INTER-AMERICAN TROPICAL TUNA COMMISSION

***AD-HOC* WORKING GROUP ON ELECTRONIC MONITORING**

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OUTCOMES OF THE IATTC ELECTRONIC MONITORING WORKSHOPS

UPDATED STAFF CONSIDERATIONS AND DRAFT RECOMMENDATIONS

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SUMMARY

Consistent with the Commission-approved workplan and considering that, in accordance with Resolution C-22-07, paragraph 4a, the first function of the *Ad Hoc* Working Group on Electronic Monitoring is to "review the outcomes of the EMS workshops […]",, this document aims to present an overall report on the key aspects of the discussions in these workshops and the progress that could be achieved, on the basis of the preliminary recommendations submitted by the IATTC scientific staff.

1. INTRODUCTION

In compliance with Resolution C-21-02, which established a workplan and Terms of Reference (ToR) for the Electronic Monitoring System (EMS), comprising a sequence of workshops focused on different components and subcomponents of an EMS analyzed in a logical and chronological order, to date five EMS workshops have been held at the sixth and last one will be convened in December 2023 (Table 1; Figure 1).

These workshops have focused on the various components outlined in the proposed structure of an EMS for the tuna fisheries in the EPO (Figure 2), as detailed in document SAC-11-10, titled "*An electronic monitoring system for the tuna fisheries in the eastern Pacific Ocean: objectives and standards*". Each workshop has featured dedicated presentations through which the scientific staff has described and explained the background and rationale of the recommendations related to specific components that it had put forward. The primary goals of these workshops were to inform participants in order to increase their knowledge and awareness of EM, fostering communication and discussion, generating ideas, and establishing a common understanding among stakeholders on EM matters. Additionally, these workshops seeked to identify areas of broad agreement as well as potential challenges arising from strongly held differences among participants.

It is noteworthy that the Commission provisionally adopted EM definitions through Resolution C-21-03 to facilitate discussions on EMS matters using standardized language and terms.

Following the presentation of EMS recommendations in each workshop, the staff offered a summary of participants' comments and concerns, and revised its preliminary recommendations accordingly. The workshop documents, along with summaries of discussions and revised recommendations, have been compiled, published, and reported during the 13th and 14th Meetings of the Scientific Advisory Committee (SAC). Table 2 shows a synoptic view of these documents.

For a detailed information on the discussions that took place during the five first workshops, please refer to the summaries that have been made for each one of them, as well as documents SAC-13-INF-D and SAC-14-INF-H. Appendix 1 contains a summary of the staff's revised recommendations as they were submitted during the five workshops. It is important to note that the staff's recommendations that will be submitted to the *6th EMS Workshop on the Standards of an EMS* in the EPO, scheduled for December 2023, are also presented in this document.

2. WORKPLAN ON THE IMPLEMENTATION OF THE EMS IN THE EPO: EMS WORKSHOPS

2.1. Institutional Structure, Goals and Scope of the EMS

The *2nd Workshop of an Electronic Monitoring System (EMS) in the EPO: Institutional Structure, Goals and Scope of the EMS* was held to address a number of organizational issues regarding the institutional structure (document EMS-02-01), as well as to the goals and the scope of an EMS for tuna fisheries in the EPO (document EMS-02-02_Rev). A compilation of the recommendations presented during the 2nd workshop can be found in Appendix 1, under the section *Institutional structure* and *Goals and Scope*.

2.1.1. Institutional Structure

Document EMS-02-01 outlines the options for the institutional framework of an EMS , considering whether it should fall under a single institution or a combination of institutions, and how these entities would operate, relate to one another, and interact. the overarching institutional framework for the EMS scheme would be the IATTC itself.

As indicated in the summary of discussion from WSEMS-02, there were divergent opinions on how to structure an EMS framework for the EPO. Some favored a highly decentralized system comprising exclusively national programs, providing summarized data to the IATTC based on agreed minimum standards and fields. On the other hand, some preferred a centralized or hybrid EMS program, allowing the IATTC to provide the necessary EMS coverage and process and store the resulting data.

During discussions, some non-AIDCP party participants found the 'mention of the AIDCP by the IATTC staff as a potential model for IATTC EMS structure confusing. This confusion arose because the AIDCP is a separate agreement, and they d'd not believe that creating an IATTC EMS program required a new treaty level document. IATTC staff clarified that they used the AIDCP as an example due to its hybrid structure, combining centralized and compatible national components.

Concerning the outsourcing of national EMS programs to third-party vendors to complement the IATTC EMS Program, there was a general agreement, that if pursued, approval of vendors would be subject to some level of accreditation and certification to ensure compliance with established IATTC standards.

Additionally, there was a general support for the coordination and harmonization of EMS standards with WCPFC, with an inclination toward high level of coordination.

Finally, regarding the recommendation to share all data from national EMS programs with IATTC staff, some participants raised concerns about sharing original EM records or complete datasets due to confidentiality and commercial limitations. Instead, they proposed that a subset of data might be provided based on pre-agreed minimum fields and formats, similar to the minimum requirements for longline observer data (Res. C-19-08). IATTC staff added in a situation where decentralized, national EM programs would report against minimum data standards that examples of subsamples of their data should be subject to periodic, centralized review, along with the underlying EM records that were interpreted to generate them, to ensure complete and consistent reporting and to evaluate whether the reporting standards are being interpreted consistently across programs, thereby guaranteeing the availability of accurate, quality data that can be considered equivalent for the purpose of scientific investigations.

2.1.2. Goals and scope

EMS can provide relevant and useful benefits for the conservation and management of both target and non-target species in the EPO. This includes gathering information related to fisheries activities covered by the Antigua Convention, information that would otherwise remain unavailable to the Commission, its Members, and its staff (EMS-02-02_Rev). Complementary to this, data collected on vessels with on-board observers, including biological sampling, would supplement this information. EMS-02-02_Rev also highlights that EM data can contribute to scientific research, serving as an additional and efficient tool for monitoring, control and surveillance (MCS), allowing CPCs to implement their obligations under the Antigua Convention (e.g., Article VII(1)(i) and (v) and Article XVIII4(a) and (b).

Opinions were divided on using EMS in the EPO for MCS purposes. Some insisted that MCS review must necessarily be one of the primary objectives of an IATTC EMS, while others expressed that like is currently the situation for human observers on longline vessels, information collected under a Commission EMS should be limited to scientific data and applications. Other participants expressed that if MCS objectives were considered, this might in turn imply 100% EM coverage for vessels in order to be fair and equitable. This would not imply 100% review of all EM records from all vessels, necessarily - review could still proceed for a smaller subset of vessels, so long as they were randomly selected; but 100% coverage in terms of EM equipment and EM records collection and storage does imply significantly higher costs than a vessel coverage rate that might be adequate for the collection of scientific data. Some suggested integrating compliance into the IATTC EMS, similar to how human observer data is used to identify non-compliance issues on purse-seine and transshipment vessels, even for scientific purposes. The importance of exploring cost-effective ways to analyze EM data, possibly by adjusting review rates for compliant vessels, was also emphasized.

Participants expressed differing opinions on which vessels should be covered by an EPO EMS, as detailed in the WSEMS-02 discussion summary. Recommendations included focusing or prioritizing EMS on currently unobserved or under-observed fleets and vessels. Regarding carrier vessels involved in transshipment, some participants saw EMS as a potential substitute for human observers. IATTC staff supports a certain level of overlap between human and EM observation methods for several reasons. This overlap would enable human observers to concentrate on additional tasks, such as biological sampling, and facilitates the comparison of data collected by human observers and EM data from the same fishing trips. Such comparisons help identify any disparities or biases between the two methods. Additionally, having EM systems on vessels can enhance compliance levels and reduce the pressure on human observers.

2.2. EMS Management considerations

During the *3rd Workshop of an Electronic Monitoring System (EMS) in the EPO: EMS Management considerations*, the scientific staff presented five management subcomponents outlined in document EMS-03-01: Coordination and compatibility, Confidentiality, Compliance, EM equipment, and EM coverage and review rate. Detailed discussions and revised recommendations are available in the documents WSEMS-03 discussion summary and SAC-14-INF-H respectively, as well as in in Appendix 1 of this document, under the section *Management considerations*.

In terms of coordination and compatibility, a recommendation emphasized that the EPO EMS should be designed to operate as part of or in close coordination with existing observer programs and other data collection initiatives to maximize data collection efficiency. One viewpoint highlighted the need for consistency with data requirements for longliners, in accordance with paragraph 9 of Resolution C-19-08, as described in document SAC-11-10 (refer to Appendix 3).

Regarding confidentiality, concerns arose due to the unique nature of EM records, which 4 provide sensitive video data. New regulations may be required to govern the collection and storage of such records by the Secretariat, outlining the circumstances and conditions under which such data may be shared with third parties. These rules remain adaptable, subject to updates, with each CPC handling EM data in accordance with their national legislation.

The issue of EMS as an MCS tool for compliance by CPCs and their vessels was expressed in a range of views. Some participants again suggested that EMS should be used solely for scientific purposes, at least for longliners, aligning with the current collection under Resolution C-19-08, similar to discussions in a workshop addressing the goals and scope of an EPO-EMS.

Regarding EM equipment, specifically the recommendation to have backup units on board in case of malfunctions, concerns were raised about increased costs and the need for crew training for equipment installation, maintenance and removal. Additionally, worries were expressed about the cost implications of continuous recording by numerous cameras due to extensive data storage needed. However, some participants supported the recommended EM equipment capabilities and believed that the associated training and backup unit costs could be minimized.

Concerning EM equipment manipulation recommendations, there was agreement to4 change the terms “tamper proof” and “tamper resistant” to “tamper evident”, to better reflect the ability to detect tampering or manipulation.

The recommendation to have vessels return to port when EM equipment ceases to record useful or sufficient data raised concerns, particularly for longline vessels spending extended periods at sea. Establishing a reference time-period indicating for allowing vessels at-sea with non-functional EM equipment was deemed necessary to address this delicate issue.

Opinions on EM coverage and review rates varied. Debates centered on whether 100% EM coverage for all vessels within the goals of the EMS is appropriate, particularly in relation to the scope encompassing compliance alongside scientific purposes (see section 2.1.2. Goals and scope). Concerns were raised about potential unfairness in monitoring compliance with anything less than 100% coverage. On the other hand, it was noted that a 100% coverage d’es not necessarily mean all EM records must be fully reviewed; even a smaller portion could improve compliance and ensure data availability if needed. Although a 100% coverage does not add budgetary concerns to the EMS, the cost of EM analysis, directly related to the review rate, may increase, especially for longline fishing. Notably, EM analysis employing artificial intelligence (AI) and Machine Learning (ML) has contributed to cost reduction.

During the workshop, it was recognized that the workplan anticipated practical recommendations resulting from the EMS workshops for the Commission’s consideration and adoption. However, it became clear from the workshop’s' informal and open format that this expectation was unrealistic, as they differed from the typical delegation-based negotiations that lead to consensus recommendations. In response, the staff suggested the creation of an *Ad Hoc* working group on EM (EMWG) to facilitate negotiations through a Member-appointed Chair, ultimately leading to the adoption of formal recommendations by the Commission. This proposal was adopted by the Commission via Resolution C-22-07 at its 100th Meeting.

2.3. Technical standards and data collection priorities of an EMS

The *4th Workshop of an Electronic Monitoring System in the eastern Pacific Ocean: Technical standards and data collection priorities* focused organizational aspects related to the technical standards (document EMS-04-01) and data collection priorities (document EMS-04-02) for an EMS in tuna fisheries of the EPO. Key discussions on these topics are outlined below.

A compilation of the recommendations presented during the 4th workshop can be found in Appendix 1,

sections *Technical Standards* and *Data collection priorities*.

2.3.1. Technical standards

As documented in SAC-14-INF-H and the WSEMS-04 Discussion summary, there was a general consensus that technical standards - pertaining to the selection, installation, operation and maintenance of EM equipment should be flexible and performance-oriented, rather than too prescriptive regarding the specific technical attributes. This flexibility is crucial to accommodate technological advancements, changes in priorities, and the unique requirements of vessels with varying sizes and gear types, allowing the generation of high-quality EM records with high-resolution EM data.

The workshop emphasized the pivotal role of functional cameras in providing a comprehensive view of vessel activities, such as FADs and species interactions without bringing them on board. The importance of high-resolution and clear images to facilitate fishing activities and species identifications was highlighted. Lessons from pilot projects with purse seines and longlines informed the consideration of the proposed number of cameras as a minimum requirement to adequately cover all fishing activities on both type of gears.

Addressing concerns about potential disruptions to fishing operations due to damaged sensor equipment, the staff clarified that these sensors, linked to the EM system, do not impact fishing operations.

Regarding data storage capacity to ensure the secure archiving of all the EM records, discussions primarily focused on longliners with trips lasting several months, presenting challenges for data storage. The proposed solution involves providing EM equipment with sufficient capacity, carrying spare data storage devices (preferably solid-state drives) for replacement at sea by trained crew members, and including separate duplicate backup devices to prevent data loss in case of device failure.

The staff emphasized the necessity for compatibility of EM data with the formats and protocols used by IATTC data processing and storing tools. A participant highlighted that longline data are collected by the flag State must be summarized and sent to the Secretariat. Summarized and non-standardized EM data can be challenging to handle and might lack the required resolution for fishery management based on science.

The importance of cleaning camera lenses to obtain high-quality images was totally agreed. Crew safety issues due to the cameras' high locations were minimized, as the cameras susceptible to getting dirty or splashed are not in high locations and not be cleaned before every set, but once a week, and also when the sea and work conditions ensures the safety of the cleaning crew.

2.3.2. Data collection priorities

As outlined in document EMS-04-02, the main objective of an EPO-EMS is to improve the quality and availability of tuna fishery data required by IATTC staff for fulfilling the functions stipulated in Article XIII of the Antigua Convention. However, there are existing data gaps and disparities among fisheries and fleets. For instance, in the tuna longline fishery, data is collected and reported by CPCs in summarized form rather than directly from vessels, resulting in limited information on gear characteristics, discards, and bycatch.

Resolution C-19-08 has improved the situation by providing more detailed catch and discard information through observer data, but this is based on a limited 5% observer coverage, well below the recommended 20%. EM data could complement this coverage gap. The staff discussed EM's potential to collect the minimum data fields specified in C-19-08, outlined in SAC-11-10 and EMS-04-02 (refer to Appendix 3), emphasizing that these data fields are provisional until the completion of the pilot project (project C.2.b, SSP), enabling a better assessment of EPO-EM capabilities on longline vessels.

Despite the challenges related to limited or insufficient observer coverage for certain tuna fishery data, some opinions suggested that matters related to compliance should be excluded from an EPO-EMS due to concerns about potential cost burdens on governments and the industry, especially if the EM data review rate is set at 100%. However, regardless of whether an EPO-EMS is intended for compliance purposes, priorities for EM data collection should be determined. This prioritization should be flexible, may shift over time along with objectives and research advances, and align with the goals of the Antigua Convention, the IATTC Strategic Science Plan, the status and vulnerability of species, and the requirements for compliance monitoring.

When implementing the Antigua Convention, the IATTC staff thoroughly assesses all available data sources, including observer data, to ensure compliance with active resolutions. They also regard EMS data as a valuable tool for MCS that can assist CPCs in fulfilling their obligations under the Convention.

2.4. Financial considerations of an EMS

The staff organized the *5th Workshop of an Electronic Monitoring System in the eastern Pacific Ocean: Financial considerations* to discuss the economic variables involved in financing an EPO-EMS, and to delineate the administrative role the Commission should play in determining the financial allocation of these variables. Document EMS-05-01 acknowledged that these activities would require additional resources and costs for the CPCs. Consequently, the pursuit of a cost-efficient system aligning with the Members identified objectives was emphasized. The associated costs were envisioned to be shared transparently and monitored by a suitable governing body.

To gain better insights into the economic implications of an EPO-EMS, it was agreed to conduct a comprehensive cost-benefit analysis for the purse-seine fishery in the EPO. This analysis aimed to shed light on the economic significance of EMS in the region. Note that a cost-benefit analysis for the longline fishery in the EPO was presented at the workshop (see Rodgers et al. 2023), with significant benefits anticipated for the fishery.

In the context of establishing the financial aspects, cost allocation procedures, and responsibilities within an EPO-EMS, it is crucial to identify the associated costs and implement procedures, mechanisms, and roles for financing the EMS. Various approaches were presented, with a particular emphasis on 'Cost-recovery'. This involved outlining keys to optimize costs, aiming to enhance the economic benefits of EM. The necessity to explore options and design guidelines for EPO-EMS cost allocation was underscored.

Concerns arose regarding potential confusion surrounding the term 'cost-recovery', as it might imply reimbursement of expenses, which was clarified as not being the case. The staff acknowledged the difficulty in providing detailed information on what a cost-recovery plan would entail or recommending a specific financial approach. Instead, the staff presented information on alternative models from other studies, highlighting EM programs with established design cost-recovery plans. The staff advocated for the inclusion of a cost-recovery plan as an integral part of EMS implementation.

Finally, no adverse comments were expressed regarding the financial and administrative aspects of the EMS, and it was proposed that these aspects should be reviewed and monitored by the Committee on Administration and Finance (CAF).

A compilation of the recommendations presented during the 5th workshop can be found in Appendix 1, section *Financial considerations*.

2.5. Standards of an EMS

The 6th workshop of an EMS, focused on standards, will be held in December 13-15, 2023. A compilation of the recommendations to be presented at the 6th workshop can be found in Appendix 1, section *Standards of an EMS*.

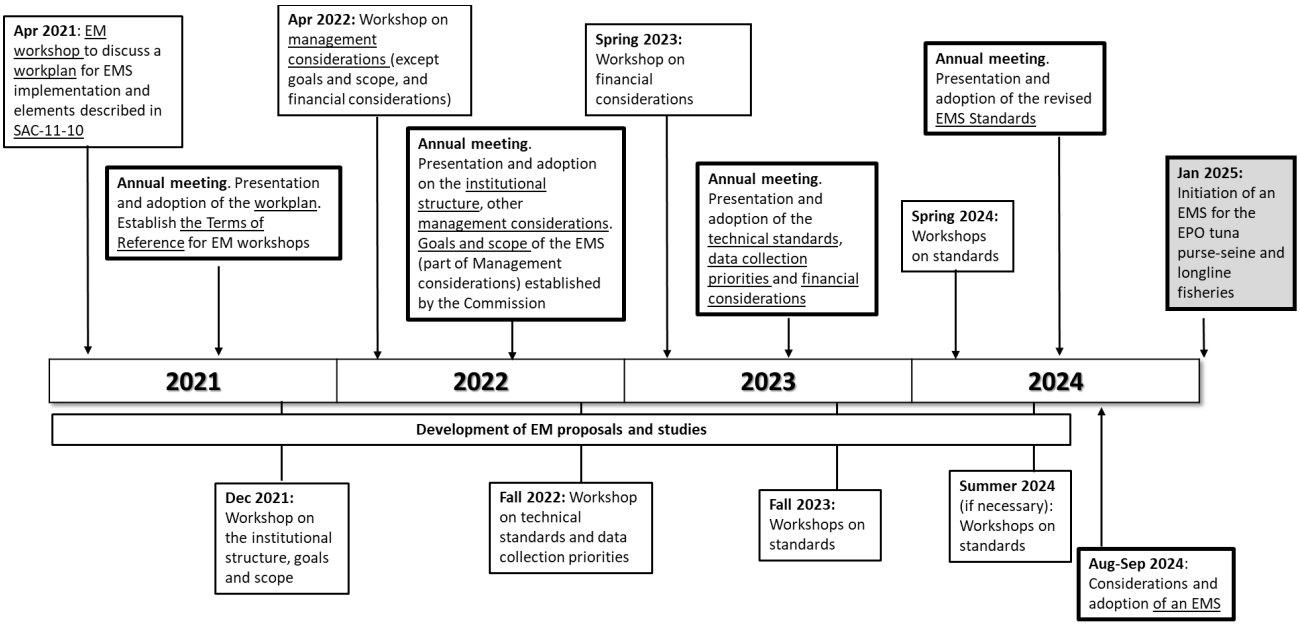

FIGURE 1. Commission's adopted workplan on the implementation of an EMS for the tuna fisheries in the EPO.
FIGURA 1. Plan de trabajo adoptado por la Comisión para la implementación de un SME para las pesquerías de atún en el OPO.

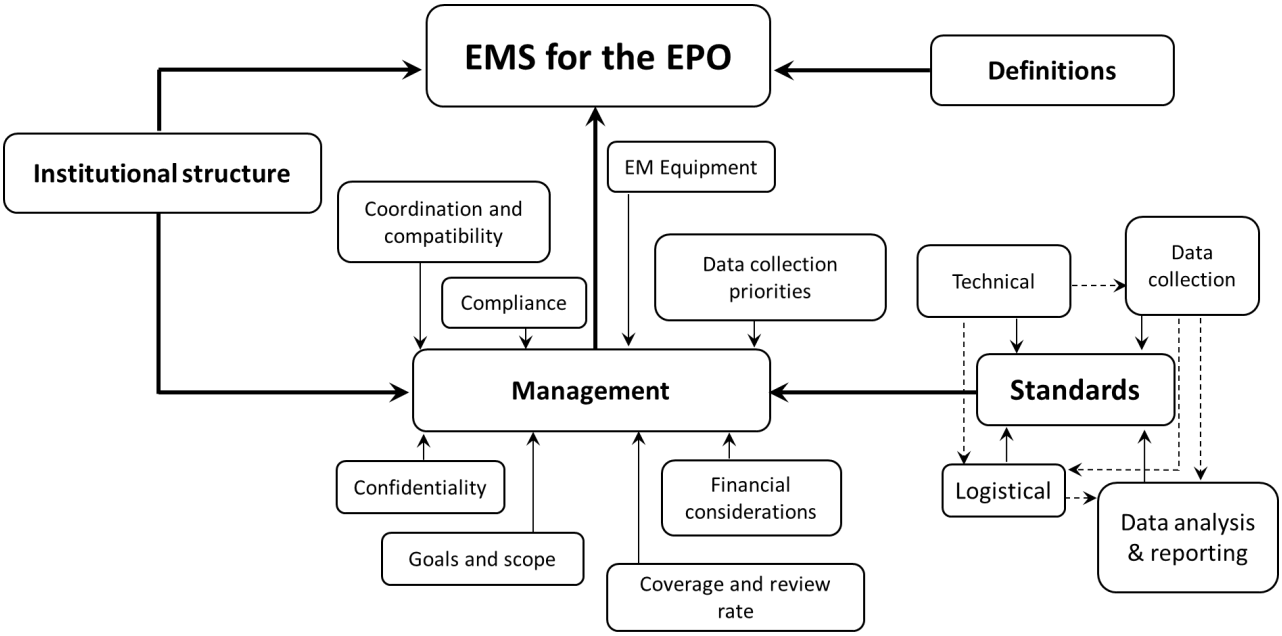

FIGURE 2. Structure of the EMS for the tuna fisheries in the EPO.
FIGURA 2. Estructura del SME para las pesquerías de atún en el OPO.

TABLE 1. Timetable of activities in the workplan adopted by the Commission.
TABLA 1. Calendario de actividades del plan de trabajo adoptado por la Comisión.

<table>
<tr><td colspan="12">2021</td></tr>
<tr><td colspan="6">Semester 1</td><td colspan="6">Semester 2</td></tr>
<tr><td>Month 1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr>
<tr><td colspan="5">Jan 1, 2021. Cont. Pilot project of EM in the purse-seine fishery (D.2.a).</td><td colspan="7"></td></tr>
<tr><td></td><td colspan="11">Feb. Pilot project of EM in the longline fishery (C.2.b).</td></tr>
<tr><td colspan="2"></td><td colspan="10">Mar. Exploring technologies for remote FAD identification (C.1.a).</td></tr>
<tr><td colspan="6"></td><td colspan="6">Jun: Cost-benefit analysis of EM for tuna fisheries in the EPO.</td></tr>
<tr><td colspan="3"></td><td colspan="3">Spring. EM workshop to discuss a work plan for EMS implementation and elements described in SAC-11-10.</td><td></td><td colspan="2">Annual meeting. Presentation and adoption of the workplan. Establish the Terms of Reference for EM workshops.</td><td colspan="3">Fall. Workshop on the institutional structure and EMS objectives and scope.</td></tr>
<tr><td colspan="12">Development of new EM proposals and studies</td></tr>
<tr><td colspan="12">2022</td></tr>
<tr><td colspan="6">Semester 3</td><td colspan="6">Semester 4</td></tr>
<tr><td>Month 13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td></tr>
<tr><td colspan="12">Jan 1, 2022. Cont. Pilot project of EM in the longline fishery (C.2.b).</td></tr>
<tr><td colspan="3">Jan. Cont. Exploring technologies for remote FAD identification (C.1.a).</td><td colspan="9"></td></tr>
<tr><td colspan="6">Jan. Analysis to define EM sampling coverage and EM data review rates (purse-seine fishery). (subject to/pending decisions on EMS objectives)</td><td colspan="6"></td></tr>
<tr><td colspan="3"></td><td colspan="3">Spring. Workshop on management considerations (except Goals and scope, and financial considerations)</td><td colspan="3">Jul/Aug, Annual meeting. Presentation and adoption on the institutional structure, other management considerations. Goals and scope of the EMS (part of Management considerations) established by the Commission</td><td colspan="3">Fall. Workshop on technical standards and data collection priorities.</td></tr>
<tr><td colspan="12">Development of new EM proposals and studies</td></tr>
<tr><td colspan="12">2023</td></tr>
<tr><td colspan="6">Semester 5</td><td colspan="6">Semester 6</td></tr>
<tr><td>Month 25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td><td>31</td><td>32</td><td>33</td><td>34</td><td>35</td><td>36</td></tr>
</table>

Jan 1, 2023. Cont. Pilot project of EM in the longline fishery (C.2.b).												
Jan. Analysis to define EM sampling coverage and EM data review rates (longline fishery). *(subject to/pending decisions on EMS objectives)*												
						Spring. Workshop on financial considerations		Jul/Aug, annual meeting. Presentation and adoption of the technical standards, data collection priorities and financial considerations.		Fall. Workshop on standards (1)		
Development of new EM proposals and studies												
2024												
Semester 7						**Semester 8**						
Month 37	38	39	40	41	42	43	44		45	46	47	48
			Spring. Workshop on standards (2)		Jun. Workshop on standards (3) *if necessary	Jul/Aug, Annual meeting. Presentation and adoption of the revised EMS Standards.						
									Aug/Sep. Final consideration and adoption by the Commission of the whole set of EMS components for the purse-seine and longline fishery on the basis of the conclusions and recommendations of the EMS workshops as well as the discussion and decisions of the Commission during its intervening meetings as described in the workplan and in this timetable**.** The EM equipment should be installed and the EMS operative before Jan 1, 2025, or on a date to be agreed upon by the Commission based on the conclusions and recommendations of the EM workshops described in the workplan and in this timetable.			
Development of new EM proposals and studies												
2025												
Semester 9									**Semester 10**			
Month 49	50	51	52	53	54	55	56	57	58	59	60	
Jan 1, 2025, or on a date agreed upon by the Commission, initiation of an EMS for the tuna fisheries in the EPO												
Development of new EM proposals and studies												

TABLE 2. EMS Workshop documents.
TABLA 2. Documentos de los talleres de un SME.

EMS Workshop	EMS Workshop documents	EMS Workshop Summary discussions documents	Updated staff considerations and recommendations documents
2nd Workshop of an Electronic Monitoring System (EMS) in the EPO: Institutional Structure, Goals and Scope of the EMS	EMS-02-01 EMS-02-02_Rev	WSEMS-02 discussion summary	SAC-13-INF-D
3rd Workshop of an Electronic Monitoring System (EMS) in the EPO: EMS Management considerations	EMS-03-01	WSEMS-03 discussion summary	
4th Workshop of an Electronic Monitoring System in the eastern Pacific Ocean: Technical standards and data collection priorities	EMS-04-01 EMS-04-02	WSEMS-04 discussion summary	SAC-14-INF-H
5th Workshop of an Electronic Monitoring System in the eastern Pacific Ocean: Financial considerations	EMS-05-01	WSEMS-05 discussion summary	
6th EMS Workshop of an Electronic Monitoring System (EMS) in the EPO: Standards of an EMS			

APPENDIX 1

List of the recommendations as submitted by the scientific staff for the development and implementation of an EMS for tuna fisheries in the EPO (see documents (see documents EMS-02-01, EMS-02-02, EMS-03-01, SAC-13-INF-D and SAC-14-INF-H).

Institutional structure

Structure of the EMS program

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.

Rules and procedures: standardization and compatibility

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.

Harmonization and compatibility of EPO EMS with WCPFC EMS

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.

Data: integration, access and sharing

Agree that all EM data resulting from national EMS programs (and, if required for research purposes, the underlying EM records) be shared with the IATTC staff.

Task the IATTC staff with coordinating the EPO EMS and integrating all derived EM data for their future utilization and analysis, as appropriate.

Goals and scope

Goals

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.

Scope

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 of 12 meters in length or more and motherships of longline vessels less than 12 meters in length, and transshipment authorized carriers.

EMS Management considerations

Coordination and compatibility

The EPO EMS should, to the extent practicable, be designed to operate as part of, or in close coordination with, the existing observer programs and other relevant data-collection programs, to maximize efficiency and avoid unnecessary duplication of effort and/or data collected.

Confidentiality

The Commission should consider whether it is necessary to clarify or amend IATTC and AIDCP data confidentiality rules 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.

Compliance

Non-compliance with measures adopted by the IATTC

Non-compliance with EM standards and requirements established pursuant to other IATTC decisions (e.g., IATTC Resolutions) should be referred to the relevant Members for investigation and further consideration, and also reported to the Review Committee for recommended improvements to increase compliance, or other actions, as appropriate.

Regulation-adapting process

The Commission will take all appropriate measures to promote and improve compliance, including through the appropriate capacity building activities.

EM equipment

EM equipment installation, malfunction and manipulation

The Commission should establish policies and procedures for installation, use, and repair of EM equipment malfunctions, and prevention of tampering.

The EM equipment should be capable of detecting, recording and reporting malfunctions, and instances of possible tampering.

Robustness of the equipment

EM records storage devices should be capable of securely storing, and preventing external data input or manipulation. Cameras and other sensors should be weather and tamper-evident as well, but also capable of allowing repair by vessel crew when at sea in coordination with EM service providers, as needed.

Provisions when EM equipment is nonfunctional

Vessels should be prohibited from leaving port unless their EM equipment is functioning properly.

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.

EM coverage and review rate

EM coverage

The 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.

EM review rate

When a vessel has operational EM equipment, it should be used to monitor all fishing activities conducted by that vessel for the entire trip.

Separate EM review rates should be established for compliance and for science, taking into account costs and feasibility.

For those EM data fields that do not require an EM review rate of 100%, the review rate should be established on a scientific basis (e.g., through the analysis of EM data provided by the Projects D.2.a, C.2.b). Results should be discussed in a workshop (possibly in fall 2022) involving stakeholders with experience in fisheries EM programs and presented to the SAC, before being transmitted to the Commission.

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

Technical standards

General aspects of the technical standards

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.

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

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.

Cameras should be capable of recording both video and still images, with a minimum frame rate of 15 frames per second (15 fps) and a minimum image capture interval of no more than 2 seconds, respectively.

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 1, based on the experience of the pilot project D.2.a.

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 landing them on the vessel. A first proposal for the location of cameras on longliners is provided in Annex 2, based on information provided by the pilot project C.2.b, EM service providers and other international initiatives.

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

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

EM equipment should include sufficient capacity to store all required EM records, 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 records and/or data in a format compatible with IATTC databases and IT resources.

Malfunction/tampering

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.

Data encryption

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

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.

Data collection priorities

Overview of priorities in data collection

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.

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).

Purse seine vessels

Recognize, on a provisional basis, the need to collect for the purse seine fishery, at a minimum, the fields presented in Appendix 2.

Longline vessels

Recognize, on a provisional basis, the need to collect for the longline fishery, at a minimum, the fields presented in Appendix 3.

Financial considerations

Assessing the economic implications of an EMS for the tuna fisheries in the EPO

Consider the results of the cost-benefit analysis for longline fisheries, as reported in Rogers et al. (2021), and conduct a similar analysis for purse seine fisheries to facilitate a more efficient implementation of an EMS in the EPO.

Establishing financing, cost-allocation procedures and responsibilities for EMS and its components

Establish cost-allocation and financing options for all expenses related to implementing and maintaining an 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).

Conduct cost-recovery studies to explore options, and develop guidelines, for the recovery of costs of an EPO-EMS.

Committee reviewing and monitoring the EPO-EMS

The Committee on Administration and Finance (CAF) should review and monitor the financial and administrative aspects of the EMS, and subsequently submit relevant recommendations to the Commission.

Logistical standards of an EMS in the EPO

Data transfer

All the EM records must be transferred from the vessel to the EM review center at the end of each trip.

Regardless of the data transfer method used for EM records, an encrypted storage device containing the same EM records information must remain on board as backup. Only when the EM records have been converted to EM data at the EM review center, they would be deleted from the vessel's backup devices.

Data review

EM data should be generated by the program that monitored that trip, whether IATTC or a national program[1]. 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.

Data analysis and reporting of an EMS in the EPO

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, which should ideally have some experience at sea.

Automation

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

Any activity identified by the cameras should automatically include, at a minimum, location, date, and time stamps.

Data quality

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

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.

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

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 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

EM records should be submitted to the EM review center within 30 days of the end of the corresponding trip.

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

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 on due EM data and records.

Appendix 2. A first assessment of data fields that should be collected, at a minimum, for the purse seine fishery, based on document SAC-11-10 and the 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, size and discards per set for skipjack, and for yellowfin and bigeye, as feasible as EM technology allows. In cases where species identification is not possible, the combined catch may be reported. For sizes, weight categories shall be used whenever possible (i.e. small <2.5 kg., medium >2.5 kg.- <15kg., large >15 kg.).
5) **Non-target species**

   Catch, size and fate of individuals: requiem sharks, hammerhead sharks, thresher 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). 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.
6) **Floating objects/FADs**
   a) Location, date, time for each FAD deployment.
   b) Location, date, time for each FAD retrieval.

Appendix 3. A first assessment of data fields that should be collected, at a minimum, for the longline fishery, based on document 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 longliners 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 branch lines (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.

The type of interaction with the catch (e.g. entangled, hooked internally, hooked externally, interaction with vessel only.)