fishing for highly migratory fish stocks on seabirds

Increasing the levels of independent monitoring, including through EM, would provide additional data and information that can be used by the Scientific Committee to monitor and better understand ecosystem impacts of fishing activities. The information will also be available to support evaluations of the effectiveness of these CMMs in minimising impacts of fishing on these NTADs.

Recommendation 3: The Commission agree that the primary objective of the WCPFC EM program for longline be to help verify reported catches of those species and stocks subject to catch limits.

Recommendation 4: The Commission agree that secondary objectives of the WCPFC EM program for longline be to collect appropriate information and verify other relevant requirements under: CMM 2204-04 (sharks), CMM 2019-05 (mobulid rays), CMM 2018-04 (sea turtles), and CMM 2018-03 (seabirds).

Minimum technical standards for longline

In preparing these minimum standards I have been particularly mindful of two factors:

- many WCPFC fishing vessels operate in one or more EEZs and on the high seas. Further, there will be vessels that participate in fisheries in different RFMOs – sometimes within the same fishing trip; and
- the standards need should be useful to both CCMs who are in the early stages of their EM journey and to the Commission as a whole in determining the ‘bottom-line’ or ‘musts’ that need to be met for an EM Program to meet the needs of the Commission.

In early January I reviewed available material from IATTC, IOTC, ICCAT, and the FFA . I also met with key members of the IATTC Secretariat. I decided to recommend that the IWG would use the draft EM SSPs that had been endorsed as interim guidelines by FFA members, as a starting point for developing interim EM Standards for WCPFC. These were provided to WCPFC in 2022 ([WCPFC19-2022-DP-08](#)). In doing so it was recognised that these SSPs were not specifically developed for adopting as WCPFC EM standards.

A summary of these SSPs, and my thoughts on how they might be used within a WCPFC context, are provided in *Appendix 1*. It is likely that there are several additional elements within the other SSPs which would be of value to include, in particular, as consideration of the reporting and assurance process is developed. Further, these SSPs cover a range of matters which are critical to developing a cost-effective EM program that can meet both scientific and compliance and monitoring needs.

To balance the need for interim EM standards to be useful to CCMs whilst also setting a clear bottom line for the Commission I have chosen to apply the MuSCoW Method⁴ to the assessment of the standards. Briefly, this approach assesses each individual requirement and determines which of these three priority levels is assigned to it:

- **MUST** – features that an EM System or EM Program must have or meet, i.e., they represent bottom-line requirements. Evidence for these ‘musts’ could be subject to an assurance process;
- **SHOULD** – features that could be very useful to have, but are not strictly required at this time; and

⁴The **MuSCoW method** is a prioritization technique used in management, project management and software development in order to reach a common understanding with stakeholders on the importance placed on the delivery of each requirement. For our application I have not included any ‘W – Won’t have’ requirements.

- COULD – features that are much less critical but could provide greater assurance or reduce program costs.

A glossary of EM-related terms and the proposed interim EM standards are provided in *Appendix 2*. Note that these do not reflect an agreed position from the ER and EM IWG but do reflect the significant input received. I have specifically highlighted sections where further discussion is warranted. Please go [here](#) to see the previous version of the standards complete with annotations and comments from IWG participants.

Recommendation 5: The Commission adopt these as interim EM standards for the WCPFC EM program.

Recommendation 6: The Commission direct the ER and EM IWG to draw on standards and associated materials from other RFMOs to identify potential improvements that could be made to give, as appropriate (i.e., without compromising decisions on scope, monitoring objectives, or reporting obligations on CCMs), greater consistency in EM standards across RFMOs.

EM data requirements for longline

It is generally agreed that the primary role of EM is to complement some of the functions currently performed by observers, noting

“The objectives of the Commission ROP shall be to collect verified catch data, other scientific data, and additional information related to the fishery from the Convention Area and to monitor the implementation of the CMMs adopted by the Commission.”

Therefore, a starting point for the establishment of minimum EM data requirements is the [ROP minimum standard data fields](#). The typical approach is to review these data fields from the perspective of what is possible from EM (from either the EM records or the associated meta-data). Many countries and RFMOs have conducted this type of exercise (e.g., see an assessment undertaken for the Hawaiian longline fleet against their own observer data requirements - [available here](#)) and I am aware that currently the FFA and SPC members are undertaking this type of exercise through their Data Coordination Committee.

I am also aware that recent meetings of the Commission and its subsidiary bodies have included discussions regarding monitoring and verification. Further, in reviewing the non-target CMMs I noted that there were many requirements which are not currently reflected in the ROP minimum data standards. Therefore, I anticipate that additional information, not captured within the current ROP minimum standard data fields, may be necessary to meet the proposed primary and secondary objectives proposed above.

There are at least these three potential options for the Commission with respect to minimum EM data requirements and I am specifically interested in views on both the options below and the approach to take this work forward⁵:

1. Adopt minimum EM data requirements based on the ROP requirements (plus any others identified) but associated with a 'MUST / SHOULD / COULD / WON'T' assessment which gives CCMs specific guidance on what is necessary;
2. Adopt the ROP data requirements as 'non-binding guidance' for CCMs and allow CCMs to use alternative mechanisms or simply not collect certain data. CCMs would document their chosen approach in their EM program description (see *Appendix 3*); or
3. Not immediately adopt any minimum EM data requirements and leave it to CCMs to determine what information to collect during an interim period.

Option 1 is clearly the desired approach but will unlikely be possible unless progress can be made through the SC, TCC, and likely additional intersessional work. Option 3 is clearly the least ideal and leaves the risk that CCMs may provide EM data in a format that cannot easily contribute to the work of the Commission. Whilst Option 2 provides an intermediate option, it does put the onus on individual CCMs to undertake their own analysis which could be a significant undertaking. Any progress that can be made by the SC and TCC could assist CCMs if Option 2 is progressed as an interim step. If either option 2 or 3 is chosen by the Commission, it is recommended that the Commission specifically request further work during 2025.

It is clear that, even putting 'collection of biological samples' to one side, there will be many ROP data fields that either (a) cannot be obtained at all from either EM records or associated meta-data; or (b) could be obtained, but at a significant cost, e.g., installation of additional cameras, sensors, or longer EM record review times. The exercise proposed under 1 and 2 above needs to consider factors such as whether the information is actually required, whether it is required, but could be captured some other way, or whether it is required and should be captured, but may not be needed for every EM record reviewed.

Some examples where flexibility might be appropriate:

- Size composition of the retained catch: It may be possible to collect size composition data through sampling during the unloading process or at a processing of sale (auction) facility. This approach is currently used for longline catches from Hawaiian, Australia, and New Zealand longline fleets. Note, it is important the time and catch location is collected at the appropriate resolution required for stock assessment.
- Line weighting and/or hook size/type requirements: it is extremely unlikely that fishers would have two sets of gear (e.g. one compliant, but not used and one non-compliant that is used), therefore these types of data fields could be collected and/or verified (if fishers are required to report them) through port or at-sea inspections.
- Bycatch versus retained catch verification – bycatch is often caught less frequently so a higher level of review would be needed to obtain the same level of precision as a more

⁵ i.e. depending on progress with respect to the interim EM technical standards and availability of time at TCC, minimum EM data requirements could be the focus of a specific session of the ER and EM IWG at or in the margins of TCC.

commonly taken species. Therefore, it might be appropriate to have an EM record review process that, for example, estimates bycatch for all records reviewed, but retained catch for only a subset.

It is also recognized that the advances in the use of AI mean that in the future some data fields may be able to be collected using AI. Any agreed EM data requirements could consider how AI could be used and what verification of AI might be necessary.

Recommendation 7: subject to progress made through the ER and EM IWG, SC, and TCC during 2024, that the Commission agree to either 1, 2, or 3 above. If it is 2, or 3, the Commission should direct its subsidiary bodies and the ER and EM IWG to undertake the work needed to allow the Commission to agree to option 1 at WCPFC22 in 2025.

Assurance around the operation of EM programs within the WCPFC

A focus on the use of EM within the WCPFC will need to be on developing the assurance process around its use. Whether it be an EM program operating to enable a CCM to meet their obligations under the Commission or for a CCM voluntarily using EM to collect more data to further the work of the Commission (e.g., for science purposes or for supporting improved verification of implementation of catch limits), it will be critical to know that minimum requirements for the EM program are being met and sufficient operational context (e.g., how vessels were selected for EM and how footage was selected for review) is available.

Here I propose that this assurance process be split into (1) information that a CCM is required to provide; and (2) how the Commission chooses to use, and potentially verify, this information.

Information a CCM is required to provide

A proposal for the information that the Commission may require a CCM to provide regarding their EM program is provided *Appendix 3*. It is anticipated that the agreed reporting details would be reflected in updates to the appropriate reporting template, for example the Annual Report Part 1 and/or Part 2 so that information available to WCPFC about CCMs implementation of their EM program is kept current.

If EM is being used to increase data collection and/or to attain minimum monitoring coverage rates of fishing activities, then the section above relating to minimum EM data standards would be relevant and the CCM would be expected to provide EM data to the required standard and within the required timeframes.

If a CCM is voluntarily using EM to collect more data to further the work of the Commission, then there may also need to be a notification process whereby the CCM confirms their intention to opt in and would provide information based on the reporting template.

Including an assessment of how standards are being met, even if they are voluntary, could support awareness of CCM capacity needs and provide lessons learnt on issues. I understand that this type of approach is considered within the ROP assurance framework.

Commission verification of a CCMs EM program

There was a general acceptance from IWG participants of the importance that the Commission have confidence that CCMs are properly meeting EM program requirements when using EM to meet their WCPFC obligations.

There is a question as to the timing of establishing such a process, i.e., whether the process be put in place at the same time as the reporting requirements above, or whether it follows shortly after, allowing for 'starting slowly and learning'. My initial thinking is that the latter is probably more realistic, given that after interim standards are adopted, there would be additional tasks to operationalize the standards. For example, work will need to be done to elaborate guidance on what questions and information would need to be checked/observed during the audit/assurance process to determine if a program is fulfilling the required standard, or whether the program may need assistance to help achieve the required standard. Supplementary resources should also be considered, so that the Secretariat has access to appropriate technical expertise, whether it is internal or external, so as to effectively support the development and implementation of a pilot assurance process. There is strong interest in further discussion on this matter, and below are some of the points that have been raised through the IWG:

- whether information provided by CCMs should be in the public domain or not (i.e., are elements commercially sensitive);
- that the approval and audit procedures used to confirm that national or subregional observer programs meet WCPFC's ROP standards for the Regional Observer Program provide a useful starting point (<https://cmm.wcpfc.int/supplementary-info/supplcmm-2018-05-1>);
- any verification process should focus on the MUST technical requirements, and some elaboration of guidance may need to be developed to support this;
- there could be process and cost efficiencies in conducting audit of a CCMs observer and EM programs in parallel;
- High Seas Boarding and Inspections (HSBIs) and Port Inspections provide an opportunity to verify on-board system components; and
- an EM audit should include a review of footage to assess the reliability of EM data

Many of these processes fit within the mandate of the Technical and Compliance Committee (TCC) so it will be important to align IWG and TCC work programs to progress this work efficiently.

Recommendation 8: The Commission adopts as an interim reporting template the Appendix 3: CCM reporting on their EM program and activities. Relevant CCMs are requested to provide a description of their EM program in Annual Report Part 1 submitted in 2025. The ER and EM IWG, SC21 and TCC21 are requested to review and provide recommendations on any changes to the reporting template.

Recommendation 9: The Commission notes the importance of establishing a WCPFC assurance process for EM Programs, and directs the ER and EM IWG, SC21 and TCC21 to prioritise work, including the development of guidance to support the audit/assurance process, in support of developing a WCPFC Assurance Process in 2025.

Appendix 1: Summary of FFA member EM Standards, Specifications, and Procedures – adopted as interim guidelines

Table 1: Summary of the Standards, Specifications, and Procedures (SSP) included in the FFA member paper WCPFC19-2022-DP-08

EM Program component	General description	Chair's Comment
1a. On-board EM systems	<p>This relates to all vessel components supporting the acquisition of and reporting of EM Records, associated meta-data, including system health status. These includes high level specifications relating to EM record transmission and security.</p> <p>It also includes standards relating to the installation, operation and servicing of EM Systems, including steps to be taken in case of malfunctions.</p>	These standards (subject to the feedback provided through the IWG) are contributing to interim EM standards for WCPFC.
1b. Data Review Centres (DRC)	This relates to entities that review EM records to produce EM data and also may monitor system health status.	These standards (subject to the feedback provided through the IWG) are contributing to interim EM standards for WCPFC.
1c. EM System Certification	This provides some options and standards that could be used to certify EM systems for use within an EM Program.	This SSP has not been considered at this stage, however elements of this SSP could contribute to an approval and assurance process for the WCPFC EM program.
2a. EM records transmission	Further detail regarding how EM records are transferred from the EM System on the vessel and made available to a Data Review Centre.	This SSP has not been considered at this stage, however elements of this SSP would be of value to CCMs developing their own EM program, in particular, reducing risks regarding loss of information.
2b. EM records analysis and quality assurance	Further details are provided regarding specific activities conducted in a DRC, including quality assurance processes regarding the quality of EM data.	This SSP has not been considered at this stage, however elements of this SSP could contribute to an approval and assurance process for the WCPFC EM program. This will be particularly important if the Commission has specific requirements around coverage rates and or verification procedures.

<p>2c. EM records and EM data storage</p>	<p>This provides details as to how EM records and ER data should be stored.</p>	<p>This SSP has not been considered at this stage, however elements of this SSP, in particular, those relating to storage of EM records, could contribute to an approval and assurance process for the WCPFC EM program.</p>
<p>3. EM records and EM data ownership and access</p>	<p>This provides a framework for EM record and EM data ownership and related roles and responsibilities.</p>	<p>This SSP has not been considered at this stage, however elements of this SSP, in particular, those relating to ownership of EM records, will be important if EM records are required to be submitted to the WCPFC.</p> <p>The standards relating to data custodial roles will be of relevance to CCMs for whom data privacy are important.</p>
<p>4. EM records and EM data security and confidentiality</p>	<p>This provides a framework for ensuring the security of EM records, including data retention policies.</p>	<p>This SSP has not been considered at this stage, however elements of this SSP, in particular, those relating to retention timeframes for EM records, could contribute to an approval and assurance process for the WCPFC EM program.</p> <p>The standards relating to data security roles will be of relevance to CCMs for whom data privacy and chain of custody (critical for use of footage for prosecution) are important.</p>

Appendix 2: Glossary and technical Electronic Monitoring standards

Proposed Interim Standards, Specifications, and Procedures (SSPs)

This document addresses the following Standards, Specifications, and Procedures (SSPs):

[SSP1a](#): On-board EM systems

[SSP1b](#): EM hardware and software in Data Review Centres (DRCs)

Terms and Definitions

ALC - Automatic location communicator (ALC) means a near real-time satellite position fixing transmitter which meets minimum standards for ALCs used in the Commission VMS and has been approved by WCPFC in accordance with CMM 2014-02 (or its replacement CMM).

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.

Cold Data Storage - The storage of inactive data that is rarely used or accessed. Cold data storage takes longer to access but is generally much cheaper to store.

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.

Custodian - A person or organisation designated by the EM records and EM data owner to manage authorization and storage of EM records and EM data. There may be a different custodian for records and data.

Data Records - Actual records or entries in a data file or database.

Data Review Centre (DRC) - A facility or entity with supporting software platform(s) used to analyse e-monitoring records and record e-monitoring data.

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 e-monitoring records and record e-monitoring data in accordance with the EM standard and analysis procedures.

EM Analysis - See EM Records Analysis/Interpretation.

EM Analysis Rate - The proportion of e-monitored records that are analysed.

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

EM Data - Data produced through analysis of e-monitoring records that conforms with the data standards specified in the SSPs.

EM Data Quality Reviewer – A EM Analyst who reviews EM Data to verify and validate information produced by the EM Analyst.

EM Program - A process administered by a national [or subregional?] fisheries agency/authority? [regulator(s)] [Chair: is there a better term commonly used for other WCPFC systems?] [of the flag state] that includes the use of EM systems on vessels to independently collect and verify fisheries data and information.

EM Records - Footage (still images and video) and sensor data recorded by an EM System that can be analysed to produce EM Data. 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/Interpretation - The process of an EM Analyst reviewing EM records and converting them into 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 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 collection of EM records from the time of a vessel's departure from port until the return to port. [Chair: For some large longline vessels 'port to port' could be many months and I understand that this came up in 2023 in the context of defining trips related to transshipments and may be revisited at SC20 and TCC20].

Geolocation device - A device that is used to capture information on vessel position, speed, and heading.

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

Machine Learning (ML) - A subset of AI that refers to the use and development of computer systems that are able to learn and adapt without following explicit instructions, by using algorithms and statistical models to analyse and draw inferences from patterns in data.

Observer - personnel who are trained under a common framework (WCPFC ROP and other accredited national or sub-regional programs etc) to observe, collect, record and report on fishing activities both at sea and in port.

Owner - The CCM Member or entity that owns the EM Records and EM Data.

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 data⁶.

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 Programs.

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

⁶ [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.”

SSP: Onboard EM Systems

Onboard EM Systems comprise all vessel components supporting the acquisition of and reporting of EM Records. Onboard EM Systems shall be configured such that they collect the information set out in a relevant WCPFC agreed minimum data standards. The core EM System components covered in these 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 (See System Health Status). 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. MUST 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 surely. To secure EM records, the system SHOULD be equipped with applications such as user logins, EM record encryption and firewalls. h. SHOULD store all EM Records on storage devices and in formats that are compatible or can be readily translated into formats that are compatible with DRC hardware and EM review software.
2. <i>User interface</i>	The onboard user interface:

On-board EM System component	SSP
	<ul style="list-style-type: none"> a. MUST include a display on the vessel. b. MUST include software that shows EM system health status (<u>System Health Status</u>) 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.
3. <i>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 collect, in accordance with WCPFC measures. c. Cameras MUST, capture imagery that meets image quality standards under typical fishing conditions that allow for an EM Analyst to extract all required data fields. As a minimum standard⁷ [Chair: there was overwhelming feedback that these minimum standards for resolution etc. needs to be a MUST, however further discussion is needed to determine the appropriate values and this has implications across RFMOs] <p style="margin-left: 20px;">:</p> <ul style="list-style-type: none"> 1. Frame rate [MUST/SHOULD] be no lower than [x/5fps] for any imagery requiring identification of catch or bycatch; and 2. Resolution [MUST/SHOULD] be no lower than [x/720p] for any imagery requiring identification of catch or bycatch <ul style="list-style-type: none"> b. See also (<u>Vessel Monitoring Plan</u>) c. COULD be capable of accommodating remote or onboard configuration of parameters to optimise camera functionality throughout a typical fishing trip;

⁷Other camera configurations (e.g. shutter speed, bitrate etc.) may vary to balance collection of adequate footage versus storage needs

On-board EM System component	SSP
	<p>Recorded imagery:</p> <ul style="list-style-type: none"> d. SHOULD 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. e. SHOULD include a timestamp, GPS location, and WCPFC VID (vessel identification information) on the video or image. [Chair: it was generally agreed that it MUST be possible to link footage to this information (i.e., collect as meta-data), but it need not be a 'MUST' to watermark it at the point of footage capture.]
4. Geolocation data and device	<ul style="list-style-type: none"> a. A geolocation device⁸ MUST record vessel location coordinates and the associated date and time in a format capable of integration with EM Records 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. c. The EM system SHOULD 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. d. The EM system SHOULD be able to verify whether transmissions of geolocation data and associated date and time, and vessel identification information to DRCs are successful. 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.

⁸ The EM system may use an existing geolocation device on type-approved hardware on the vessel (e.g., ALC) or have its own geolocation device.

On-board EM System component	SSP
	<ul style="list-style-type: none"> f. The vessel location and timestamp data from the geolocation system MUST] be associated with the EM records.
5. <i>Uninterruptible power supply</i>	<p>The EM system SHOULD include a UPS in the event that the main source of power is interrupted.</p>
6. <i>Sensors</i>	<ul style="list-style-type: none"> a. EM systems SHOULD be outfitted with sensors, which may include the use of camera imagery as a synthetic sensor, to capture information about fishing activity. These may include, but are not limited to: <ul style="list-style-type: none"> i. Pressure sensors ii. Hydraulic or drum rotation sensors iii. Temperature sensors iv. Door open/closed sensors v. Proximity sensors vi. RFID readers b. 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.
7. <i>Communication system</i>	<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 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

On-board EM System component	SSP
	<ul style="list-style-type: none"> i. 3G, 4G, or 5G cellular networks. ii. Wi-Fi iii. Satellite communications. <p>c. The EM system SHOULD be able to verify whether transmissions of data on system health (including still images), sensors, and geolocation to DRCs are successful.</p> <p>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.</p>

General Requirements for onboard EM Components

<p>1. <i>Weather Resistance</i></p>	<p>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.</p>
<p>2. <i>Tamper Resistant and Tamper Evident</i></p>	<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 shall 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.
<p>3. <i>Compatibility with Other On Board Equipment</i></p>	<p>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).</p>
<p>4. <i>Compatibility with DRC Review Software</i></p>	<p>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.</p>
<p>5. <i>Capable of Spatial Calibration</i></p>	<p>An EM system SHOULD have capability for spatial calibration for accurate image and fish length measurements. [Chair: does this require something to be added to the section on camera placement and measurements]</p>
<p>6. <i>System Health Status</i></p>	<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) . [Chair: feedback not yet incorporated AU - Suggested edit noting that there are different tests that can be carried out (e.g., testing camera views, gear sensor inputs that require activation etc).</p>

ISSF - Cross reference with Table 1 On-board EM System component, 1: Control Centre - b. MUST be powered on and remain on while the vessel is underway and during all fishing activity including during any at sea vessel rendezvous activity. Consider how these two work together.]

- a. The EM system MUST be able to generate a log file including, but not limited to, the following EM processes to capture the operational health status of the system:
 - i. System power up
 - ii. System shutdown planned
 - iii. System shutdown unplanned (e.g., power cut)
 - iv. Camera connectivity
 - v. Camera recording start and stop times (planned)
 - vi. Camera recording error⁹
 - 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
- 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.
- 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.

⁹The 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>The EM Service Provider or their designated installer:</p> <ol style="list-style-type: none"> a. MUST coordinate installation with the vessel owner or their designated representative. b. MUST install an onboard EM system that meets the performance standards described in <u>onboard EM System Component</u> and <u>General Requirements</u>. c. MUST ensure the onboard EM system meets the performance standards described in <u>onboard EM System Component</u> and <u>General Requirements</u> through system tests. d. MUST provide the necessary information for the vessel owner/operator or their designated representative to complete a Vessel Monitoring Plan (<u>Vessel Monitoring Plans</u>) or complete the Vessel Monitoring Plan on behalf of the owner/operator. e. MUST 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 (<u>Vessel Monitoring Plans</u>). 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 <u>onboard EM System Component</u> and <u>General Requirements</u>.¹⁰ <p>The vessel owner or their designated representative:</p>

¹⁰ Note: A standardised regional form could be useful for this purpose

Installation, Operation, and Service of onboard EM Systems	
Requirement	SSP
	<ul style="list-style-type: none"> a. MUST provide information¹¹ 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.
<i>2. 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 EM Program for approval.¹² b. A copy of the Vessel Monitoring Plan MUST be kept on board the vessel. 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. General vessel information as specified in the vessel identification section of the latest version of the regional minimum data field standards. 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

¹¹ Note: A standardised regional form could be useful for this purpose

¹² Note: A standardised regional form could be useful for this purpose

Installation, Operation, and Service of onboard EM Systems

Requirement	SSP
	<p>items, tools, or areas on the vessel that EM to support estimation of lengths of fish caught. [Chair: This is a bit too vague – would be grateful for guidance on the types of things on the vessel that require measuring, including the precision, to allow EM to be used to measure the length of fish caught.]</p> <p>iv. A description of the EM setup:</p> <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 ○ Software and Firmware versions ○ Spatial calibration settings, if applicable <p>v. MUST include any catch handling procedures required to ensure that EM Records collected allow for an EM Analyst to generate EM Data for all the required data fields (e.g., handling in view of cameras, allowable discard locations).</p> <p>vi. MUST include vessel duty of care responsibilities to prevent system malfunctions and ensure effective operation of the system, such as:</p> <ul style="list-style-type: none"> ● Verifying system functionality at the beginning and throughout the duration of each trip

Installation, Operation, and Service of onboard EM Systems	
Requirement	SSP
	<ul style="list-style-type: none"> ● Instructions for cleaning camera lenses <p>vii. MUST include vessel responsibilities in the event of system malfunctions that describe the steps that must be taken.</p>
<p><i>3. Field and Technical Support Services</i></p>	<p>The EM Service Provider, in a timely manner, SHOULD:</p> <ol style="list-style-type: none"> 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 <u>onboard EM System Component</u> and <u>General Requirements</u> 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: <ol style="list-style-type: none"> 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.

Installation, Operation, and Service of onboard EM Systems

Requirement	SSP
	<ul style="list-style-type: none"> 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. <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 software platform(s) used 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. SHOULD 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. MUST 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 automatically [Chair: What does automatically mean] 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 relevant databases used in regional fisheries management organisations to store information on fishing activity. h. COULD be able to import EM records (and related sensor 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. SHOULD have proper ergonomics that support analyst well-being, quality, and efficiency.
<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. The EM Analysts:</p> <ul style="list-style-type: none"> a. MUST complete an appropriate training program which covers materials including (but not limited to): species ID, basic fishing practices, and EM review processes). b. MUST have an absence of fisheries-related convictions. c. MUST be independent from fishing-related parties including, but not limited to, vessels owners and operators, dealers, processors, canners, traders, shipping companies, fishers, or advocacy groups, to prevent conflicts of interest, whether it be a direct or indirect interest that could affect the performance or

DRC Component	SSP
	<p>non-performance of the official duties of the EM Analyst. Any potential conflicts of interest must be declared to their employer and EM Certifier.</p>
<p><i>4. A system to monitor EM System health on vessels</i></p>	<ul style="list-style-type: none"> a. 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. b. The on-shore health monitoring system MUST receive any malfunction alerts (errors and warnings) that have been generated from the onboard health monitoring system. c. The health monitoring system SHOULD be able to display the latest geolocation of all covered EM Systems on a map.

Appendix 3: CCM reporting on their EM program and activities

Any CCM that chooses to implement an EM program to meet WCPFC requirements shall provide a description of their EM program.

This description, to be provided [mechanism TBC but likely either Annual Report Part 1 report or a standalone document], shall include at least the following information:

- an attestation that all ‘MUST’ technical requirements have been met
- an example of the Vessel Monitoring Plans used, including details of camera settings being used;
- details of the individual vessels with EM systems installed;
- a description of the responsibilities of the vessel owner/crew with respect to installing and maintaining equipment, including routine cleaning of cameras, and responding to mechanical or technical failure of the EM system;
- protocols for EM record data storage and retrieval;
- details of any minimum EM data requirements which are met by means other than the review of EM records and associated meta-data;
- details of any WCPFC Conservation and Management Measures (CMMs) measures where the use of EM is necessary for the CCM to meet their requirements, including any protocols for reporting and following up on potential infringements detected through EM.

The following be included within the Annual Report **Part 1**:

- results of the implementation of its EM program during the previous year, including, at least, the number of vessels and fishing effort monitored; the coverage levels achieved by fishery and gear type; details on how footage for review was selected and how those coverage levels were calculated; and, where appropriate, information on compliance monitoring.

For any CCM that voluntary chooses to use EM for WCPFC fisheries and provide EM data for the work on the Commission, it is recommended that this information be provided to allow the necessary operational context for the use of any EM data.