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22-23 April 2021

DOCUMENT EMS-01-01
STAFF RECOMMENDATIONS FOR THE IMPLEMENTATION OF AN ELECTRONIC
MONITORING SYSTEM FOR THE TUNA FISHERIES IN THE EASTERN PACIFIC
OCEAN

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1. INTRODUCTION AND BACKGROUND

The Commission has acknowledged that electronic monitoring (EM) is a promising tool for monitoring and improving data collection for both purse-seine and longline vessels that do not carry onboard observers, as well as for vessels with observers onboard as a mean to complement the observer’s data-collection. Accordingly, the Scientific Advisory Committee during its 10th meeting in 2019, and pursuant to paragraphs 9 and 10 of Resolution [C-19-08](#), requested the IATTC staff to draft minimum standards and data collection and reporting requirements for electronic monitoring (EM) for both the purse-seine and the longline fleets operating in the eastern Pacific Ocean (EPO), to be presented for consideration to the

Commission. In 2020, the staff prepared the document [SAC-11-10](#) “An electronic monitoring system for the tuna fisheries in the eastern Pacific Ocean: objectives and standards”. This document, which received positive feedback from several global experts on the matter, was presented at the 11th meeting of the SAC, in October 2020. However, because the meeting was held by video conference, it was not possible for members to provide appropriate feedback. Thus, it was proposed that a workshop be held in 2021 to further discuss some of the elements contained in document SAC-11-10, as well as a workplan for the implementation of an EM system (EMS) in the EPO ([EMS-01-02](#)). This proposal was endorsed by the Commission during its 96th meeting (extraordinary) and it was agreed that the workshop should be held in April 2021, before the SAC 12th meeting.

Using [SAC-11-10](#) and the results of the ongoing EM pilot study on purse seine (Project [D.2.a](#); [SAC-10-12](#)) as a baseline, the present document intends to provide Members with a set of recommendations on the implementation of an EMS in the EPO. In so doing, it only focuses on the different elements of EMS, including standards and other components, as well as the most immediate actions which should be taken, for discussion and adoption as appropriate, by the Commission. Members should refer to, among others, document [SAC-11-10](#) for getting other important background information related to better understanding the use of EMS in the region.

1. AN ELECTRONIC MONITORING SYSTEM (EMS) FOR THE TUNA FISHERIES IN THE EPO

Figure 1 describes the overall structure of the proposed EMS framework. The EMS is built from four main components (Definitions, Institutional structure, Management and Standards), several of which include subcomponents. Recommendations are made in the sections below for each of these components and subcomponents of the EMS.

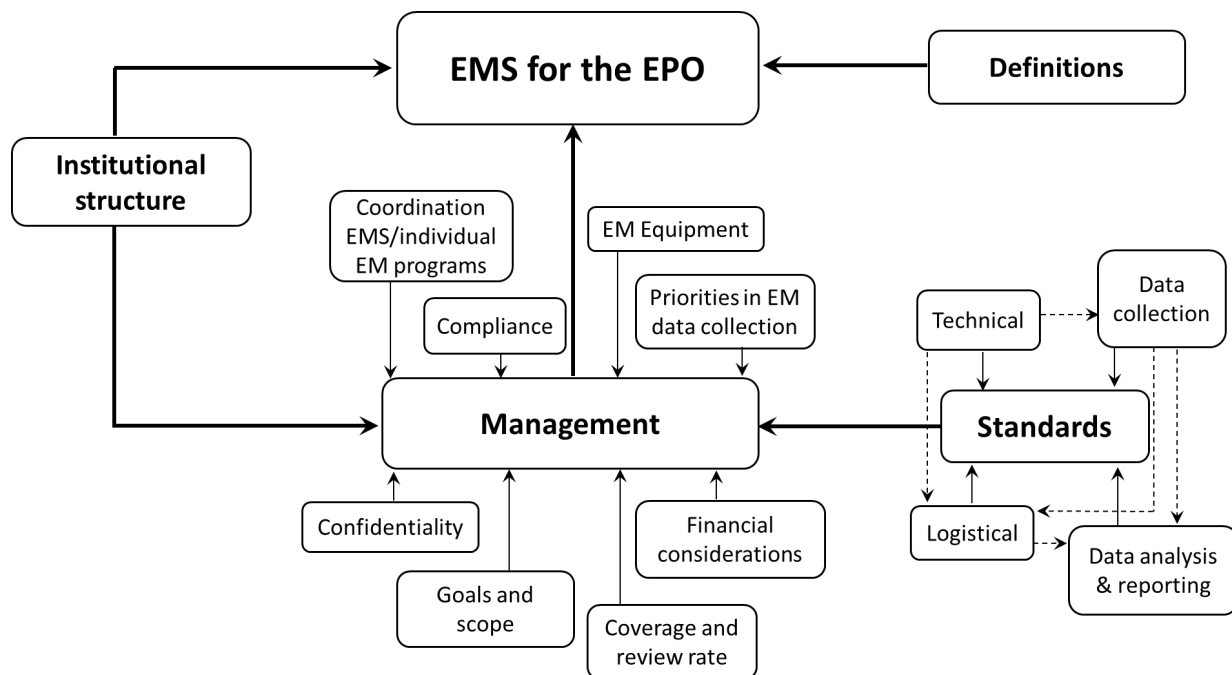


Figure 1. Schematic showing the proposed structure of the EMS for the tuna fisheries in the EPO.

It should be reminded that, as described below and in document [EMS-01-02](#), the staff's proposed workplan ([EM-01-02](#)) contemplates the holding of various focused workshops to consider and analyze the EMS components and subcomponents. At present, no Terms of Reference (TOR) for these proposed workshops and other related activities have been developed and adopted. These TOR are needed since will serve to provide structure for the various steps of the EMS implementation process, similar to the function of the TOR put in place for the Management Strategy Evaluation workshops that were adopted by the Commission in 2019 through Resolution C-19-07.

1. The Commission, taking into account a draft to be prepared by the staff in consultation with the members and relevant stakeholders, should develop and adopt at its annual regular meeting in 2021 the terms of reference for the EM workshops.

2. DEFINITIONS

The terminology adopted by the IATTC staff to describe the EMS for the EPO is based on that developed by other RFMOs, but with some additions and modifications, in the interests of completeness and clarity. The corresponding list of terms and definitions is reproduced in Annex 1 of this document. Without duplicating the information provided in that annex, it is important to clarify that, as illustrated in Figure 1 above, the term EMS not only refers to the hardware and software components, but also the broader set of activities and arrangements, including institutional, that must be agreed upon and implemented within an EPO EMS, in particular to ensure its efficiency. The staff's recommendations on the definitions of the EMS are the following:

1. Adopt, at least on a provisional basis, the definitions provided in Annex 1.
2. Ensure , as much as possible, the harmonization and compatibility of these definitions with those adopted by other t-RFMOs.

3. INSTITUTIONAL STRUCTURE

Resolution C-19-08 directs the IATTC staff to prepare a draft proposal for the development of minimum standards for the implementation of an EMS for the longline fleets. Members have also proposed a similar, parallel process for implementation of EM on purse-seine vessels. In conjunction with this effort, IATTC staff are recommending drafting a detailed plan regarding the necessary institutional structure and function for the implementation of an EPO EMS. Toward this end, the staff proposes that a workshop be scheduled in Fall 2021, to allow the Commission to develop and formalize a detailed implementation plan (see [EMS-01-02](#)). The following draft recommendations are proposed by the IATTC staff for the institutional structure of the EMS under the existing IATTC framework, subject to further elaboration and refinement through the planned workshop.

1. Establish a single, unified EMS Program for the EPO following the International Dolphin Conservation Program (IDCP) model, in which databases, standards, procedures and protocols are standardized across all components/individual programs and are compatible with existing IDCP and IATTC practices.
2. To the extent practical, seek to ensure harmonization and compatibility of EPO EMS with WCPFC EMS procedures and standards among others to facilitate cooperation and exchange of information as appropriate and necessary between the two organizations.
3. Agree that national EMS programs that may be set up to complement the IATTC EMS Program, can be fully or partially contracted out to third parties, but only if they apply the common standards, protocols, procedures and databases of the overarching EPO EMS Program.

4. Agree that all EM data resulting from national EMS programs (and, if required for research purposes, the EM records) be shared with the IATTC staff.
5. Task the IATTC staff with coordinating the EPO EMS and integrating all derived EM data for their future utilization and analysis, as appropriate.

4. MANAGEMENT

Once the institutional structure of the EM system is adopted, there are a number of management issues that will need to be addressed. The staff is proposing that a series of workshops be held by the Commission to discuss and formalize EMS management guidelines, starting in Fall 2021 ([EMS-01-02](#)) to discuss the goals and scope of the EMS. In Spring 2022, a workshop on management considerations (except Objectives and scope, and financial considerations) is proposed. In Fall 2022 another workshop is proposed to discuss data collection priorities. In spring 2023, a dedicated workshop on financial considerations is proposed. Towards this end, the actions that the IATTC staff recommends regarding EMS management subcomponents are as follows:

4.1. Goals and scope

Defining the broad goals and scope of the EPO EMS is an essential first step as these will serve to guide decisions on a number of associated aspects along with specific objectives, including EM coverage, EM review rate, and the types of EM data to be collected. The staff's recommendations on the goals and scope of the EMS are the following:

1. The EPO EMS should generate data to be made be available for use in both scientific and compliance related activities, as defined by the Members.
2. The scope of the EPO EMS should include the following types of vessels operating in the IATTC Convention Area: tuna purse-seine vessels of all sizes; all longline vessels, except those of less than 12 m length overall using manually-operated fishing gear (i.e. without mechanical or hydraulic winches) and that do not deliver catch to motherships at any time during the fishing trip¹.

4.2. Coordination and compatibility

1. The EPO EMS and individual EMS programs should be designed to operate in coordination with the existing observer and other data-collection programs, to avoid unnecessary duplication of effort and/or data collected.

4.3. Priorities in data collection

1. Priorities for EM data collection should be established, taking into account, among others, the provisions of the Antigua Convention, the IATTC Strategic Science Plan, the status and vulnerability of species, and the needs for compliance monitoring.
2. The Commission should support and ensure the funding of research activities that would improve EM data collection for scientific and compliance purposes (e.g. sensors that could remotely identify satellite buoys attached to FADs, accurate identification of certain fishing activities, other fishery components).

¹ As indicated in Resolution C-16-06, the Commission is working with the scientific staff on the establishment of data collection programs that are better suited to the characteristics of this fleet segment (see [SAC-11-10](#)).

4.4. Confidentiality

1. The Commission should consider to, if necessary, clarify or amend IATTC and AIDCP data confidentiality rules in order to ensure that they are adapted to the circumstances and requirements related to the implementation of an EMS, in particular to guarantee the personal and commercial privacy and confidentiality of EM records and EM data.

4.5. Compliance

1. Non-compliance with EM standards and/or other requirements (e.g. IATTC Resolutions) should be referred to the relevant Members for investigation and further consideration, and also reported to the Review Committee² for recommended improvements to increase compliance, or other actions, as appropriate.
2. The Commission will take all appropriate measures to promote and improve compliance, including through the appropriate capacity building activities.

4.6. EM equipment

1. The Commission should establish policies and procedures for handling cases of EM equipment malfunctions and tampering that take place at sea.
2. The EM equipment should be capable of detecting, recording and reporting malfunctions, and tampering.
3. EM records storage devices should be tamper-proof. Cameras and other sensors should be tamper-resistant as well, but also capable of allowing repair by vessel crew when at sea in coordination with EM service providers, as needed.
4. Vessels should be prohibited from leaving port unless their EM equipment is functioning properly.
5. If the EM equipment ceases to record useful or sufficient data, the vessel should be required to return to port in a reasonable timeframe when at-sea repair is not feasible.

4.7. EM coverage and review rate

By the IATTC Annual Meeting in 2023 (see [EMS-01-02](#)), the Commission should have adopted the goals and scope of the EPO EMS and the priorities for data collection so that the EM coverage and EM review rates can be determined. The recommendations for EM coverage and review rates below are based on the assumption that the purpose of the EMS will be for both data collection for scientific research and monitoring for compliance (see section 5.1 above).

1. The long-term objective of EM coverage should be 100% coverage for all longline and purse-seine vessels and trips, with an interim objective of making sure that programmatic coverage at less than 100% must be representative of all fleets and fishing strategies.
2. When a vessel has operational EM equipment, it should be used to monitor all fishing activities conducted by that vessel for the entire trip.
3. Separate EM review rates should be established for compliance and for science, taking into account costs and feasibility.
4. For those EM data fields that do not require an EM review rate of 100%, the review rate should be determined by scientific studies (e.g. through the analysis of EM data provided by the projects

² Formally the *Committee for the Review of Implementation of Measures adopted by the Commission*

[D.2.a](#), [C.2.b](#)). Results should be discussed in a workshop (possibly in Spring 2023) involving stakeholders with experience in fisheries EM programs and presented to the SAC, before being transmitted to the Commission.

5. EM review rates should be reviewed periodically so that they are revised, if necessary, following results of analysis of EM data.

4.8. Financial considerations

1. Promote a cost-benefit analysis for the implementation of an EMS in the EPO.
2. A dedicated workshop with Members, vessel owners, the staff, EM service providers and other stakeholders should take place, in Spring 2023, to determine the cost-allocation procedures and financing options for EMS and its components (e.g. EM equipment, installation, technical assistance both at sea and at EM review centers, and EM analysis, including training, hardware and software).
3. Financial and administrative aspects of the EMS Program should be reviewed and monitored by the Committee on Administration and Finance (CAF) and the relevant recommendations submitted in this respect to the Commission.

5. STANDARDS

There are four key subcomponents of the EM standards: technical (specifications, installation, operation and maintenance of onboard recording equipment and associated software), data collection (recording and storing EM records), logistical (transfer and management of EM records) and data analysis and reporting (analysis of EM records, and the subsequent submission of the resulting EM data or EM records). The staff has proposed a series of dedicated workshops to discuss the different standards (see [EMS-01-02](#)): in Fall 2022, a workshop is proposed to discuss technical standards. The staff proposes a first workshop in Fall 2023 and a second one in Spring 2024 to discuss the remaining subcomponents and standards. If a third workshop is needed, it could be organized in June of 2024, so that all standards are discussed and agreed before the annual meeting of the IATTC of the same year.

Specific recommendations for each subcomponent are provided below.

5.1. Technical standards

1. The standards need to be 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.
2. Unless (or until) common standards are adopted, the EM equipment installed should be capable of working with all existing hardware and software and be adaptable to future technological developments.

Cameras

3. Cameras must 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, and durable enough to withstand conditions at sea.
4. Cameras should be capable of recording both video and still images, with a minimum image capture interval of no more than 2 seconds.
5. For 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. A first proposal for location of cameras in class 2-6 purse-seiners is provided in Annex 2, based on the experience of the pilot [project D.2.a](#).

6. On longliners, the cameras should provide, at a minimum, a view of all hooked fauna, both those brought aboard the vessel and those discarded. A first proposal for the location of cameras on longliners is provided in Annex 3, based on information provided by EM service providers and other international initiatives.
7. CPCs will require their vessels to cooperate with and facilitate the installation, maintenance and repair of cameras and other EM equipment according to the device placement design plan for their vessel or vessel type.

Sensors

8. Other 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.

Data storage

9. EM equipment should include sufficient capacity to store all required EM records, at a minimum, for the duration of a fishing trip.
10. EM equipment should include separate duplicate backup devices, to ensure that data are not lost if one device fails.
11. Vessels should have onboard enough blank data storage devices (hard drives, solid-state drives et cetera) 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.

Compatibility

12. EM equipment should use and generate records and/or data in a format compatible with IATTC databases and IT resources.

Malfunctions/tampering

13. EM equipment should be tamper-proof 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.

Data encryption

14. EM equipment should be capable of transmitting EM records in encrypted form.

Equipment maintenance

15. 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.
16. On land, all maintenance, repairs and replacement activities of EM equipment should be conducted by an official technician, in coordination with EM service provider.

17. 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.

5.2. Logistical standards

Data transfer

1. All the EM records must be transferred from the vessel to the EM review center at the end of each trip.
2. It must also be possible to delete the EM records from the storage device and the backup only after they are successfully copied or transmitted. This could be done remotely, or by vessel crew using one-time passwords; alternatively, a technician could visit every vessel on its return to port and either copy the EM records from the storage device or physically remove it, leaving the backup device in place. Only when the records have been successfully transferred to an EM review center, they would be deleted from the vessel's backup devices.

Data review

3. EM data should be generated by the program that monitored that trip, whether IATTC or a national program³. 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.

5.3. Data collection

The following recommendations are exclusively for the data fields that, at present, can be collected reliably (per Appendices 2-3 of document SAC-11-10 and the advances of the pilot [project D.2.a](#)) regardless of the presence of an observer onboard. These following recommendations may be updated in the future as technology improves.

1. The vessel crew should never be involved in the collection of EM records.
2. Recognize, on a provisional basis, the need to collect for the purse seine fishery, at a minimum, the fields presented in Annex 4.
3. Adopt, in an interim basis, the need to collect for the longline fishery, at a minimum, the fields presented in Annex 5.

5.4. Data analysis and reporting

Training

1. Design and organize training courses for EM analysts, coordinated by IATTC staff, with input from EM service providers and other experts.
2. EM analyses should only be conducted by trained EM analysts, which should ideally have some experience at sea.

Automation

³ This would involve expanding existing programs or creating new ones at national, or perhaps regional, level.

3. Make EM data generation automatic and user-friendly, to expedite EM analysis and to directly include information in EM data or reports.
4. Any activity identified by the cameras should automatically include, at a minimum, location, date, and time stamps.

Data quality

5. Develop software with built-in error and cross-checking procedures and digital measuring tools, as well as review routines to flag potential errors.
6. 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

7. 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

8. Standard formats should be used when generating EM data fields (e.g. dates as DDMMYY, latitude and longitude in decimal units) and the resulting EM data files (e.g. csv, accdb, xlsx).

Reporting frequency

9. EM records should be submitted to the EM review center within 30 days of the end of the corresponding trip.
10. EM data should be submitted following a system similar to the AIDCP or other IATTC procedures, in which EM programs submit purse-seine and longline data to the IATTC annually, in March and June, respectively, of the following year.

Reporting procedure

11. To simplify and facilitate the timely and correct reporting of EM records and data, they 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 on due EM data and records.

Annex 1. Definitions

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 relevant to specified vessels in a defined area and/or fishery.
4. **EMS Program:** A national or regional program established for implementing an EMS in a defined area and/or fishery.
5. **EM equipment:** A network of electronic cameras, sensors and data storage devices installed on vessels and used to record these vessels' activities in the framework of a specific EMS.
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:** Local, national, or regional facility where EM records are analyzed to produce EM data.
11. **EM coverage:** The proportion of the vessels or effort by a fishery that is subject to EM.
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. A first proposal for location of cameras in class 2-6 purse seine vessels.

Pilot project [D.2.a](#), demonstrated that 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 operativities. The following number and locations of cameras are recommended to generate acceptable EM records and EM data for class 2-6 purse-seine vessel fishing activities, given the experience acquired in project D.2.a:

1) 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 bum 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).

2) 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 bum controls roof, covering the brailing area.
- Two cameras (e.g., 105°) covering equal numbers of well rows.

3) 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.

Annex 3. A first proposal for location of cameras on longliners.

On longline vessels, cameras should provide a view of all hooked fauna, both those brought aboard the vessel and those discarded. 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), may be updated at a later time with results of pilot project [C.2.b](#):

4) For small-sized longline vessels (< 20m LOA):

- One camera on the work deck to identify species
- One camera mounted outside the side rail to cover the fish door, where the catch is brought aboard.

5) For medium large-sized longline vessels (> 20m LOA):

- One camera at the stern, to record the number of floats, hooks and bait used on the setting.
- One camera located amidships, covering the total catch and discards by species, size and fate.
- One camera located at the bow, covering the retained catch, by species, size and fate.
- One camera mounted on boom, outside the rail where the line is hauled, to record catch evasion, line cutting, etc.

Annex 4. A first assessment of data fields that should be collected, at a minimum, for the purse seine fishery, based on SAC-11-10 and the progress of pilot project D.2.a.

1) **Trip information**

- a) Depart port, arrival port.
- b) Depart date/time, arrival date/time.

2) **Vessel activity**

- a) Speed and geographical position of the vessel every 2 seconds.

3) **Set information**

- a) Type of the set.
- b) Date/time of the start of the set, rings up, and the end of the set.
- c) Position (latitude and longitude, in decimal degrees) of the set.
- d) Wind speed (Beaufort scale).
- e) The time and date, as well as potential reason, of any major malfunction that stops or delays the setting maneuver.

4) **Target species**

- a) Total catch and discards per set for skipjack, and for yellowfin and bigeye combined.

5) **Non-target species**

- a) Catch and fate of individuals by taxonomic groups (e.g. mobulids, carcharhinids, hammerhead sharks, billfishes, turtles, carangids, triggerfishes).
- b) Catch and fate of large-sized species: whale shark, oceanic whitetip shark, silky shark, wahoo, mahi-mahi, rainbow-runner, sailfish, billfish and swordfish.

6) **Floating objects/FADs**

- a) Location, date, time for each FAD deployment.
- b) Location, date, time for each FAD retrieval.

Annex 5. A first assessment of data fields that should be collected, at a minimum, for the purse seine fishery, based on SAC-11-10.

The ability of EM to collect the data specified in C-19-08 ([option \(i\)](#)) is summarized in Appendix 3 of [SAC-11-10](#). However, the staff has no practical experience of EM on longline vessels and, since fisheries are region-specific, it will be in a better position to assess the capabilities of EM on longline vessels after the proposed pilot study (Project [C.2.b](#)) is completed. For the purposes of this document, and although it could be revised in the future, the recommendations of the IATTC staff on the observer data fields for longlines that EM should collect, at a minimum, are as follows:

1) Trip information

- a) Depart port, arrival port.
- b) Depart date/time, arrival date/time.

2) Vessel activity

- a) Speed, geographical position of the vessel, at a minimum, every 2 seconds.

3) Set information

- a) Date/time of the start, and the end of the set.
- b) Position (latitude and longitude, in decimal degrees) of the start and end of the set.
- c) Date/time of the start, and the end of the hauling.
- d) Position (latitude and longitude, in decimal degrees) of the hauling.
- e) Haul direction.
- f) Use of blue-dyed bait (Yes-No).
- g) Total number of baskets or floats.
- h) Total number of hooks used.
- i) Wire traces on some or all of its branchlines (Yes-No).
- j) Number of shark lines (branch lines running directly off the longline floats or drop lines).

4) Target and non-target species

- a) The species identification of each individual caught.
- b) 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.
- c) The estimated condition of the individual when caught, brought on deck and released.
- d) Fate of the individual brought on deck (e.g. retained, discarded, etc.)
- e) Tag recovery information.
- f) The type of interaction with the catch (e.g. entangled, hooked internally, hooked externally, interaction with vessel only.)