

INTER-AMERICAN TROPICAL TUNA COMMISSION
AD-HOC WORKING GROUP ON ELECTRONIC MONITORING
2ND MEETING RESUMED

Panama, Panama
27 August 2024

DOCUMENT WGEM-02-02

**DRAFT INTERIM MINIMUM STANDARDS FOR THE USE OF ELECTRONIC
MONITORING SYSTEMS (EMS) IN IATTC FISHERIES**

Green Highlights = provisions that IATTC staff considers extremely necessary to include, especially if EM data collected by EM pilots or EM programs are to be submitted and used by the IATTC staff for fishery management purposes based on reliable fishing data.

Light Blue Highlights = The text highlighted in light blue represents the standards that the staff believes could be made optional

Explanatory Memorandum

~~The EMWG should consider whether the interim minimum standards should be mandatory or voluntary. The options identified by the Co-chairs for consideration are as follows:~~

- ~~1) If a CPC decides to apply the IATTC interim minimum standards to a national EM program, it shall apply the interim minimum standards approved by the IATTC as a national EM program, including pilot studies.~~
- ~~2) If a CPC develops or has an existing national EM program, it may use these interim minimum standards as guidelines approved by the IATTC, but always complying with all the objectives defined as necessary by the Commission to strengthen on-board monitoring.~~
- ~~3) If a CPC has an EM program operating in the IATTC Convention Area, it must apply the IATTC interim minimum standards.~~

~~The Co-chairs view Option 1 as the most viable at this time while the IATTC aims to adopt a comprehensive EM program for the eastern Pacific Ocean in the future. This option would ensure national programs have guidelines that will meet standards that are likely to be incorporated into a future IATTC EM program.~~

~~Please review the following proposal for interim minimum standards that were analyzed and tasked to be prepared in this working group with the technical advice of the IATTC Secretariat. Therefore, it is necessary to review the proposed text and its annexes and indicate whether these interim~~

~~minimum standards are mandatory or voluntary.~~

These draft interim minimum standards are intended to be a potential¹ proposal to the Commission for its consideration of adoption at its 102nd Meeting to be held in Panama City, Panama.

Goal and Scope

1. The purpose of this document is to establish a set of interim minimum standards, hereafter called minimum standards, and specifications for the use of Electronic Monitoring Systems (EMS) in the Antigua Convention area, both on board purse-seine and longline vessels [and on-board carrier vessels engaged in transshipment at sea pursuant to Resolution C-22-03]. These standards are intended to ensure the suitability of electronic monitoring (EM) data collected for objectives of the IATTC~~either scientific or compliance monitoring purposes or both~~, on an interim basis, until such time as the Commission adopts a permanent set of standards in 2026~~5~~, consistent with the work plan developed by the EM workshops.
2. EM is not mandatory in the IATTC at this time, and these standards do not create any independent obligation for Members and CNCPs to implement EMS onboard their fishing vessels.~~These minimum standards are not mandatory, but. Data derived from electronic monitoring shall not be used to satisfy existing IATTC data requirements, including data submission and observer requirements [at this time.] [CPCs that would like to provide the IATTC scientific staff EM data through pilot programs to develop their domestic EM programs using these minimum standards may do so as long as they apply the mandatory items in these minimum standards.] The Commission shall review this Resolution in [2026], consider CPC experiences with the use of EM in IATTC fisheries, and taking into account this review and CPC experiences, discuss the feasibility of allowing for EM to be used as a substitute for human observers to fulfill certain IATTC observer coverage requirements. OR If a CPC decides to use EM to collect fisheries data for submission to the Commission, it must apply mandatory items in the IATTC interim minimum standards to its national EM program [after 2027]. All other items in the IATTC interim Minimum standards will be considered Voluntary.² A mandatory EM Program~~5~~ for the EPO tuna fisheries is yet to be adopted by the Commission, but is expected in the near future based on a work plan developed during the EM Workshops. [but if a CPC decides to use EM to collect fisheries data for submission to the Commission, it must apply mandatory items in the IATTC interim minimum standards to its national EM program [after 2027]. All other items in the IATTC interim Minimum standards will be considered Voluntary. ³] [if a CPCs decides to submit EM data to IATTC, it should satisfy the~~

Commented [1]: Suggest new paragraph

¹ [PEW: These draft interim minimum standards are intended to be a potential proposal to the Commission for its consideration of adoption at its 102nd Meeting to be held in Panama City, Panama.]

² [PEW comment: The second option seems more representative of the discussions held over the last 2 days. As written, it still ensures that the overall standards are voluntary but allows members to use it if they plan to submit EM data to the Commission. This is key to ensure consistency in what the staff receives. The 2027 deadline can be removed as the timeline may be the decision of the Commission].

³ Document EMS-01-02 contains a workplan for the implementation of EMS in the region, which tentatively targets January 1, 2025, or a date to be agreed by the IATTC.

~~requirements of Resolution C-03-05~~ ~~but~~ [This document will reflect a hybrid approach using language as follows:

- **SHALL/MUST** – these are items that an EM System or EM Program must have in order to meet minimum data quality requirements;
- **SHOULD** – features that could be very useful to have, but not strictly required; and
- **MAY** – features that are much less critical

~~[If a CPCs decides to submit EM data to IATTC, it should satisfy the requirements of Resolution C-03-05]~~

~~2- [Deployment and implementation of EMS in purse seine, longline or carrier vessels consistent with these guidelines cannot replace human observer coverage currently required under resolutions C-22-03 (transshipment vessels), C-19-08 (longline vessels) or C-09-04 (purse seine vessels).] (CRI Comment: We value maintaining this point, with the caveat that it be on vessels greater than 24-20 m LOA; due to cost issues, it is difficult to make it mandatory for vessels under 20 meters. It would be important to maintain a transition period until 2027. It has been very difficult to establish a human observer program due to the conditions of the vessels in Costa Rica (they all are smaller than 24 m), so this is a transition period and with the results obtained the replacement of human observers by EM could be established.)~~

3. The EMS terms and definitions adopted by the Commission through Resolution C-21-03, are in Annex 1.

EMS ~~minimum~~ technical standards and minimum data fields

4. ~~EM equipment should~~ ~~must~~ EM equipment shall automatically and autonomously collect EM records to generate the required EM data and ~~should~~ ~~must~~ shall be tamper-evident (i.e., any attempts to tamper with the equipment will be detectable to the EM service provider/vessel owner, and reported to the respective vessel flag authority).
5. The recommended minimum technical requirements, performance standards, and activities that should be covered under EMS and captured by the camera(s) are provided in Annex 2. General recommendations for configurations of ~~for~~ EM equipment (e.g., camera placement and subsequent views) for purse seine and longline are also in Annex 2, but vessels observing these minimum standards shall ~~should~~ ~~must~~ ~~have~~ ~~develop~~ their own Vessel Monitoring Plan (VMP) (see section on VMP below and Annex 4) based on vessel's designs and specifics. The VMP describes how the EM equipment is specifically positioned and configured on board to monitor fishing activities, and through which the CPCs should verify and document that the minimum standards for the use of the IATTC are met. Data obtained from the VMP, and provided by all IATTC EMS observant vessels, would ensure robust assessments on the performance, progress and evolution of the EMS in IATTC fisheries.
6. The minimum data fields that EMS ~~should~~ shall collect for each vessel type are provided in Annex 3.

Commented [2]: Consider deleting with added text above, or keep that below if think its better

Commented [3]: Proposed Chairs' edits.

Commented [4]: ICCAT: EMS shall automatically and autonomously collect required data for each fishing trip and shall be tamper-evident

Commented [5]: ICCAT: CPCs shall ensure that a unique Vessel Monitoring Plan (VMP) for each individual vessel flying their flags on which EMS is to be installed is developed that shall allow the installation of the EMS...

Commented [6]: Maybe something like "the minimum data fields that EMS shall collect for each...Annex 3, unless stated otherwise..." or something that indicates a shall unless says should in that annex

4 Document EMS-01-02 contains a workplan for the implementation of EMS in the region, which tentatively targets January 1, 2025, or a date to be agreed by the IATTC.



EM Vessel Monitoring Plan (VMP)

- 7. ~~If a CPC intends to achieve fisheries data submission or observer coverage by EM, such a CPC should~~ shall develop [and ~~notify~~] [submit] to the Director, an EM Vessel Monitoring Plan (VMP) for each vessel, or groups of vessels (e.g., all purse-seine, or all longline, or all long-line of a certain size range) fishing for tuna or tuna-like species flagged to the CPC and on which EM equipment is to be operated and applying the IATTC minimum standards for EMS. The VMP will describe the configuration, components and installation of EM equipment on each vessel, and this configuration [shall] should be capable of collecting EM records consistent with all relevant [mandatory] minimum standards and technical specifications in this document. A copy of the CPC approved VMP should be maintained aboard each vessel at all times when EM equipment is deployed to monitor vessel's activities. Additional details on VMP contents are provided in Annex 4. ~~(noting that the Commission has not yet approved using EM to satisfy observer coverage requirements)~~
- 8. [Any modification to the VMP, including EM equipment, ~~should~~ shall ~~not~~ be reported to the vessel flag authority for approval, and] promptly notified to the IATTC by the relevant CPC.]

Data Management

- 9. Standards for storage and retention of EM records, data retrieval and data review and reporting are detailed in Annex 5.

Commented [7]: ICCAT: Para 10. ...The VMP shall cover all relevant minimum standards and technical specifications in this Recommendation while optimizing the quality of data the EMS collects from the vessel. A copy of the approved VMP shall be maintained aboard the vessel at all times during fishing operations.

Commented [8]: This would be better in the active voice, but leaving passive to limit changes for now.

Role of the Skipper/Vessel Master

10. The Skipper/Master of the vessel ~~[shall]~~^{should} ensure that:

- ~~[the vessel does not leave port if the EM equipment is not operating properly unless the flag CPC authorizes it to do so];~~
- Chinese Taipei comment: Maybe the coverage rate and the review rate of the EM data should be taken into account? This regulation seems to be not practical.
- in case the EM equipment malfunctions, the malfunctions are reported to the relevant flag authority [COL: and provider] as soon as possible, and in any case within 24 hours;
- on-board physical access to the EM equipment components is provided if requested by the flag authority or any CPC-authorized personnel;
- in accordance with the VMP and the camera views capable of collecting the minimum data identified in this Resolution as specified in Annex 2, the cameras have an un-obstructed view, and that the lenses or lens covers are cleaned, as necessary;
- ~~[the handling of the catch and bycatch, to the extent practicable, allows EM cameras an adequate view the collection of the relevant data fields specified in Annex 2 (e.g., species identification, catch composition, etc.); (Chinese Taipei comment: it seems that we 'll have technical difficulty to handle catch and bycatch.)~~
-
- ~~[the transmission or retrieval of EM records is carried out in accordance with the [mandatory] provisions of Annex 5;]~~
- unless authorized and instructed by the flag CPC [or CPC-authorized personnel, the EM equipment is not tampered with (e.g., disconnect the system, rearrange or obstruct the view of the cameras, disconnect cameras or sensors, switch-off the EM equipment manually, intentionally break the system).

Commented [9]: CHN would like to delete this part

Commented [10]: ICCAT: Para 12. The Master of the vessel shall ensure that:
- the vessel does not leave port if the EMS is not operating properly unless, the flag CPC authorizes it to do so and ensures that any relevant data collection or other ICCAT obligations, such as minimum observer coverage requirements, can be met through other means;...

Commented [11]: If the vessel does not have working EMS, it cannot report the data, but we are not requiring them to use EMS. The goal here is to identify which things are must have if we are going to consider the data to be useable.

Commented [12]: Can be flexible on time, good to establish good practices in this regard.

Commented [13]: ICCAT: Para 12. The Master of the vessel shall ensure that:

...
- the handling of the catch does not hinder the proper identification and estimation of the catch composition by the EMS, including by-catch;

Commented [14]: Some suggested to be mandatory, some optional. Refer to Annex 5.

Commented [15]: Ecuador wants in brackets. Not sure about burdening capt. Stay in brackets until Annex 5 is covered

Commented [16]: ICCAT: Para 12. The Master of the vessel shall ensure that:
...
- the transmission or retrieval of EMS data is carried out in accordance with the provisions of Annex 5;

Roles of the flag CPC

11. CPCs that decide to implement EMS to collect fisheries data for submission to IATTC ~~shall~~ ~~should~~ ensure that the ~~[fishing]~~ vessels flying their flags meet the mandatory elements of the EMS minimum standards and requirements established in this document, including the following:

~~11~~
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Mandato

- that ~~national~~ CPC EM programs are developed, and designed and implemented in a manner that ensures they are transparent and the resulting data verifiable;
 - that the analysis of the EM records in the synthesis of EM data is done by CPC-authorized companies or by CPC institutions or CPC authorities, with the necessary training, knowledge, skills and abilities to ensure effective EM records analysis and EM data generation; this includes sufficiently accurate species identification;
 - that the health status report of the EM equipment on board each vessel under its jurisdiction be provided by the EM service provider or by the EM equipment itself;
 - that rules and procedures are established in case of EM equipment failure and are followed;
 - Voluntary
- that in instances where possible infractions or other actions inconsistent with IATTC requirements, rules and regulations are detected in EM records or data, appropriate follow-up by the competent flag authority is undertaken.

That the EM system can generate a log file including, but not limited to, the following EM processes to capture the operational health status of the system:

- System power up
- System shutdown planned
- System shutdown unplanned (eg power cut)
- Camera connectivity
- Camera recording start and stop times (planned)
- Camera recording error
- Available hard drive space
- Sensor connectivity
- Sensor recording start and stop times (planned)
- Sensor recording error
- Activation and deactivation of recording triggers (eg vessel speed, drum rotation sensors, georeferences, and time scheduled)

12. [A CPC that decides to ~~implement an EM program consistent with these minimum standards and which intends to~~ submit EM data collected by its national program for inclusion in the IATTC databases shall ensure that their programs meet the requirements in this Resolution and ~~shall~~ ~~should~~ submit an EM program description to the Director detailing, at a minimum, the

Commented [17]: ICCAT: Para 13. . CPCs that choose to implement EMS to meet ICCAT requirements specified in separate ICCAT recommendations (e.g., regarding observer coverage), shall ensure that the fishing vessels flying their flags meet the EMS minimum standards and requirements established in this Recommendation, including ensuring the following:
- that domestic EMS programmes are developed, and designed and implemented in a manner that ensures they are independent, transparent, and accountable, in accordance with requirements set out in this Recommendation;
- that the analysis of the EMS data is done by CPC-authorized independent companies or by CPC institutions or CPC authorities, with the necessary knowledge, skills and abilities to ensure effective data analysis, including sufficiently accurate species identification;
- that rules and procedures are established in case of EMS failure, including to ensure that any relevant data collection or other ICCAT obligations, such as minimum observer coverage requirements, can be met through other means;
- that appropriate follow-up is undertaken if potential infringements of ICCAT conservation and management measures are detected through the CPC's EMS programme.

Commented [18]: CHN requested to be in brackets because it is new and has not been discussed by WCPFC

Commented [19]: These are taken from WCPFC draft interim standards.

Commented [20]: ICCAT: Para 14. ... The EMS domestic programme shall meet the requirements in this Recommendation and include at least the following information:

Commented [21]: Chairs recommend retaining the elements below as requirements.

following information:

- an example of the VMPs used in the program;
- responsibilities of fishing authorities and vessel owner/crew with respect to installing and maintaining equipment, including routine cleaning of cameras, and responses to mechanical or technical failure of the EMS;
- protocols for data storage, retrieval and transfer (**Annex 5**);
- protocols for **internal** reporting and following up on possible infractions that are detected. **CPCs may voluntarily share information on such infractions with the IATTC**

(Chinese Taipei comment: *We believe this will lead back to the discussion of voluntary or mandatory, and the words appears to be mandatory. As we have discussed regarding VMP, we haven't decided whether the VMP should be submitted to the Director. We suggest that this paragraph should be deleted.*)

13. [The EM program description in paragraph ~~12~~ **12** above ~~should~~**shall** be submitted to the IATTC Director prior to the implementation of a program that operates, or when a pre-existing EM national program begins to operate, consistent with these minimum standards. CPCs should report any changes to their EM domestic program to the Director whenever such changes occur.] **(Chinese Taipei comment: This paragraph is related to the one above, and so we suggest it should also be deleted)**

Annual Reporting⁶

15. EM data for each year collected consistent with these minimum standards should be reported to the IATTC Secretariat (datahandlers@iattc.org) **[as soon as practicable]** by [June 30] [or by the end] of the following year, using the formats and guidelines described in **Annexes 2, 3 and 5** consistent with procedures in place for other data reporting requirements and consistent with domestic confidentiality requirements.
16. CPCs implementing EMS consistent with the provisions and standards in this Resolution **[should]****[shall]** submit by [March 30 of ~~the following~~**the following** year] a summary annual report to the Commission describing the implementation of their EM program(s) in the previous year, including, at a minimum, the number of vessels and fishing effort monitored; the coverage levels achieved by fishery and gear type; details on how those coverage levels were calculated; and, where appropriate, information on compliance monitoring so that these reports can be reviewed by **[the EMWG]** or other Commission body, as appropriate.

5 [PEW comment: Paragraph 12 provides a clear choice that these basic requirements only apply to a CPC who decides to submit EM data. Perhaps the edit to remove some of the sentence may help clarify?]

6 [PEW: Annual Reporting]

Commented [22]: Edits to make it clear that this is meant to be CPCs sharing how they will deal with evidence of infractions internally - evidence of infractions derived from EM need not feed into IATTC compliance process at this time.

Commented [23]: This is a common sense provision meant to keep the IATTC informed of national program implementation. It is only mandatory for CPCs that submit EM data collected by its national program for inclusion in the IATTC databases

Commented [24]: Co-Chairs recommend retaining this section, but being flexible on deadlines given the data are not proposed to be used to fulfill IATTC requirements.

Commented [25]: Because EM records require review in order to create EM data, it is unclear how much longer that will take compared to the processing of human observer data. We suggest bracketing these dates for now.

Commented [26]: ICCAT: Para 16. A CPC that chooses to implement EMS in its longline or purse seine fisheries to meet ICCAT requirements for scientific data collection and/or compliance monitoring purposes, shall also:
a) When EMS is used for scientific purposes, report to the SCRS each year, using the electronic formats that are developed by the SCRS, information collected through domestic EMS programmes, in line with procedures in place for other data reporting requirements and consistent with domestic confidentiality requirements; and
b) report to the Commission in its Annual Report other relevant information on the results of the implementation of its EMS domestic programme during the previous year, including, at least, the number of vessels or fishing effort monitored; the coverage levels achieved by fishery and gear type; details on how those coverage levels were calculated; and, where appropriate, information on compliance monitoring

Commented [27]: This reporting will be useful to the WG and the Commission. Co-chairs recommend retaining, with a preference for "shall".

EMWG roles and responsibilities

17. [The EMWG should review, with assistance of the IATTC staff where appropriate, the EMS national reports⁷ submitted pursuant to paragraph 16, as well as the implementation of those programs and, if appropriate, suggest improvements and adjustments to the minimum standards or to meeting the minimum standards.]

Secretariat roles and responsibilities

18. The Secretariat [shall][should]:

- At the request of a CPC and subject to the availability of funding and staff resources, collaborate with the CPCs implementing EM national programs in order to help ~~make ensure~~ that their program is consistent with the ~~se~~ minimum standards, ~~established in these minimum standards and with an emphasis on~~ ensure the quality of the EMS data that will be submitted for inclusion in the IATTC data holdings;
- summarize and provide an annual report to the EMWG about the progress of CPCs in implementing EM national programs.

[COL: 18bis. Notwithstanding the provisions of paragraph 17, the Secretariat may make recommendations to the Commission, its Scientific Advisory Committee and the EMWG on improvements and adjustments to the minimum standards, as well as to the implementation of the EMS in national programs].

Periodic review

19. [The Commission shall~~could~~ review these minimum interim standards in [2026~~7~~] and at least every two years thereafter, or until a final set of EMS standards are adopted. The Commission should evaluate how effectively these ~~se standards~~ fulfilled their purpose and, on that basis, consider whether there is the need to revise them, taking into account, *inter alia*, relevant information provided by CPCs on the inception and implementation of their EM national programs as well as any new technological or scientific developments.]

Commented [28]: Chairs recommend "shall".

Commented [29]: Chairs recommend retaining this suggestion.

Commented [30]: ICCAT: Para 20. The Commission shall review this Recommendation in 2026 and at least every four years thereafter to evaluate its effectiveness in fulfilling its purpose and consider the need for revisions, taking into account, *inter alia*, relevant information provided by CPCs on the introduction and implementation of their EMS domestic programmes as well as any new technological developments.

7 [PEW: The EMWG should review, with assistance of the IATTC staff where appropriate, the EM program description and national reports...]

ANNEX 1/ANEXO 1

EMS terms and definitions adopted by the Commission through Resolution [C-21-03](#)

1. **EM (electronic monitoring):** The use of EM equipment to record a vessel's activities.
2. **EMS (Electronic Monitoring System):** A system for implementing EM aboard vessels, and for collecting, processing, and analyzing the resulting EM records.
3. **EM standards:** The agreed standards, rules, and procedures governing the establishment and operation of an EMS, applicable to all components of the system as they may be used for specified vessels in a specific area and/or type of fishing activity.
4. **EMS Program:** A national or regional program established for implementing an EMS.
5. **EM equipment:** A network of electronic cameras, sensors and/or data storage devices installed on vessels and used to record these vessels' activities.
6. **EM records:** Images and other data recorded by the EM equipment.
7. **EM data:** Data resulting from analysis of EM records.
8. **EM analysis:** The analysis of EM records to produce EM data.
9. **EM analyst:** A person qualified to analyze EM records and produce EM data.
10. **EM review center:** A facility where EM records are analyzed to produce EM data.
11. **EM coverage:** The proportion of the vessels or fishing activities that is effectively covered by the EMS.
12. **EM review rate:** The proportion of EM records that are analyzed to produce EM data.
13. **EM service provider:** Provider of EM equipment and/or technical and logistical services.

ANNEX 2/ANEXO 2

Minimum technical requirements, performance standards, camera view of fishing activities under coverage by EMS, and recommended configurations for EM equipment for each vessel type [\(CRI](#)

[Comment: Is it only for fishing vessels? What about carrier vessels?\)](#)

- The standards need to be purpose and performance oriented, flexible enough and periodically reviewed by the Commission to accommodate technological advances and changes in priorities, as well as the particular requirements of vessels of different sizes, gears, and fishing practices.

EM equipment

~~[The EM equipment installed shall should be capable of working with all existing hardware and software and be adaptable to future technological developments.] (Chinese Taipei comment: It's hard to ensure whether the hardware and software can be adaptable to future technological developments.)~~

- The EM equipment ~~[shall]~~ [should] be protected against onboard power outage, with a backup

Commented [31]: EU and Japan would also like to delete or clarify this paragraph

Commented [32]: Part of ICCAT Annex A.1, which reads: "A.1. The following minimum technical requirements shall be required:..."

Commented [33]: JPN prefers should

power system capable of keep operating until the vessel power is restored (e.g., 30 minutes). It should also be capable of saving EM records collected when the vessel power is down for longer periods than the backup system was designed to withstand.

- Digital video is typically preferred for capturing information during the different phases of vessel activity, but still images can also serve as a viable option, especially due to limited storage capacity. An optimal configuration may involve a camera setting, using video for specific areas, cameras, or moments, while utilizing still photos for others.
- EM records collected by the cameras and sensors [shall/should] automatically include, at a minimum, [location], date, vessel ID, and time stamps, and [to the extent practicable,] integrate with other data collection and monitoring tools (e.g., VMS). (Chinese Taipei comment: Regarding the location, we have been using the VMS and keeping track of all the vessel. If location is included, there will be additional burden for us. We suggest that the location of data be excluded in the minimum standards.)

- ~~The onboard interface [shall/should] include an on-board screen, or equivalent interface, to allow verification by the skipper/crew on the correct functioning of the EM equipment. (COL, in accordance with paragraph 10, if the EM equipment malfunctions, the captain shall report the malfunction to the flag authority and to the provider.)~~

- The EM provider should ensure that radio frequency interference from EM equipment with other on-board vessel communication, navigation, safety, geolocation devices or fishing equipment is prevented.

- EM equipment [shall/should] be tamper-evident/resistant [and send automatic alerts in real time to the appropriate EM program and EM provider in cases of malfunctions, manual activation/shutdown, manual data input, external data manipulation, or attempts to tamper with the equipment or EM records]. It should also be possible for data recording to be controlled manually, but only in case the EM equipment fails to start or stops automatically, and any manual activation should trigger an automatic alert. Manual shutdown should not be permitted.

Cameras

- Cameras [shall/should] be sufficient in number and quality to meet the data requirements of the EMS, with high-resolution images that allow the identification of species, specific fishing activities and the vessel's surroundings.

- ~~Cameras, sensors and other EM equipment that might be installed outdoors should be robust and durable enough to withstand conditions at sea, and the onboard fishing environment. [Onboard EM hardware components shall be sufficiently dust and water resistant and durable enough to~~

Commented [34]: Part of ICCAT Annex A.1, which reads: "A.1. The following minimum technical requirements shall be required:..."

Commented [35]: ICCAT: EMS shall be capable of collecting data:
a) on the position, and, unless the EMS uses cameras that will record continuously, the speed and course of the vessel;...

Commented [36]: Chairs recommend "shall".

Commented [37]: ICCAT: Part of A.1, which reads: "A.1. The following minimum technical requirements shall be required:..."

Commented [38]: ICCAT: see earlier comments as tamper evident was required by ICCAT earlier in text.

Commented [39]: ICCAT: A recommended (optional) requirement in A.2

Commented [40]: Japan prefers to delete this. IN their view, reason for EMS is for collection of scientific data, so ...
EU - we appreciate getting these alerts in case that a timely intervention to correct any errors or warnings. Even if just for science, is good to avoid losing info if possible. USA - ditto USA and COL.

Commented [41]: vessel shall ensure that:
...
- unless authorized and instructed by the flag CPC to take a specific action, the EMS is not tampered with (e.g., disconnect the system, rearrange, or obstruct the view of the cameras, disconnect cameras or sensors, switch-off the EMS manually, intentionally break the system, etc.).

operate reliably under the range of conditions expected in their location on vessels.

- **[CRI comment: IP66/IP67/IP68W] Camera protection rating should be established as a minimum.**
- Cameras should be capable of recording ~~[both video and/or]~~ still images. Video for catch processing shall ~~should~~ have a resolution no less than [720p] and a minimum frame rate of [~~5/10/15~~ frames per second (~~5/10/15~~ fps)]. Photos should have a minimum capture interval of no more than 2 seconds and with resolution no less than 2MP. ~~[Other cameras not involved in the identification of catch or bycatch could have a frame rate lower than 5 fps or resolution less than 720p.]~~
- Placement of cameras should provide clear and unobstructed views of the areas that are being covered.
- ~~The number of cameras to be installed on purse seines should not follow a standardized plan, either it should be customized to the vessel structural design and fishing operations. For example:~~
 - On purse seine vessels, the cameras should cover, at a minimum, the working deck (both port and starboard sides), the net sack and the brailer, the foredeck or amidships, and (if applicable) the well deck and conveyor belt. Descriptions and image for an example of camera locations in class 2-6 purse-seiners is provided in Table 1 and Figure 1.
- On longliners, the cameras should provide, at a minimum, a view of all hooked fauna, both those brought aboard the vessel and, when possible, those discarded or released without first bringing them on the vessel. Descriptions and an image for an example of the camera locations cameras on longliners is provided in Table 2 and Figure 2.
- Cameras should be able to record activities in low and very bright natural light conditions (low and high contrasts). Nocturnal fishing activities involving species captured should be illuminated with sufficient lighting (e.g., longlines). In these cases, the EM service provider should test the quality image to ensure there is not excessive glare.
- Cameras ~~may should~~ provide capability to obtain fish length measurements from relevant camera images, when this is technologically feasible. **Chinese Taipei comment: Providing fish length is not practicable).**

Sensors

- [EM equipment may also include sensors for recording non-visual data (e.g., vessel movement, hydraulic pressure, environmental information), and also possibly mechanisms for activating/disactivating cameras so as to focus visual data collection during activities of interest.]
- A GPS sensor or equivalent shall be capable of automatically recording the position and, unless the EM equipment uses cameras that will record continuously, the speed and course of the vessel.

Data storage

Commented [42]: ICCAT: Annex A, Section B. Recommended, not required: "- Ingress Protection: IP66 Rating. A higher IP for cameras exposed to heavy weather conditions is recommended."

Commented [43]: ICCAT: Annex A, Section B. The following minimum technical specifications for cameras, video recording and analysis, as a part of an EMS, shall be required:
- Resolution: sufficient resolution to meet the purpose of each camera. For cameras used for species identification, no less than 720p, with a minimum frame rate of 5-10 FPS. Still images shall have a resolution of no less than 2MP.
- Measuring capability: capability to obtain fish length measurements from relevant camera images.

Commented [44]: Japan and China prefer the ICCAT version of 5-10 fps

Commented [45]: EU and China prefers to delete this addition. USA agrees

Commented [46]: CCAT: Annex 2. EMS cameras, and where appropriate sensors, shall be installed to properly capture all relevant fishing activity, including those in Table 1 below. [Table 1 describes areas of the vessel, activities, and data fields required; some may overlap with those in the tables below in minimum data fields to be collected in this proposal]

Commented [47]: ICCAT: Annex A, Section B. The following minimum technical specifications for cameras, video recording and analysis, as a part of an EMS, shall be required:
...
- Measuring capability: capability to obtain fish length measurements from relevant camera images.

Commented [48]: China agrees

Commented [49]: China prefers to delete.

- EM equipment shall include sufficient capacity to store all required EM records, including GPS (or equivalent) records position, date, time, vessel name and sensor information, where applicable, at a minimum, for the duration of a fishing trip.
- Vessels should have onboard enough blank data storage devices (preferable solid-state drives) in case these must be replaced at sea. A specially trained crew member may need to replace the devices during a fishing trip if the data storage capacity is exhausted, always in coordination with the EM service provider.
- EM equipment should include separate duplicate backup devices, to ensure that data are not lost if one device fails. (Chinese Taipei comment: The space on the vessel is limited. If EM equipment should be backed up, we don't think there is room for another disc.)
-

Compatibility

- EM equipment should use and generate EM records and/or EM data in a format compatible with IATTC databases and IT resources (e.g., data structure, units, species id/other fishing activity codes, etc.).
- Recorded imagery should be recorded in a widely used and accessible video or image file format, such as MP4 or JPEG.
- All EM Records generated by the EM system shall be compatible with EM analysis software being used by the EM Review Center where EM Records will be sent to generate EM data.

Commented [50]: China prefers to delete this entire section

EM equipment maintenance

- At sea, all maintenance, repairs and replacement activities of EM equipment should be conducted by a designated/specially trained vessel crew member(s), only in coordination and when instructed to do so remotely by the EM service provider.
- On land, all maintenance, repairs and replacement activities of EM equipment should be conducted by an official technician, a technician in coordination with EM service provider.
- Each vessel must have a designated crew member responsible for routine camera lenses cleansing, per a specific protocol, to ensure the clarity of EM records. (according to a protocol to be developed by IATTC scientific staff). The protocol should include the following instructions: the lenses of cameras operating within 10 meters of any fishing activity must be wiped clean before every set; the lenses of all other cameras must be wiped clean once every week. Appropriate cleaning materials must be used to avoid lenses damage and should always be available onboard.

TABLE 1. An example for the ~~first proposal for~~ location of cameras in class 2-6 purse-seine vessels.

Class-6 vessels with 6 or more rows of wells
<ul style="list-style-type: none"> • Two panoramic cameras (e.g., 180°) on crow's nest, covering port side (floating object presence/absence for set type determination and FAD interactions, set times) and starboard side (No. speedboats used in the set, FAD deployment, large-sized bycatch identification, discards, set times). • One camera (e.g., 105°) on back of crow's nest, covering the main deck and sack area (catch and bycatch species identification, discards). • One camera (e.g., 105°) on bridge roof, covering the bow (FAD deployments, retrievals). • One camera (e.g., 105°) on boom controls roof, covering the brailing area (total catch estimation, bycatch identification, discards). • Three cameras (e.g., 105°), each covering equal numbers of well rows (catch and bycatch identification and estimation by species, discards).
Class-5 vessels with less than 6 rows of wells
<ul style="list-style-type: none"> • Two panoramic cameras (e.g., 180°) on crow's nest, covering starboard and port sides. • One camera (e.g., 105°) on back of crow's nest, covering the main deck and sack area (FAD deployments, retrievals). • One camera (e.g., 105°) on boom controls roof, covering the brailing area. • Two cameras (e.g., 105°) covering equal numbers of well rows.
Class-2 vessels with no wet deck access
<ul style="list-style-type: none"> • One panoramic camera (e.g., 180°) on crow's nest, covering the port side. • One camera (e.g., 105°) on back of crow's nest, covering the main deck. • One camera (e.g., 105°) on bridge roof, covering the bow. • One camera (e.g., 105°) on boom controls roof, covering the brailing area.

TABLE 2. A first ~~proposal~~ **example** for location of cameras in longliners.

The following ~~preliminary~~ **are examples of** camera installation design, which ~~are~~ based on information gathered from EM service providers and international initiatives (e.g., Carnes *et al.* 2019):

[Small-sized longline vessels ← ([12-20m] LOA)
<ul style="list-style-type: none"> • One camera (e.g., 105°) on the work deck to identify species • One camera (e.g., 105°) mounted outside the side rail to cover the fish door, where the catch is brought aboard.]
Medium and large-sized longline vessels (> 20m LOA):
<ul style="list-style-type: none"> • One camera (e.g., 105°) at the stern (typically) to record the number of floats, hooks and bait used on the setting. • One camera (e.g., 105°) located amidships, covering the total catch and discards by species, size and fate. • One camera (e.g., 105°) located at the bow, covering the retained catch, by species, size and fate, during the hauling. • One camera (e.g., 105°) mounted on boom, outside the rail where the line is hauled, to record catch evasion, line cutting, etc.

Commented [51]: It would be useful to have a table with proposed location of cameras on transshipment vessels as well.

ANNEX 3/ANEXO 3

Minimum data requirements for vessel type

- Minimum data fields for purse-seine activities to be collected ~~/submitted~~, presented in Table 1.
- Minimum data fields for longline activities to be collected ~~/submitted~~, presented in Table 2.
- Minimum data fields for carrier vessels (to be provided when available in Table 3)

Table 1. A first assessment of data fields that should be collected, at a minimum, for the purse-seine fishery.

TRIP INFORMATION	
Depart port	Port name and country, date/time, position (latitude and longitude, in decimal degrees).
Arrival port	Port name and country, date/time, position (latitude and longitude, in decimal degrees).
VESSEL ACTIVITY	
Position and speed	Every 2 seconds (based on some EM equipment capability), but no less than 60 min.

Commented [52]: ICCAT: Annex 3, Table 3. Data fields for ICCAT purse seine activities to be collected and reported when an EMS is to be implemented for science purposes. These data can be identified by the EMS or estimated through data analysis

SET INFORMATION		
	Set type.	
Set start	Date/time, position (latitude and longitude, in decimal degrees).	
Rings up	Date/time.	
Set end	Date/time, position (latitude and longitude, in decimal degrees).	
Wind speed	Recorded in Beaufort scale.	
Malfunctions	Date/time, description of any major malfunction that stops or delays the setting maneuver.	
CATCH AND DISCARD		
	Target species	Non-target species
Species Id.	Total catch and discards, as feasible as EM technology allows. Combined catch may be reported where species identification is not possible.	Sharks, lamnid sharks, whale shark, mobulid rays, billfishes, scombrids, carangids, triggerfishes, sea turtles, sea birds, and marine mammals, where each individual will be identified to the lowest taxonomic resolution possible (i.e., species), as feasible as EM technology allows. In cases where species identification is not possible, the animal may be identified to a broader taxonomic resolution (e.g., genus, family).
Size	Weight categories should be used whenever possible (i.e., small 2.5 kg - 15 kg).	Wherever possible, individuals shall be measured to the nearest cm as follows: sharks in total length, billfishes in post-orbital fork length, fishes in fork length, rays in disc width, turtles in curved carapace length. In cases where individual measurement is not possible, the animal may be classified by size category (i.e., small, medium, large) following IATTC observer practices.
Condition		When possible, the estimated condition of the individual when caught, brought on deck and released.
Tag		When possible, the tag recovery information recorded.

Fate	Catch retained and discarded, by species, in metric tons.	When possible, the fate of the individual brought on deck (e.g., retained, discarded, etc.)
Floating objects/FADs		
Deployments	Date/time, position (latitude and longitude, in decimal degrees).	
Retrievals	Date/time, position (latitude and longitude, in decimal degrees).	
Visits	When possible - Date/time, position (latitude and longitude, in decimal degrees)	
Buoy ID	When possible – alphanumeric code of the satellite buoy attached	

Table 2. A first assessment of data fields that should be collected, at a minimum, for the longline fishery.

TRIP INFORMATION	
Depart port	Port name and country, date/time, position (latitude and longitude, in decimal degrees).
Arrival port	Port name and country, date/time, position (latitude and longitude, in decimal degrees).
VESSEL ACTIVITY	
Position and speed	Every 2 seconds (based on some EM equipment capability), but no less than 60 min.
SET INFORMATION	
Set start	Date/time, position (latitude and longitude, in decimal degrees).
Set end	Date/time, position (latitude and longitude, in decimal degrees).

Commented [53]: ICCAT: Annex 2, Table 2. 2. Data fields for ICCAT longline activities to be collected and reported when a CPC chooses to implement an EMS domestic programme based on an ICCAT requirement to use EMS to monitor compliance. These data can be identified by the EMS or estimated through data analysis.

8 [PEW: When possible, the fate of the individual caught or brought on deck] [PEW comment: Modified so that species that are released before they are brought on deck are recorded. This also matches up to the Condition row.]

Hauling start	Date/time, position (latitude and longitude, in decimal degrees).
Hauling end	Date/time, position (latitude and longitude, in decimal degrees).
Haul direction	Start to end; end to start.
Blue-dyed bait used	Yes – No, <u>as feasible as EM technology allows.</u>
Baskets or floats	Total number used in the set.
Hooks	Total number used in the set.
Wire traces on any branch lines	Yes – No, <u>as feasible as EM technology allows.</u>
Shark lines	Number of branch lines running directly off the longline-floats or drop lines, <u>as feasible as EM technology allows.</u>
CATCH AND DISCARD OF TARGET AND NON-TARGET SPECIES	
Species id.	The species identification of each individual caught, where each individual will be identified to the lowest taxonomic resolution possible (i.e., species), as feasible as EM technology allows.
Size	Size of each individual caught, using the recommended measurement approach and the appropriate measurement code (standard, furcal, post-orbital, width of the disc, etc.) for the species- <u>as feasible as EM technology allows.</u>
Condition	The estimated condition of the individual when caught, brought on deck and released.
Fate	Fate of the individual brought on deck (e.g., retained, discarded, etc.)
Tag	Tag recovery information recorded, <u>as feasible as EM technology allows.</u>
Catch interaction	The type of catch interaction (e.g., entangled, hooked internally, hooked externally, interaction with vessel only.)

Commented [54]: The formatting is off on this table, but we recommend adding “as feasible as EM technology allows” to this as well.

ANNEX 4/ANEXO 4

Description of the EM Vessel Monitoring Plan (VMP)
The VMP should meet the following conditions ⁹ :

Commented [55]: ICCAT: Annex 4. The VMP shall meet the following conditions: [similar language to what is in this proposal]

9 [PEW: The VMP should meet the following conditionsrequirements:]

1. The VMP should be developed for each vessel ~~or group of vessels~~ on which EM equipment is to be installed and ~~must~~ be delivered to the flag CPC competent authorities.
2. The VMP should be developed in collaboration with the EM service provider, vessel owner and relevant ~~flag~~ CPC fishing authorities.
3. A survey of the vessel intended for EM equipment installation should be conducted by either the EM provider or ~~flag~~ CPC fishing authorities. During this survey, the following aspects will be considered in the development of the VMP, aimed at ensuring that the system meets the minimum data collection requirements outlined in Annex 2:
 - a. Camera placement and settings.
 - b. Number of cameras to be installed to ensure optimization of the view of the catch-handling area.
 - c. Key areas to be surveyed are catch handling areas for species identification and storage of the individuals and areas of discards or release.
4. The minimum sections to be contained in a VMP ~~should be~~ shall/should include:
 - a. ~~[Contact information: current contact information for the vessel owner, vessel operator and EM service provider as long as the contract lasts.]~~
 - b. General vessel information: basic information about the vessel and its fishing activities and operations (e.g., vessel name, registration number, target fishery, fishing areas, fishing gear, LOA, etc.).
 - c. Fishing gear information:
 - o Purse-seine: Net length (fathoms), net depth (strips), brail capacity (metric tons).
 - o Longline: Mainline length(fathoms), hook type, branch line material, etc.
 - d. Vessel layout: equipment of the vessel with detailed information, plan of the vessel disposition and different areas (deck, processing, storage -including number of wells, etc.).
 - e. EM equipment set up: description of the settings of the EM equipment, such as time running, number of cameras, settings of the cameras (frame rate and resolution), and areas covered, time recording for each of the cameras, number of sensors, where applicable, software used, control box disposition, etc.
 - f. Catch handling procedures: description of the crew and their operations.
 - g. A shot and image taken by each camera should be inserted in the VMP.
5. Any physical changes to the vessel, ~~additions~~, modifications in vessel categorization (fleet segmentation), or adjustments to the catch handling deck ~~must~~ should be reported to the Flag CPC authorities. Subsequently, the VMP should be updated accordingly before the commencement of the next fishing trip.

Commented [56]: JPN edit. CHN support. Problem is that these things are not fixed and can be changed during the course of a trip.

6. The VMP ~~shall~~ be signed off by the vessel owner and approved by the Flag CPC competent authority or its designated institutions.
7. The EM equipment should not compromise vessel stability, posing risks to vessel operations, crew safety, or the environment. Additionally, it should not hinder the vessel's safe navigation.

Commented [57]: USA wants to know why CHN agreed to this language at ICCAT, but cant agree to it here. CHN says this is after further consideration and thinks this is an improvement.

An example template of a VMP is presented in Appendix 1. CPCs may choose another format of a VMP as long as it contains the minimum requirements described in paragraph number 4.

Appendix 1 * TO BE BIFURCATED INTO SEPARATE SECTIONS FOR PS AND LL VESSELS**

EM Vessel Monitoring Plan

Part A

(Should be ~~handed over~~ provided by the vessel owner to the competent authority of flag CPC or its designated institutions)

1. Information provided by the owner of the vessel

External registration:		Main fishery(es):	
Vessel name:		Gear type(s):	
IATTC vessel register No.:		Crew size:	
IRCS:		May carry an observer:	
Port base:		Owner(s) representative:	
Vessel length (m):		[Phone No.:]	
Vessel type:		[Email:]	
Net length (fathoms):		[Mainline length (fathoms):]	
Net depth (strips):		[Hook type:]	
Brail capacity (mt):		[Branch line material:]	

2. Description of the crew fish handling and any other useful details

3. If available, copy or image of the vessel general arrangement plan

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4. General layout and handling (not necessarily to scale)

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5. General remarks

Part B

(Responsibility of the flag CPC competent authority and to be validated by the flag CPC competent authority)

1. Vessel image

2. EM equipment configuration

a. System Operation – General Description

Sensor recording, where applicable:	Description of the settings:

Video recording:	Description of the settings:

b. System Components Location

Control box:	User Interface:
<i>Image of location of the control box</i>	
GPS <u>or equivalent</u>:	GPS details:
<i>Image of location of the GPS <u>or equivalent</u></i>	
[Drum Rotation Sensor:]	Drum Rotation Sensor details:
<i>Image of location of drum sensor</i>	

<p>[Hydraulic Pressure Sensor (HPS):]</p> <p><i>Image of location of the HPS</i></p>	<p>HPS details:</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
<p>Sensor XX:</p> <p><i>Image of location of the XX Sensor</i></p>	<p>XX Sensor details:</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
<p>Sensor XX:</p> <p><i>Image of location of the XX Sensor</i></p>	<p>XX Sensor details:</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
<p>Sensor XX:</p> <p><i>Image of location of the XX Sensor</i></p>	<p>XX Sensor details:</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
<p>Sensor XX:</p> <p><i>Image of location of the XX Sensor</i></p>	<p>XX Sensor details:</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

Camera 1 - Deck Camera	
<i>Image of Location of Camera 1</i>	View and Objectives:
<i>Image of Location of deck camera</i>	Camera settings:
Camera 2 - Retain/General View Camera	
<i>Image of Location of Camera 2</i>	View and Objectives:
<i>Image Retain/General View Camera</i>	Camera settings:
Camera 3 - Sorting Belt Camera	
<i>Image of Location of Camera 3</i>	View and Objectives:
<i>Image Sorting Belt Camera</i>	Camera settings:
Camera 4 - Discard Camera	
<i>Image of Location of Camera 4</i>	View and Objectives:
<i>Image Discard Camera</i>	Camera settings:
Camera XX - XX Camera	
<i>Image of Location of Camera XX</i>	View and Objectives:
<i>Image of XX Camera</i>	Camera settings:
Camera XX - XX Camera	
<i>Image of Location of Camera XX</i>	View and Objectives:
<i>Image of XX Camera</i>	Camera settings:

Commented [58]: Japan thinks we need separate formats for LL and PS VMP because many things seem to be specific to PS.

Camera XX - XX Camera	
<i>Image of Location of Camera XX</i>	View and Objectives:
<i>Image of XX Camera</i>	Camera settings:
Camera XX - XX Camera	
<i>Image of Location of Camera XX</i>	View and Objectives:
<i>Image of XX Camera</i>	Camera settings:
Control Box Setting Summary:	Camera Setting summary:
<i>Main configuration screen</i>	
Sorting Area Measurement Details:	
Part C <i>(To be completed by the EM service provider)</i>	
1. EM User Guide	
a. Description on how to retrieve memory devices	
b. Description on how to power up the system	

c. Description on how to do a function test

2. Vessel-specific handling protocols

Description of any special protocols that may apply to the vessel referred in the VMP.

a. Description and diagrams of control points with specific procedures carried out. For each area description, there must be a protocol on how to ensure the catch remains in camera view.

Part D

(To be completed by the EM service provider)

List of EMS service providers contact information:

Name and Last Name	Phone	Email	Office address

Part E

(To be completed by the vessel owner and the EM service provider)

This part should certify that the vessel owner/operators [have been trained in/understand] the function and operation on the EMS installed on the vessel, and that the operator agrees to comply to the VMP.

Vessel owner/operator

EM service provider

Full name:

Full name:

Signature:

Signature:

Date and time:

Date and time:]

Commented [59]: JPN wants reference to training removed, USA prefers to maintain

Commented [60]: JPN wants to delete the service provider info and USA prefers to keep

ANNEX 5/ANEXO 5

Logistical and data analysis and reporting standards

Data transfer

- All EM records should be transferred from the vessel to the EM review center or the vessel flag CPC authority ~~shall~~ should allow¹⁰ for the recovery and secure transmission of EM Records at¹¹ the end of each trip.
- A detailed protocol on how to retrieve the data from the vessel to the authorities or to the EM review center should be established and agreed on the VMP by both the vessel owner and the vessel authority.
- When EMS records are transmitted (via WI-FI, mobile data network or satellite, or hard disk delivery), the transmission of the data should be done at the end of the fishing trip where possible. If not possible the data shall be securely stored and transmitted without delay/at the earliest opportunity.¹²
- Irrespective of the data transfer method used for EM records, and according to the recommendation in Annex 2, the transmission ~~should~~ ensure the information is properly encrypted.¹³ Also, an encrypted storage device containing the same EM records information ~~should~~ must remain on board as backup. The deletion of records from the vessel's backup devices should only occur once the EM records have been converted to EM data at the EM review center.

Data review

- EM data ~~should~~ shall be generated by the program that monitored that trip¹⁴. Provided that standard protocols and procedures are followed¹⁵, CPCs ~~should~~ shall choose whether to contract the work out through a commercial EM review service provider, authorized contractor, or do it themselves.
- [EM equipment should include separate ~~duplicate~~ backup devices, to ensure that data are not lost if one device fails.] [JPN; comments that they think backups should not be mandatory, so OK with this as long as it is understood to be optional]

Commented [61]: ICCAT mandates these paragraphs: Annex 5. When EMS records are retrieved by extracting the memory device or when a memory device is replaced between trips, traceability of every memory device and information recorded on board shall be guaranteed. The chain of custody of the EMS memory device shall be assured.

A detailed protocol on how to retrieve the data from the vessel to the authorities or to the data analyst shall be detailed and agreed on the vessel monitoring plan by both the vessel owner, the respective authorities. When EMS records are transmitted (via WI-FI, mobile data network or satellite), the transmission of the data shall be done at the end of the fishing trip where possible. If not possible the data shall be securely stored and transmitted without delay/at the earliest opportunity. This type of transmission shall ensure proper encrypted data, when required/decided by national authorities.

Commented [62]: If hard disk retrieved and transferred to the EM Review center, the para # 1 would be not necessary.

10 [PEW comment: "shall ensure" may be more applicable?]

11 [PEW: at by the end of each trip] [PEW comment: Allows for situation where data could be transferred during a trip using satellite internet.]

12 If not possible the data shall be securely stored and transmitted without delay/at the earliest opportunity

13 [PEW: Irrespective of the data transfer method used for EM records, and according to the recommendation in Annex 2, the transmission should ensure the information is properly encrypted EM records should be properly encrypted when transferred from the vessels to the EM review or vessel authority.]

14 This would involve expanding existing programs or creating new ones at national, or perhaps regional, level.

15 [PEW: procedures are followed, and the minimum data requirements in Annex 3 are met, CPCs should choose whether...]

EM ~~records~~ data storage and retention

- All information regarding fishing operations of the vessel shall be treated as confidential by the IATTC and subject to IATTC confidentiality rules.
- Procedures for where, how, and [how long] the EM records will be stored after EM analysis, ~~shall~~ should be specified by the flag CPC.¹⁶ Storage decisions ~~shall~~ should be based on the EM program's goals and the staff who will need to access monitoring records, at what frequency, and for what purpose.

Data analysis and reporting standards

Training

- ~~The IATTC Staff will~~ design and organize training courses for EM analysts, coordinated by IATTC staff, with input from EM service providers and other experts. [JPN suggestion: Design and organize training courses for EM analysts, coordinated by IATTC staff where necessary, with input from EM service providers and other experts.]
- EM analyses ~~shall~~ should only be conducted by qualified ~~EM~~ EM analysts, ideally possessing some experience [at sea/in fishing activities], with skills on how to use the dedicated analysis software and observe and record accurately data to be collected under the program. [EM analysts shall not be employees of a fishing vessel company involved in the observed fishery or have other direct conflicts of interest.]

Automation

- When feasible, make EM data generation automatic and user-friendly to expedite EM analysis and directly include information in EM data or reports.¹⁷
- EM records subject to EM analysis shall contain at least the vessel name and vessel ID and trip ID, camera number, [geolocation data (date, time (UTC)), latitude and longitude), sensor data where appropriate applicable, camera recording status and EM equipment system status, where available, and images.

Data quality

- The EM analysis should involve a dedicated software, which [shall/should] permit the analysis of all the stored data, images, and sensor data where appropriate applicable, in a synchronized way. CPCs [shall/should] ensure that data analysis procedures ensure traceability and effective analysis of data and routines to flag potential errors, and digital measuring tools.

Commented [63]: USA prefers "at sea", noting it is "ideally" and not mandatory. PAN prefers other option

Commented [64]: PAN- need to clarify that this is at the time of being hired to review data- i.e. not a current employee

Commented [65]: ICCAT: Annex 5 mandates much of this.
The EMS shall have dedicated software to assist in data review. This software shall permit the analysis of all the stored data, images, and sensor data where appropriate, in a synchronized way. CPCs shall ensure that data analysis procedures ensure good traceability and effective analysis of data. At a minimum, analysis software shall allow for the report of the following:

- identification of fishing operations date/time;
- identification of set type;
- estimation of the catch by set, including bycatch;
- estimation of species catch composition and sizes;
- estimation of discards or release species, and its condition;
- FAD deployment (for purse seine vessels)

16 [PEW comment: Where might these metrics be reported? In the VMPs? Should the minimum standards provide some parameters? ICCAT requires that footage is stored for 3 years.]

17 [PEW: Where possible, make EM data generation...]

- The EM analysis software **[shall/should]** allow reporting the minimum data fields requirements established in Tables ~~1 and 2~~ **1 and 2** of Annex 3 (Areas of fishing activities under coverage by EMS and minimum data requirements for vessel type)
- EM data should be consistent and comparable, regardless the EM program or review center that generated it and ~~should~~ **should** be generated and reported using standard protocols and procedures.

Conversion factors

- **Standardized species-specific length-weight and weight-number conversion factors, based on peer-reviewed research results and/or empirical data, should be developed and agreed upon, and updated as necessary.**

Format

- **Standard formats applicable to human observers reporting should be used for generating EM data fields (e.g., dates as DDMMYY, latitude and longitude in decimal units, speeds in knots, weights in kg, lengths in centimeters) and creating resulting EM data files (e.g., csv, accdb, xlsx).**

Reporting frequency

- **When deemed required by the scientific IATTC staff, and so agreed by the flag CPC, the EM records and/or data should be submitted to the IATTC** ~~within 30 days of the end of the corresponding trip (in line to what established in the 4th recommendation of the EMS institutional structure).~~
- **EM data [shall/should] be submitted following a system similar to the AIDCP or other IATTC procedures, where EM programs submit purse-seine and longline data to the IATTC annually, in March and June, respectively, of the following year.**

Reporting procedure

- **CPCs shall report minimum the EM data requirements to the IATTC in a format that is compatible with the IATTC observer databases** ~~and reported in accordance with IATTC observer programs.~~
- EM ~~records and~~ data should be submitted via a dedicated cloud-based portal. The portal should be as user-friendly and automated as possible, and include quality control (e.g., format checking, error flagging) procedures, as well as automatic reminders for the timely submission of EM data ~~and records~~.