**INTER-AMERICAN TROPICAL TUNA COMMISSION**

**102ND MEETING**

**Panama City, Panama**
**2-6 September 2024**

# RESOLUTION C-24-09

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

*The Inter-American Tropical Tuna Commission (IATTC),* gathered in Panama for its 102nd Meeting:

*Committed* to the long-term conservation and sustainable use of fish stocks in the Antigua Convention Area;

*Committed* to ensuring that the best scientific evidence is obtained and made available to be utilized as the basis for the adoption of conservation and management measures, as stipulated in the Antigua Convention;

*Mindful* that Electronic Monitoring System (EMS) is a promising tool for monitoring and improving data collection, including for both purse-seine and longline vessels, and that it may, subject to additional technical work, be similarly promising for carrier vessels engaged in transshipment at sea;

*Incorporating* the definitions related to EMS adopted by the Commission in Resolution C-21-03;

*Taking Note* of the draft Interim Minimum Standards for the Use of EMS in IATTC Fisheries developed during the 2nd Meeting of the IATTC Ad Hoc Working Group on Electronic Monitoring;

*Agrees*:

1. To adopt the minimum standards for the use of electronic monitoring systems (EMS) in IATTC fisheries and associated provisions contained in **Appendix 1** and its **Annexes.**

2. As specified in Appendix 1, to review these minimum interim standards in 2027 and at least every two years thereafter, or until a final set of EMS standards is adopted, and in doing so to evaluate how effectively these 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 programs as well as any new technological or scientific developments.

**APPENDIX 1.**

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

## 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[1]. These standards are intended to ensure the suitability of electronic monitoring (EM) data collected for objectives of the IATTC, on an interim basis, until such time as the Commission adopts a permanent set of standards 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 Cooperating non- Members to implement EMS onboard their fishing vessels. 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 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 2027, 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. A mandatory EM Program 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. 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

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

## EMS technical standards and minimum data fields

4. EM equipment shall automatically and autonomously collect EM records to generate the required EM data and 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 EM equipment (e.g., camera placement and subsequent views) for purse seine and longline are also in **Annex 2**, but vessels or groups of vessels with similar designs observing these minimum standards shall have a Vessel Monitoring Plan (VMP)

[1] The EMWG expressed an interest in extending the scope of EM in IATTC to carrier vessels engaged in transshipment at sea pursuant to Resolution C-22-03, but noted that this will depend upon developing further technical guidance with respect to, inter alia, technical standards, data requirements, and recommended equipment configurations.

(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. Both the mandatory minimum data fields that EMS shall collect, as well as optional data fields EMS may collect for each vessel type are provided in **Annex 3**

**EM Vessel Monitoring Plan (VMP)**

7. If a CPC intends to achieve fisheries data submission by EM, such a CPC shall develop] 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 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**.

8. Any modification to the VMP, including EM equipment, shall be reported to the vessel flag authority for approval.

**Data Management**

9. 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**

10. The Skipper/Master of the vessel shall ensure that:
    - in case the EM equipment malfunctions, the malfunctions are reported to the relevant flag authority and, where appropriate, the provider as soon as possible;
    - 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 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).

**Roles of the flag CPC**

11. CPCs that decide to implement EMS to collect fisheries data for submission to IATTC shall

ensure that the vessels flying their flags meet the mandatory elements of the EMS minimum standards and requirements established in this document, including the following:

Mandatory

- that 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 actions inconsistent with these standards 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. CPCs that decide to implement EMS to collect fisheries data for submission to IATTC shall ensure that their programs meet the requirements in this Resolution and prior to submitting EM data to the IATTC shall 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 internal reporting and following up on possible actions inconsistent with these

standards that are detected. CPCs may voluntarily share information on such instances with the IATTC Secretariat

13. The EM program description in paragraph 12 above shall be submitted to the IATTC Director before a CPC's EM program begins to submit data to the IATTC. CPCs shall report any changes to their EM domestic program to the Director whenever such changes occur.

**Annual Reporting**

14. CPCs that decide to implement EMS to collect fisheries data for submission to IATTC shall report EM data for each year collected consistent with these minimum standards to the IATTC Secretariat, preferably consistent with data reporting deadlines of relevant resolutions 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 the confidentiality requirements of the CPCs.
15. CPCs that decide to implement EMS to collect fisheries data for submission to IATTC shall submit by March 30 of the following year a fleet-level summary of the VMPs to the Commission describing the implementation of their EM program(s) in the previous year, including, at a minimum, the number of vessels implementing EM by gear and fishery type]; the range of EMS configurations implemented within the fleet (including the numbers and placements of cameras for each configuration); a general description of EMS requirements placed upon vessel skippers/crews by the CPC; the percent 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**

16. The EMWG should review, with assistance of the IATTC staff where appropriate, the CPC EMS reports submitted pursuant to paragraph 15, 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**

17. The Secretariat should:

- At the request of a CPC and subject to the availability of funding and staff resources, collaborate with the CPCs implementing their EM programs in order to help make their program consistent with these minimum standards, and ensure the quality of the EMS data that will be submitted for inclusion in the IATTC data holdings;
- To the extent information is available, summarize and provide an annual report to the EMWG about the progress of CPCs in implementing their EM programs.
- Notwithstanding the provisions of paragraph 16, 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 CPC EM programs.

**Periodic review**

18. The Commission shall 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 shall evaluate how effectively these 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 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 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 shall include, at a minimum, location, date, and time stamps, and to the extent

possible, vessel ID, and to integrate with other data collection and monitoring tools (e.g., sensors).

- The onboard interface shall include 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 shall be tamper-evident/resistant and record automatic alerts which should be provided to the appropriate EM Coordinator and EM provider in near real-time in cases of malfunctions, manual activation/shutdown, manual data input, external data manipulation, or attempts to tamper with the equipment or EM records. If these recorded automatic alerts cannot be sent in near real-time to the EM program coordinator and EM provider they shall be provided as soon as possible, along with other EM records at the end of the corresponding trip. It should also be possible for data recording to be controlled manually, but only in case the EM equipment fails to start or stop automatically, and any manual activation should trigger an automatic alert. Manual shutdown should not be permitted.

**Cameras**

- Cameras shall 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.
- Onboard EM hardware components shall be sufficiently dust and water resistant and durable enough to operate reliably under the range of conditions expected in their location on vessels.
- Cameras shall be capable of recording video and/or still images, as appropriate to the purpose of the individual camera. For cameras used for species identification, video shall have a resolution no less than 720p, with a minimum frame rate of 5-10 FPS. Still images shall have a minimum capture interval of no more than 1 second and with resolution no less than 2MP.
- Placement of cameras shall provide clear and unobstructed views of the areas that are being covered.
- On purse seine vessels, the cameras shall 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 shall 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 camera locations on longliners that would provide these views 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 image quality to ensure there is not excessive glare.

**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 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 shall 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 data shall be submitted to the IATTC 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.

**EM equipment maintenance**

- At sea, all maintenance, repairs and replacement activities of EM equipment shall be conducted by a designated 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 shall be conducted a technician in coordination with EM service provider.
- Each vessel shall 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. Appropriate cleaning materials must be used to avoid lenses damage and should always be available onboard.

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

| **Class-6 vessels with 6 or more rows of wells** |
|---|
| • 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**

- 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**

- 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 example for location of cameras in longliners.

The following 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 (<20m LOA)**

- 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 (20-24m LOA) and large-sized longline vessels (> 24m LOA)**

- One camera (e.g., 105°) at the stern 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. (Optional, if necessary to achieve the required views)
- One camera (e.g., 105°) mounted on boom, outside the rail where the line is hauled, to record catch evasion, line cutting, etc. (optional for 20-24m)

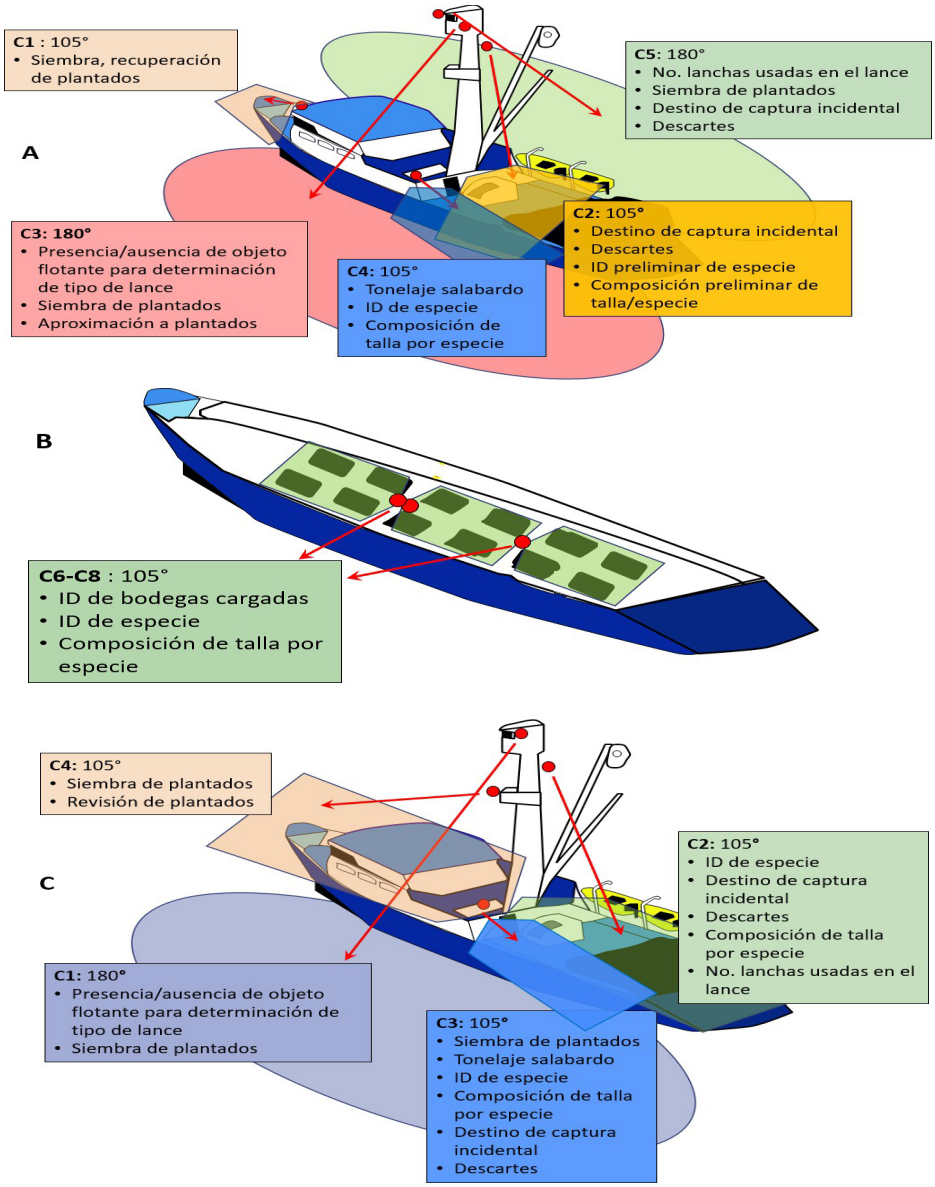


**FIGURE 1**. Cameras' configuration and fishing activities to record on the main deck (A) and the well deck (B) of the Class-6 tuna purse-seine vessels, and on the Class-2 vessel (C).

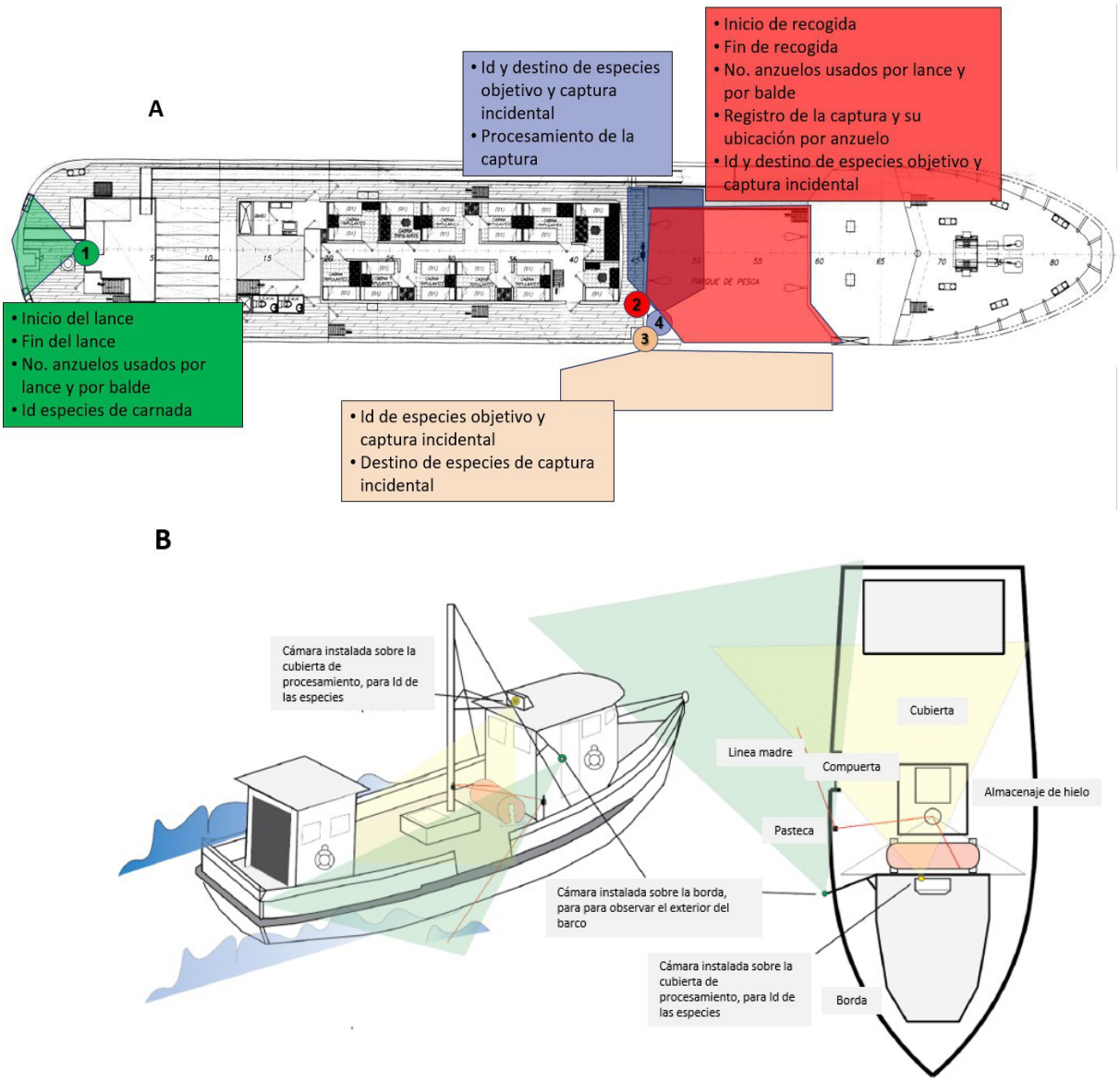


**FIGURE 2**. Provisional cameras configuration and fishing activities to record on board a large longline vessel (A), and (B) on a small longline vessel EM camera configuration for Hawaii longline vessels. Bottom picture taken from Carnes *et al.* (2019).

# ANNEX 3

**Minimum data requirements for vessel type**

- Minimum data fields for purse-seine activities to be collected and submitted, presented in Table 1.
- Minimum data fields for longline activities to be collected and submitted, 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 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 | 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 used | Yes – No, as feasible as EM technology allows. |
| Baskets or floats | Total number used in the set. |
| Hooks | Total number used in the set. |
| Wire traces on any branch lines | Yes – No, as feasible as EM technology allows. |
| Shark lines | Number of branch lines running directly off the longline floats or drop lines, as feasible as EM technology allows. |

| 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, as feasible as EM technology allows. |
| Condition | The estimated condition of the individual when caught, brought on deck and released, where possible. |
| Fate | Fate of the individual brought on deck (e.g., retained, discarded, etc.) |
| Tag | Tag recovery information recorded, as feasible as EM technology allows. |
| 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 shall meet the following conditions:

1. The VMP shall be developed for each vessel or group of vessels on which EM equipment is to be installed and shall be delivered to the flag CPC competent authorities.
2. The VMP shall be developed in collaboration with the EM service provider, vessel owner and relevant flag CPC fishing authorities.
3. A survey of each vessel or example vessel for a group of vessels intended for EM equipment installation shall 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 shall 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 type and configuration:
    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. An example view from each required camera view.

5. Any physical changes to the vessel, , modifications in vessel categorization (fleet segmentation), or adjustments to the catch handling deck, including those result in the vessel no longer belonging to its original group, should 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 shall be signed off by the vessel owner and approved by the Flag CPC competent authority or its designated institutions.

7. The EM equipment shall not compromise vessel stability, posing risks to vessel operations, crew safety, or the environment. Additionally, it shall not hinder the vessel's safe navigation.

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

**EM Vessel Monitoring Plan Part A**

*(Should be 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

| |
|---|
| |

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: | User Interface: |
|---|---|
| *Image of location of the control box* | |
| GPS or equivalent: | GPS details: |
| *Image of location of the GPS or equivalent* | |

| | |
|---|---|
| Drum Rotation Sensor: | Drum Rotation Sensor details: |
| *Image of location of drum sensor* | |
| Hydraulic Pressure Sensor (HPS): | HPS details: |
| *Image of location of the HPS* | |
| Sensor XX: | XX Sensor details: |
| *Image of location of the XX Sensor* | |
| Sensor XX: | XX Sensor details: |
| *Image of location of the XX Sensor* | |

| | |
|---|---|
| Sensor XX: | XX Sensor details: |
| *Image of location of the XX Sensor* | |
| Sensor XX: | XX Sensor details: |
| *Image of location of the XX Sensor* | |

| | |
|---|---|
| Camera 1 - Deck Camera | |
| *Image of Location of Camera 1* | View and Objectives: |
| *mage of Location of deck camera* | Camera settings: |
| Camera 2 - Retain/General View Camera | |
| *Image of Location of Camera 2* | View and Objectives: |
| *Image Retain/General View Camera* | Camera settings: |
| Camera 3 - Sorting Belt Camera | |
| *Image of Location of Camera 3* | View and Objectives: |
| *Image Sorting Belt Camera* | Camera settings: |

| Camera 4 - Discard Camera | |
|---|---|
| *Image of Location of Camera 4* | View and Objectives: |
| *Image Discard Camera* | Camera settings: |

| Camera XX - XX Camera | |
|---|---|
| *Image of Location of Camera XX* | View and Objectives: |
| *Image of XX Camera* | Camera settings: |
| Camera XX - XX Camera | |
| *Image of Location of Camera XX* | View and Objectives: |
| *Image of XX Camera* | Camera settings: |
| Camera XX - XX Camera | |
| *Image of Location of Camera XX* | View and Objectives: |
| *Image of XX Camera* | Camera settings: |
| Camera XX - XX Camera | |
| *Image of Location of Camera XX* | View and Objectives: |
| *Image of XX Camera* | Camera settings: |

| Control Box Setting Summary: | Camera Setting summary: |
|---|---|
| *Main configuration screen* | |

| 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 and 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: |

# ANNEX 5

## Logistical and data analysis and reporting standards

**Data transfer**

- The vessel flag CPC authority shall allow for the recovery and secure transmission of EM Records 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 in the VMP by both the vessel owners 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.
- 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. Also, an encrypted storage device containing the same EM records information should 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 shall be generated by the program that monitored that trip. Provided that standard protocols and procedures are followed, CPCs may 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 backup devices, to ensure that data are not lost if one device fails.

**EM 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, should be specified by the flag CPC. Storage decisions 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 CPCs should design and organize training courses for EM analysts, with input from IATTC staff, EM service providers and other experts, where necessary.
- EM analyses shall only be conducted by qualified EM analysts, ideally possessing some experience 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.
- 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 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 permit the analysis of all the stored data, images, and sensor data where applicable, 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 shall allow reporting the mandatory minimum data fields requirements established in Tables 1 and 2 of Annex 3 (Areas of fishing activities under coverage by EMS and minimum data requirements for vessel type). It may also allow reporting of the voluntary data fields.

*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 by the IATTC Secretariat, endorsed by the SAC and adopted by the Commission, 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 procedure*

- EM data should be submitted via a dedicated cloud-based portal which may be developed by the IATTC Secretariat, or other appropriate means. The portal should be as user-friendly and automated as possible, and include quality control procedures (e.g., format checking, error flagging), as well as automatic reminders for the timely submission of EM data.