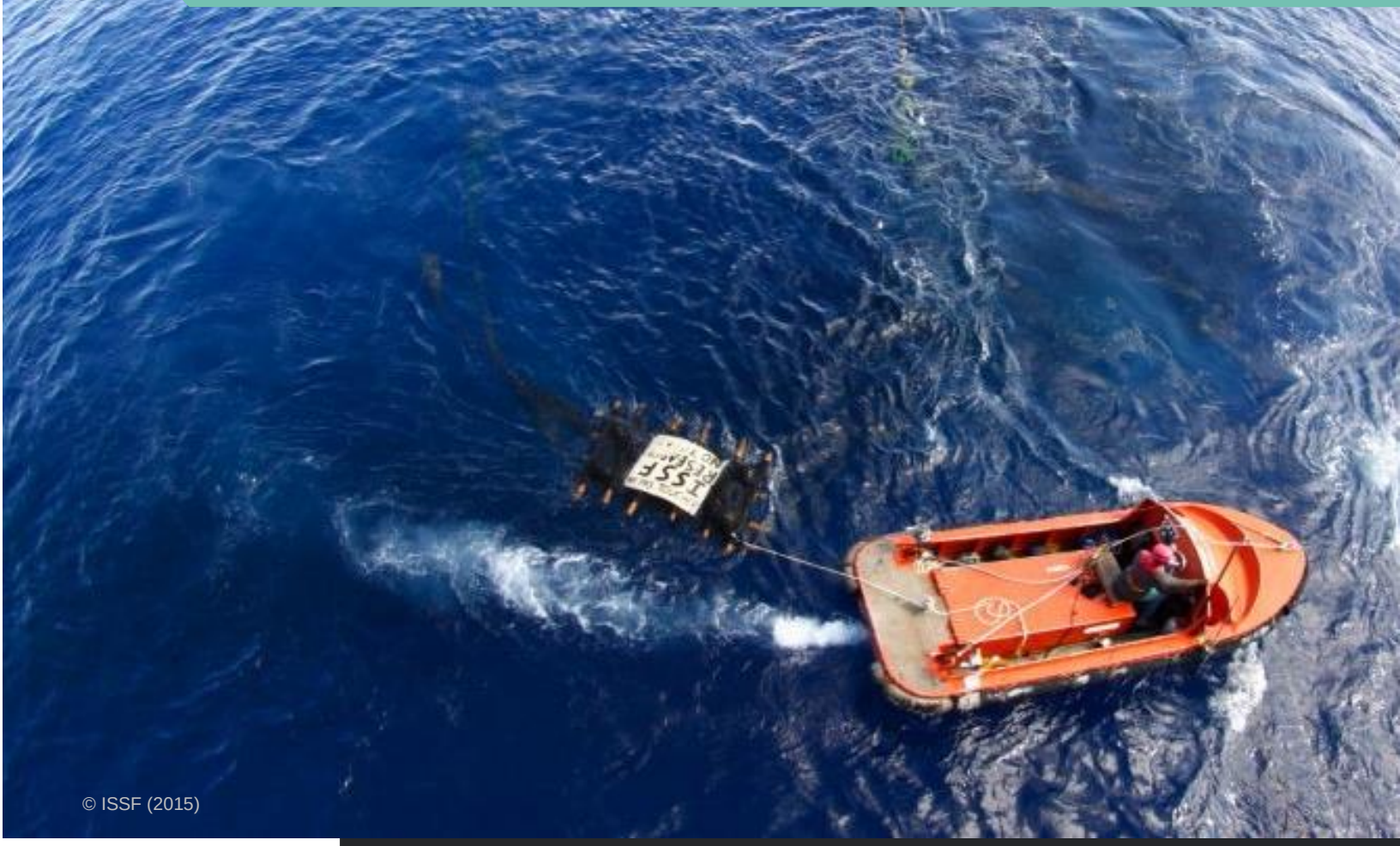
ISSF Technical Report 2018-04

MINIMUM STANDARDS FOR ELECTRONIC MONITORING SYSTEMS IN TROPICAL TUNA PURSE SEINE FISHERIES



V. Restrepo, A. Justel-Rubio, H. Koehler and J. Ruiz / **February 2018**

Suggested citation:
Restrepo, V., Justel-Rubio, A., Koehler, H. and Ruiz, J. (2018). Minimum Standards for Electronic Monitoring Systems in Tropical Tuna Purse Seine Fisheries. ISSF Technical Report 2018-04. International Seafood Sustainability Foundation, Washington, D.C., USA

Topic Categories: Electronic Monitoring & Reporting, Purse Seine, Tuna

Abstract

This document presents minimum standards for electronic monitoring systems on tropical tuna purse seine vessels. These standards are meant to be auditable for the purpose of demonstrating best practice.

Author Information

V. Restrepo and H. Koehler | **International Seafood Sustainability Foundation**
1440 G Street NW, Washington, D.C. 20005

A. Justel-Rubio | **International Seafood Sustainability Foundation - EU**
C/ Francisco Giralte, 2 28002 Madrid, Spain

J. Ruiz | **AZTI-Tecnalia**
Spain

February 2018

ISSF is a global coalition of scientists, the tuna industry and World Wildlife Fund (WWF) — the world's leading conservation organization — promoting science-based initiatives for the long-term conservation and sustainable use of tuna stocks, reducing bycatch and promoting ecosystem health. ISSF receives financial support from charitable foundations and industry sources.

To learn more, visit **iss-foundation.org**.

Table of Contents

1. Introduction

Electronic Monitoring (EM) uses video cameras, gear sensors, combined with GPS, to monitor a vessel's fishing activity at sea to provide information such as catch, bycatch and fishing effort (McElderry, 2008). EM can also be used for some compliance activities.

Use of EM in some tropical tuna purse seine fleets has been high on a voluntary basis as a result of ISSF Conservation Measure 4.3(a), which requires ISSF Participating Companies to "*conduct transactions only with those large-scale purse seine vessels that have 100% observer coverage (human or electronic if proven to be effective) on every fishing trip and observing every fishing operation, unless prevented by force majeure conditions in a particular region*." In addition, there is a Code of Good Practices (Lopez J, *et al*., 2017) that Spanish vessel owners have agreed to follow on a voluntary basis, which also requires 100% observer coverage. It should be noted that 100% human observer coverage is required for most large-scale purse seine vessels operating in the Pacific Ocean, in the IATTC and WCPFC Convention Areas. However, this requirement does not exist in the Atlantic (ICCAT) or Indian (IOTC) Oceans, so the use of EM in the latter regions is more prevalent.

In order to enable a degree of harmonization between systems, Restrepo (2012) (updated by Restrepo *et al*., 2014) provided guidance on the use of EM systems in tuna purse seine vessels. Subsequently, Ruiz *et al*. (2017) drafted Minimum Standards for EM in tropical tuna purse seine vessels which have been endorsed by ICCAT and IOTC. The purpose of this report is to complement Restrepo *et al*. (2014) and Ruiz *et al*. (2017) and provide minimum standards that can be used during ISSF audits. NOTE: Much of the text below has been adapted from Ruiz *et al*. (2017).

2. Standards for how data should be collected and integrated to databases

An EM system is more than simply installing cameras. In addition to an appropriate - and adequately placed -- number of cameras (often more than five, depending on the vessel), the system must be equipped with a GPS receiver. Supplementary sensors (e.g. hydraulic and/or rotation sensors) are helpful to distinguish fishing and non-fishing time, and can help address privacy concerns (e.g. by turning the cameras off when the hydraulic systems are not operating). Generally, for the collection of accurate data to become useful for scientific and management purposes, an effective EM system should fulfill several minimum requirements (1) before, (2) during and (3) after the trip (**Table 1**).

Table 1. Minimum standards

STANDARD	EXPLANATION	AUDIT PROTOCOL
1. Before the trip		
1.1 The system has been tested (and certified) by a third party	There are several EM vendors at the present time. A proper EM system should be tested through pilot studies before being implemented in a monitoring program. Such pilot studies should be executed by qualified organizations that run human observer programs for tropical tuna purse seine vessels. The aim of the pilot studies is that the EM system can provide data of similar characteristics to that from a human observer program (in this regard, it is important to note that for many data types, both the human and the electronic system provide estimates, so a perfect match is not expected when comparing both methods of data collection). Once the efficacy and accuracy of a system has been proven, periodic audits are recommended.	Provide proof that the system has been tested by a qualified organization (e.g. a scientific publication; a report from the organization).

1.2 The system is customized to the vessel level; The number of cameras, and camera type are sufficient and well placed to deliver the required data	EMS installation should ideally be tailored to each individual vessel. There is not a standard configuration that will cover all vessels in the fleet, thus each installation must be customized at the vessel level, or at least to vessels of similar characteristics. **Table 2** shows the areas/actions that should be covered by the camera's field-of-views (FOV). However, these areas, and especially the camera placement to cover these actions, could vary from vessel to vessel. In this regard, crew cooperation is crucial; it is necessary that ship owners authorize appropriate access to the vessel to install the EM system effectively, and that the crew get involved in choosing optimal camera placements. Digital cameras are advantageous compared to analog ones. Video or still photographs can be equally valid options. For the latter, a picture at least every two seconds during fishing operations is needed, at least from the camera with view of the fish handling areas. Image quality must permit species identification. Camera number and position must be adapted to each individual vessel, which should have sufficient cameras to view the following areas (see **Table 2**): Work deck (portside & starboard side), well deck & conveyor belt, in-water purse seine area, foredeck or/and amidships, depending of FAD deploying area. The cameras must cover the following actions: brailing, net hauling, FAD activities, bycatch handling and release, tuna discards, catch well sorting (process of putting the catch in the hold or wells).	Provide proof that the system was customized for the particular vessel (e.g. a report from the EM vendor with vessel layout, location of the cameras and camera type(s) and explaining the rationale for system configuration).
2. During the trip (data collection)		
2.1 The system is robust; The system operates largely independently from the crew	Electronic monitoring systems have to be capable to resist rough conditions at-sea, with minimum human intervention. In many cases, excepting routine maintenance (e.g., cleaning camera lenses), proper maintenance and inspection can be only achieved at port, in-between long fishing trips. Note that crew assistance may be required to clean the camera lenses when necessary during a trip. Any EM system should be, to the extent possible, independent from the crew during the trip. If image recording is not continuous (24 h/day), different sensors (e.g. rotation, hydraulic sensors, GPS speed) will be needed to automatically detect a fishing-related activity and, acting as a trigger, start the image recording. However, even if the EM system is working independently, it is expected that some basic maintenance (such as cleaning the camera lens) must be done by the crew.	Provide proof from the vendor that the system is manufactured to withstand at-sea conditions; provide agreement from vessel owner that the crew has been instructed to assist in cleaning the lenses when necessary.

2.2 The system ensures data security	EM system components and data need to be tamper-proof (or at least tamper-resistant) and avoid access or manipulation of information by unauthorized persons. EM systems should have, at a minimum: I. Its own internal auxiliary batteries to ensure the system can function even in the event of a vessel power outage; II. An inviolable system with encrypted data; III. GPS linked imagery (date, time and coordinates), ideally with data superimposed on the images; IV. near-real-time remote online "health statements" that assure that the data are recorded during the trip, which are sent to the supplier and/or authorities; and V. Alerts when there is evidence of tampering.	Provide evidence from the vendor of how data security and system functioning are protected and documentation that the system meets the minimum requirements.
2.3 The system is capable of adequate data storage and autonomy	The system should have enough autonomy to cover a minimum of 4 months-worth of data. Data are to be extracted (or hard drives replaced) by technicians between trips, and the equipment should be prepared for any eventuality such as entries into unexpected ports, etc. It is necessary to find the balance between the image quality and the EMS data storage capacity. It is recommended that the system uses solid state storage devices (SSD) which have no moving mechanical components, which makes them more robust to at-sea conditions than classic Hard Disk Drives (HDDs).	Vendor provides proof that the system meets the minimum storage standard and documentation of the overall system design.
3. After the trip (data traceability analysis and review)		
3.1 The system has dedicated software to assist in data review	In addition to the hardware, the EM system vendor should provide a dedicated software to facilitate the review of images in an effective and efficient way. This software shall permit the analysis of all the stored data, images and sensor data in a synchronized way, performing all analyses and reporting nimbly. At a minimum, analysis software should allow for the: • Identification of fishing operations date/time; • Identification of set type; • Detection of operations with FADs; • Estimation of the total catch by set; • Estimation of target species catch composition and sizes; • Detection of bycatch species; and • Estimation of discards of target species.	Vendor provides specifications for the analysis software demonstrating that it is efficient (e.g. reviewing one day of data should take much less than one day). Vendor provides documentation that the analysis software design meets the minimum standards.

3.2 Data analysis and reporting is done by a qualified third party; Data reviewers are properly trained	The analysis of the data recorded through EM system is not an easy task, and should be done by institutions, organizations and/or independent companies that have or do work with on-board observers on purse seine vessels. These entities should also be familiar with the end users' data needs, relevant RFMO management measures and reporting obligations, as well as the on-board operations and conditions. Data analysis procedures should be written and approved, to ensure a good traceability of data. EM system monitoring program managers must ensure that their on-land or office observers have the following minimum qualifications to accomplish their analyses and reporting: • Sufficient knowledge and experience to know in detail how the purse seine fishing operation and catch handling is done, to identify species and to collect information on different fishing activities. In this regard, previous at sea observer experience is desirable. • Satisfactory knowledge of the relevant RFMO conservation and management measures and reporting obligations. • The ability to observe and record accurately data to be collected under the program. • The ability to use properly the dedicated image analysis software; and; • Not be an employee of a fishing vessel company involved in the observed fishery or have similar potential conflicts of interest.	Provide proof that the analysis and reporting is done by a qualified third party; provide documentation of the approved written data analysis procedures; and provide proof that the data reviewers meet the minimum qualifications.
3.3 The software used to generate reports is compatible with ongoing standardized data flow and databases	The EM vendor software must have a data output format that is compatible with the ongoing National Observer Sampling Programs (including observer's data bases), and RFMO templates for data submission.	Provide proof of compatibility with relevant observer program and RFMO databases
3.4 Chain of custody of the data is guaranteed	In order to guarantee independence of the system, it is necessary to ensure that the data has not been manipulated in any step of the process; from the data collection at sea to the report elaboration by a third party.	Provide proof of how chain of custody is guaranteed, e.g. documentation from the institution retrieving the data.
3.5 Storing storage devices	To ensure data integrity and longevity, hard drives or other data storage devices should be maintained in rooms properly equipped with climatic controls to prevent the degradation of the data source. Data should also be kept for a minimum of 6 months before the hard drives are put back into rotation aboard vessels.	Provide evidence that storage devices are maintained under adequate conditions and for a minimum of 6 months.

Table 2. Areas of the vessel and actions that must be covered by cameras in an EM system.

AREA COVERED	ACTION COVERED	PURPOSE	MINIMUM DATA REQUIREMENTS TO BE MONITORED
Work deck (port side)	Brailing	Total catch by set Species composition	Number of brails & fullness by brail. Weight, size and species of retained tuna
	Tuna discards	Total tuna discards by set	Weight, size and species of discarded tuna
	Bycatch handling	Best practices Total bycatch by set	Handling mode
Work deck (starboard side)	Bycatch handling	Best practices	Handling mode
	Bycatch release	Total bycatch by set Best practices	Number of individuals and species ID
In-water purse seine area	Brailing	Total catch by set	Number of brails & fullness by brail
	Bycatch handling of big species (whale sharks, manta rays…)	Best practices	Handling mode
	Bycatch release of big species (whale sharks, manta rays…)	Total bycatch by set Best practices	Number of individuals and species ID
Foredeck or amidships	FAD activity (deploying, replacement, repairs…)	Total number of FAD activities by trip	Number, material (natural or artificial), and FAD characteristics (entangling or non-entangling)
Well deck and conveyor belt	Catch well sorting	Species composition	Weight, size and species of retained tuna.
	Bycatch handling	Best practices	Handling mode
	Bycatch discarded, released or retained	Total bycatch by set Species composition Best practices	Number, size or weight of individuals, species ID and fate

Bibliography

Lopez J, Goñi N, Arregi I, Ruiz J, Krug I, Murua H, Murua J, Santiago J. (2017). Taking another step forward: system of verification of the code of good practices in the Spanish tropical tuna purse seiner fleet operating in the Atlantic, Indian and Pacific Oceans. IOTC–2017–WGFAD01–12

McElderry, H. (2008). At Sea Observing Using Video Based Electronic Monitoring. Electronic Fisheries Monitoring Workshop Proceedings. Alaska Fisheries Science Center, Seattle, Washington. July 29-30, 2008.

Restrepo, V.R. (2012). Guidance on electronic monitoring for observer programs to comply with ISSF Commitments. ISSF Technical Report 2012 13. International Seafood Sustainability Foundation, Washington, D.C., USA.

Restrepo, V., J. Ariz, J. Ruiz, A. Justel-Rubio and P. Chavance, (2014). Updated Guidance on Electronic Monitoring Systems for tropical Tuna Purse Seine Fisheries. ISSF Technical Report 2014- 08. International Seafood Sustainability Foundation, Washington, D.C., USA.

Ruiz, J., Batty, A., Chavance, P., McElderry, H., Restrepo, V., Sharples, P., Santos, J., and Urtizberea, A. (2014). Electronic monitoring trials on in the tropical tuna purse-seine fishery. – ICES Journal of Marine Science, doi: 10.1093/icesjms/fsu224

Ruiz, J., I. Krug, A. Justel-Rubio, V. Restrepo, G. Hammann, O. Gonzalez, G. Legorburu, P. Pascual Alayon, P. Bach, P. Bannerman, and T. Galán. (2017). Minimum standards for the implementation of electronic monitoring systems for the tropical tuna purse seine fleet. ICCAT Col. Vol. Sci. Pap. 73(2): 818-828.

Related Reports

Anonymous, 2016. Summary report of the International Workshop on Application of Electronic Monitoring Systems in Tuna Longline Fisheries. ISSF Technical Report 2016-07.International Seafood Sustainability Foundation,Washington, D.C., USA.

Chavance,P., Batty,A., Mc Elderry,H., Dubroca, L., Dewals, P., Cauquil, P., Restrepo, V. and Dagorn, L. (2013). Comparing observer data with video monitoring on a French purse seiner in the Indian Ocean. IOTC-2013-WPEB09-43.

Monteagudo,J.P., Legorburu,G., Justel-Rubio,A. and Restrepo,V. (2014). Preliminary study about the suitability of an electronic monitoring system to record scientific and other information from the tropical tuna purse seine fishery. (2014). ICCAT Col. Vol. Sci. Pap. 71(1): 440-459

MRAG, 2016. DOS electronic Monitoring System Assesment against ISSF Requirements. ES2021 Phase Four Report. MRAG, February 2016.

Ruiz,J., Batty,A., McElderry,H., Restrepo,V., Lezama, N., Murua, H., Urtizberea,A. and Urrutia,X. (2012). Pilot study of an electronic monitoring system on a tropical tuna purse seine vessel in the Atlantic Ocean. ICCAT Col. Vol. Sci. Pap. 69(5): 1995-2032.

Ruiz,J., Krug,I., González,O., Gómez, G. and Urrutia,X. (2014b). Electronic Eye: Electronic Monitoring trial on a tropical tuna purse seiner in the Atlantic Ocean. (2014). ICCAT Col. Vol. Sci. Pap. 71(1): 476-488.

Ruiz J., Krug,I., González, O. and Hammann,G. (2016). E-EYE PLUS: electronic monitoring trial on the tropical tuna purse seine fleet. SCRS 2016/181

SPC and FFA, 2017. Second Regional Electronic Monitoring Process Standards Workshop. 20 to 24 November 2017, New Caledonia.

ISSF INTERNATIONAL SEAFOOD SUSTAINABILITY FOUNDATION

www.iss-foundation.org

1440 G Street NW
Washington D.C. 20005
United States

Phone: + 1 703 226 8101
E-mail: info@iss-foundation.org