

**INTER-AMERICAN TROPICAL TUNA COMMISSION**  
**AD-HOC WORKING GROUP ON ELECTRONIC MONITORING**  
**2<sup>ND</sup> MEETING**  
*by videoconference*  
23-25 April 2024

**CO-CHAIR'S WORKING TEXT**  
**DOCUMENT WGEM-02-01**

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

**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.

**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 either scientific or compliance monitoring purposes or both, on an interim basis, until such time as the Commission adopts a permanent set of standards.
2. These minimum standards are not mandatory. A mandatory EMS 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.<sup>1</sup>

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

#### **EMS minimum standards**

5. EM equipment should automatically and autonomously collect EM records to generate the required EM data and should 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).
6. 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 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.
7. The minimum data fields that EMS should collect for each vessel type are provided in **Annex 3**.

#### **EM Vessel Monitoring Plan (VMP)**

8. CPCs should develop and 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 should be capable of collecting EM records consistent with all relevant minimum standards and technical specifications in this document. A copy of the 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**.
9. Any modification to the VMP, including EM equipment, should be reported to the vessel flag authority for approval, and promptly notified to the IATTC.

#### **Data Management**

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

#### **Role of the Skipper/Vessel Master**

11. The Skipper/Master of the vessel 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;
  - in case the EM equipment malfunctions, the malfunctions are reported to the relevant flag

---

<sup>1</sup> 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.

authority 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.);
- the transmission or retrieval of EM records is carried out in accordance with the 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).

### **Roles of the flag CPC**

12. CPCs that decide to implement EMS to collect fisheries data for submission to IATTC should ensure that the fishing vessels flying their flags meet the EMS minimum standards and requirements established in this document, including the following:
  - that national 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;
  - that rules and procedures are established in case of EM equipment failure and are followed;
  - 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.
13. 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 should submit an EM program description to the Director detailing, at a minimum, the 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 reporting and following up on possible infractions that are detected.
14. The EM program description in paragraph 13 above should 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.

### **Reporting**

15. EM data for each year collected consistent with these minimum standards should be reported to the IATTC Secretariat ([datahandlers@iattc.org](mailto:datahandlers@iattc.org)) by June 30 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 submit by March 30 of each 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.

### **EMWG roles and responsibilities**

17. The EMWG should review, with assistance of the IATTC staff where appropriate, the EMS national reports 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 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 ensure that their program is consistent with the minimum standards established in these minimum standards and with an emphasis on 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.

### **Periodic review**

19. The Commission should review these minimum interim standards in 2027 and at least every two years thereafter, or until a final set of EMS standards are adopted. The Commission should evaluate how effectively they 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.

## Annex 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**

### **Minimum technical requirements, performance standards, camera view of fishing activities under coverage by EMS, and recommended configurations for EM equipment for each vessel type**

- 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 should be capable of working with all existing hardware and software and be adaptable to future technological developments.
- The EM equipment should be protected against onboard power outage, with a backup power system capable to 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 should automatically include, at a minimum, location, date, and time stamps and integrate with other data collection and monitoring tools (e.g., VMS).
- An on-board screen, or equivalent interface, to allow verification by the skipper/crew on the correct functioning of the EM equipment.
- 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 should be tamper-evident/resistant and send automatic alerts in real time to the appropriate EM program 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 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.

- Cameras should be capable of recording both video and still images. Video should have a resolution no less than 720p and a minimum frame rate of 15 frames per second (15 fps). Photos should have a minimum capture interval of no more than 2 seconds and with resolution no less than 2MP.
- 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, rather 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 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 should provide capability to obtain fish length measurements from relevant camera images.

### **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**

- EM equipment should include sufficient capacity to store all required EM records and sensor information, where appropriate, 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.

### **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.).

### **EM equipment maintenance**

- At sea, all maintenance, repairs and replacement activities of EM equipment should be conducted by a specially trained vessel crew member, 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, 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. The protocol should include the following instructions: i) the lenses of cameras operating within 10 meters of any fishing activity must be wiped clean before every set; ii) 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.



## Tables

**TABLE 1.** A first proposal for location of cameras in class 2-6 purse-seine vessels.

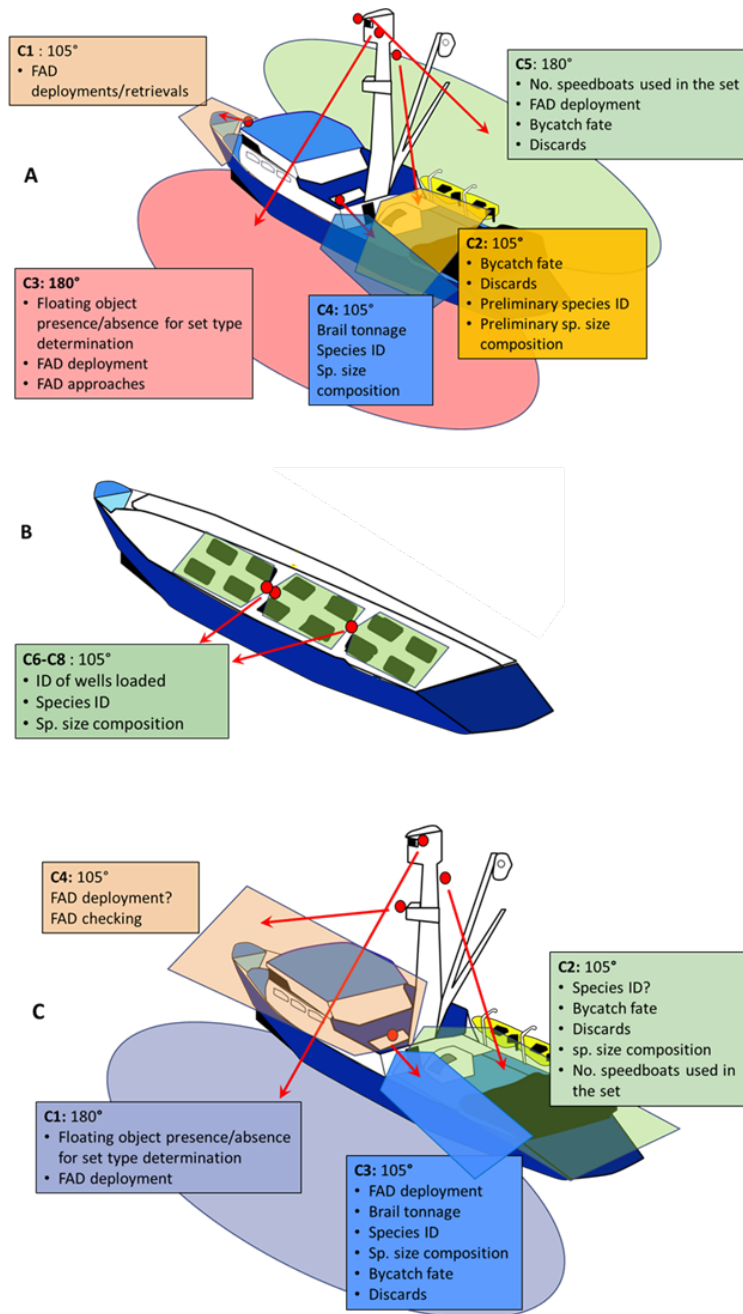
<b>Class-6 vessels with 6 or more rows of wells</b>
<ul style="list-style-type: none"> <li>• Two panoramic cameras (e.g., 180°) on crow's nest, covering port side (floating object presence/absence for set type determination and FAD interactions, set times) and starboard side (No. speedboats used in the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

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

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

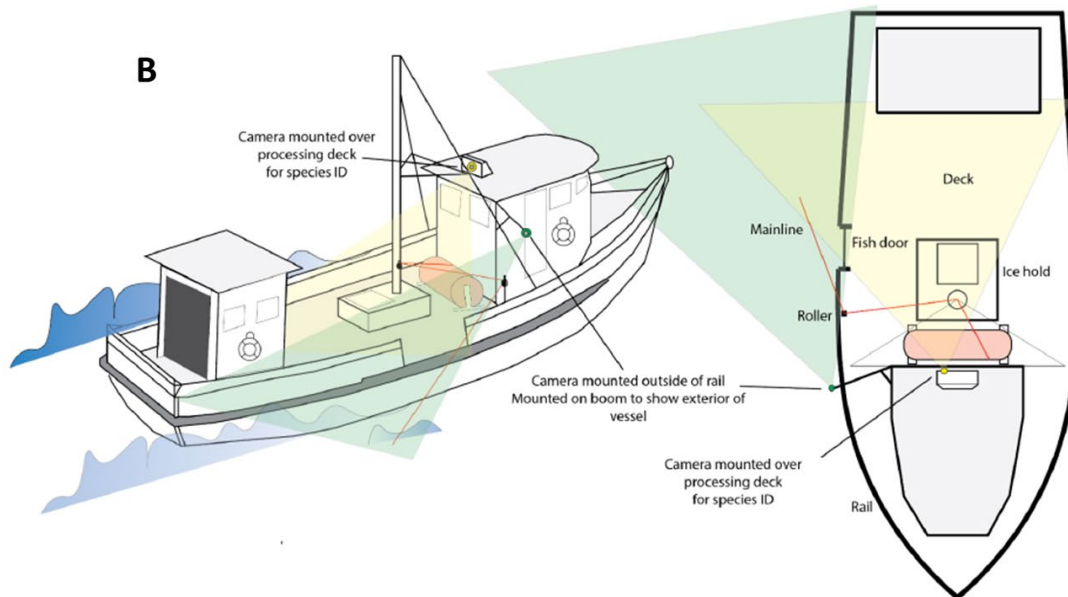
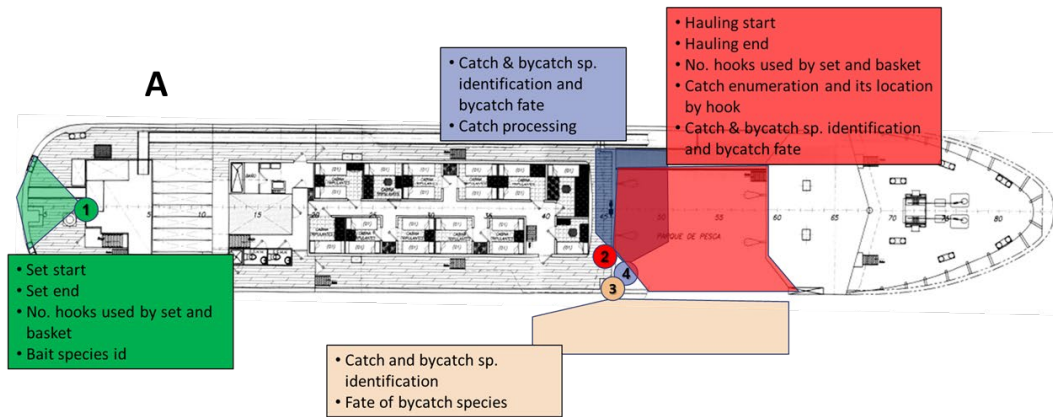
<b>Small-sized longline vessels (&lt; 20m LOA)</b>
<ul style="list-style-type: none"><li>• One camera (e.g., 105°) on the work deck to identify species.</li><li>• One camera (e.g., 105°) mounted outside the side rail to cover the fish door, where the catch is brought aboard.</li></ul>
<b>Medium large-sized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

## Figures



**FIGURE 1.** Cameras' configuration and fishing activities to record on the main deck (A) and the well deck (B) of the Class-6 tuna purse-seine vessels, and on the Class-2 vessel (C).

**FIGURA 1.** Configuración de las cámaras y actividades pesqueras a registrar en la cubierta principal (A) y en la cubierta de bodegas (B) de los buques cerqueros atuneros de clase 6, y en el buque de clase 2 (C).



**Figure 2.** Cameras' configuration and fishing activities to record on board a large longline vessel (A), and (B) on a small longline vessel EM camera configuration for Hawaii longline vessels. Bottom picture taken from Carnes *et al.* (2019).

**FIGURA 2.** Configuración de las cámaras y actividades pesqueras a registrar a bordo de un buque palangrero grande (A), y (B) configuración de las cámaras de ME para buques palangreros de Hawái en un buque palangrero pequeño. Imagen inferior tomada de Carnes *et al.* (2019).

### **Annex 3**

#### **Minimum data requirements for vessel type**

- Minimum data fields for purse-seine activities to be collected, presented in Table 1.
- Minimum data fields for longline activities to be collected, presented in Table 2.

**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.	
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 shall 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.)
<b>Floating objects/FADs</b>		
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.

<b>TRIP INFORMATION</b>	
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).
<b>VESSEL ACTIVITY</b>	
Position and speed	Every 2 seconds (based on some EM equipment capability), but no less than 60 min.
<b>SET INFORMATION</b>	
Set start	Date/time, position (latitude and longitude, in decimal degrees).
Set end	Date/time, position (latitude and longitude, in decimal degrees).
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	Yes – No.
Baskets or floats	Total number used in the set.
Hooks	Total number used in the set.
Wire traces on any branch lines	Yes – No.
Shark lines	Number of branch lines running directly off the longline floats or drop lines.
<b>CATCH AND DISCARD OF TARGET AND NON-TARGET SPECIES</b>	
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.
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.
Catch interaction	The type of catch interaction (e.g., entangled, hooked internally, hooked externally, interaction with vessel only.)



## Annex 4

### Description of the EM Vessel Monitoring Plan (VMP)

The VMP should meet the following conditions:

1. The VMP should be developed for each vessel on which EM equipment is to be installed and shall 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 CPC fishing authorities.
3. A survey of the vessel intended for EM equipment installation should be conducted by either the EM provider or 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:
  - 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:
    - Purse-seine: Net length (fathoms), net depth (strips), brail capacity (metric tons).
    - 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, fishing gear, modifications in vessel categorization (fleet segmentation), or adjustments to the catch handling deck must be reported to the Flag CPC authorities. Subsequently, the VMP should be updated accordingly before the commencement of the next fishing trip.

6. The VMP should be signed off by the vessel owner and approved by the Flag CPC competent authority.
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.

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**

**EM Vessel Monitoring Plan**

**Part A**

*(Should be handed over by the vessel owner)*

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

--

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

--

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:  <i>Image of location of the control box</i>	User Interface:
GPS:  <i>Image of location of the GPS</i>	GPS details:
Drum Rotation Sensor:  <i>Image of location of drum sensor</i>	Drum Rotation Sensor details:
Hydraulic Pressure Sensor (HPS):  <i>Image of location of the HPS</i>	HPS details:
Sensor XX:	XX Sensor details:

<i>Image of location of the XX Sensor</i>	
Sensor XX:	XX Sensor details:
<i>Image of location of the XX Sensor</i>	
Sensor XX:	XX Sensor details:
<i>Image of location of the XX Sensor</i>	
Sensor XX:	XX Sensor details:
<i>Image of location of the XX Sensor</i>	

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

*(To be completed by the EM service provider)*

- 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 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: .....

## Annex 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 authority at 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), 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.
- Irrespective of the data transfer method used for EM records, and according to the recommendation in Annex 2, the transmission shall ensure the information is properly encrypted. Also, an encrypted storage device containing the same EM records information 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 be generated by the program that monitored that trip<sup>1</sup>. Provided that standard protocols and procedures are followed, CPCs should choose whether to contract the work out through a commercial EM review service provider or do it themselves.
- EM equipment should include separate duplicate backup devices, to ensure that data are not lost if one device fails.

#### EM records 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 be specified. Storage decisions shall 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*

- Design and organize training courses for EM analysts, coordinated by IATTC staff, with input from EM service providers and other experts.
- EM analyses should only be conducted by trained EM analysts, ideally possessing some experience at sea, with skills on how to use the dedicated analysis software and observe and record

---

<sup>1</sup> This would involve expanding existing programs or creating new ones at national, or perhaps regional, level.



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*

- Make EM data generation automatic and user-friendly to expedite EM analysis and directly include information in EM data or reports.

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, camera recording status and EM equipment system status, where available, and images.

#### *Data quality*

- The EM analysis should involve a dedicated software, which 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 traceability and effective analysis of data and routines to flag potential errors, and digital measuring tools.
- The EM analysis software should allow reporting the minimum data fields requirements established in Tables 3 and 4 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 must 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, the EM records should be submitted to the IATTC within 30 days of the end of the corresponding trip (in line to what established in the 4<sup>th</sup> recommendation of the EMS Institutional structure).
- EM data 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.