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ELECTRONIC MONITORING (EM) OF THE ACTIVITIES AND CATCHES OF PURSE-SEINE VESSELS: UPDATE (PROJECT D.2.a)

Marlon H. Román, Cleridy Lennert-Cody, Enrique Ureña

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SUMMARY

To explore electronic monitoring (EM) options for the tuna purse-seine fishery in the eastern Pacific Ocean (EPO), a proof-of-concept study for the small-vessel component (Classes 1-5) of the EPO fleet was initiated in 2018 (Project D.2.a), funded by the European Union. The low participation by Class 1-5 vessels has resulted in a delay in the project timeline and to the project being expanded to include Class-6 vessels. As of April 2019, four Ecuadorian vessels, two Class-6 and two Class 1-5 vessels, are participating in the project. Cameras have been installed aboard three of the vessels, and both the Class-6 vessels have tested them in fishing operations. Analysis of EM data from these vessels will begin soon. The project remains within budget, with sufficient funds available to reach completion. The project is scheduled to be completed in August/October 2020.

1. INTRODUCTION

Science-based fisheries management requires high-quality data from the fisheries, mainly catch composition and effort information. For the purse-seine tuna fishery in the eastern Pacific Ocean (EPO), the main sources of detailed data for management are on-board observers, vessel logbooks, and port sampling. The AIDCP On-Board Observer Program covers Class-6 vessels[1] only; smaller (Classes 1-5) vessels are rarely sampled by observers, and most of the data obtained from those vessels' logbooks include limited information on non-target species, and none on discards of target species. The port-sampling program collects species and size composition data for target species only. For non-target species such as dorado, wahoo, and yellowtail, which may be the target of other EPO fisheries, and whose status it is therefore important to monitor, detailed biological and size-composition data can only be collected at sea. However, observers are increasingly required to collect data on operational aspects of

[1] Over 363 t carrying capacity

the fishery, and therefore do not have enough time to collect additional data on these or other species, including tunas, especially during the brailing period of the set. Thus, additional data collection tools neare needed.

Electronic monitoring (EM) offers potential solutions to some of these challenges. In recent years, EM has been tried in various fisheries around the world, with mixed results. While successful in longline fisheries, in other fisheries (like tuna purse-seine fisheries), the results have not been as encouraging for all data types. No EM trials have been conducted in the tuna purse-seine fisheries in the EPO, where fleet dynamics and fishing strategies may be different from other ocean areas.

To explore EM options for the EPO tuna purse-seine fishery, a proof-of-concept study for the small-vessel component of the EPO purse-seine fleet was initiated in 2018 (Project D.2.a), funded by the European Union. This document provides updated information on the progress, costs, and challenges associated with this project.

2. PROJECT DESCRIPTION

The goal of this project is to determine whether EM can be used in the purse-seine fishery to collect reliable information on set type, FAD deployments, catches, and bycatches. Originally the project was to cover only Class 1-5 vessels, but the low participation by those vessels resulted in the project being extended to Class-6 vessels.

With the inclusion of Class-6 vessels, the project now has two components: 1) determine whether EM can be implemented on Class 1-5 vessels to complement data from logbooks, and in particular collect reliable data on set type, FAD deployments, catches and bycatches; and 2) determine whether EM can be implemented on Class-6 vessels to complement some of the data currently collected by on-board observers.

2.1. Component 1: EM data collection and evaluation for Class 1-5 vessels

The objectives for this component are:

1. Collect data at sea using both EM and an on-board observer, simultaneously.
2. Compare EM and observer data to obtain a preliminary evaluation of the performance of EM on small purse-seine vessels in the EPO.
3. If EM appears promising, develop a sampling design for a pilot study aboard Class 1-5 vessels.

2.2. Component 2: EM data collection and evaluation for Class-6 vessels

The objectives for this component are:

1. Review EM imagery.
2. Compare EM and observer data, to identify those activities which EM can record with equal or greater accuracy than a human observer.

The results will form the basis for determining whether any of the observers' data-collection duties can be performed by EM, thus giving them time for activities such as length-frequency and biological sampling.

3. CURRENT SITUATION

As of April 2019, Activities 1 and 2 (Appendix 1) have been completed. Four Ecuadorian vessels, *Charo* and *San Andrés* (Class 6), *Bernardita B* (Class 5), and *Romeo* (Class 2), all based in Manta, have agreed to participate in the project. The structural and operational characteristics of these vessels that may affect placement of EM equipment and data collection (see presentation at SAC-09) are representative of many vessels.

Questionnaires were sent to 69 Class 1-5 vessels to identify the structural and operational characteristics

that may affect placement of EM equipment and data collection, and to help with the selection of participant vessels. 58 vessels (84%) responded to the survey. By September 2018, IATTC staff members had met with individual companies to explain the purpose of the project, that the EM data would be kept confidential, and that the IATTC would pay for the EM equipment and its installation, and two vessels, the *Romeo* (Class 2) and *Bernardita B.* (Class 5), agreed to participate.

Based on the results of this survey, locations for mounting EM equipment were identified, taking into consideration brailing strategies, fishing gear configuration, and the types of sets typically made by the vessels.

In November 2018, with the inclusion of the *Charo* and *San Andrés*, the study was extended to Class-6 vessels. By December 2018, the vessel companies involved signed Memorandums of Understanding (MOUs) with the IATTC, and by January 2019 the EM equipment was purchased, and cameras were installed on the *Charo* and *San Andrés* (Figure 1). In February 2019, the EM equipment started collecting data for these two vessels. At the time of writing, one vessel is at sea fishing, the other is bound to port.

By April 2019, cameras were installed on the *Romeo* (Figures 1 and 3), and the vessel departed with the cameras operating. The cameras for the *Bernardita B* have arrived in Ecuador, but are not yet installed.

3.1. Timetable

Appendix 1 shows the projected timeline for the five activities included in the project. If the EM trials are unsuccessful, there is no point in developing a sampling design for Class 1-5 vessels (Activity 5), and the project will conclude in August 2020 (32 months), at the end of Activity 4. If Activity 5 is deemed warranted, the project will continue through October 2020 (34 months in total).

3.2. Budget

Costs incurred by the project to date (Appendix 2) are as follows:

1. **Investigating EM equipment.** IATTC staff attended conferences, workshops and seminars to learn about and select the EM equipment and service provider. The budget for this activity was US$ 8,927; at the time of writing, US$ 4,387 had been spent.
2. **Purchasing EM equipment.** The budget for buying, shipping, and importing the EM equipment was US$ 77,010; at the time of writing, US$ 30,495 had been spent.
3. **EM data interpretation: equipment and training.** This is required for the IATTC staff to be able to review and interpret EM imagery. The budget for these activities was US$ 17,798; at the time of writing, US$ 6,500 had been spent on data imagery review equipment.

4. DISCUSSION

4.1. Challenges

The major challenge to date has been the lack of support from Class 1-5 vessels, which delayed the study for almost eight months (Appendix 1: Activity 2). This delay indirectly caused the study to expand its scope by including the two Class-6 vessels.

Other challenges are expected. For example, estimating species and size composition for Class 1-5 vessels may be problematic because of the methods used to load fish into the wells from the net. Different options for EM equipment and placement of that equipment will be considered to explore all possibilities.

The EM equipment needs to work continuously and reliably, without loss of data. However, most of the Class 1-5 vessels were built several decades ago, and power failures are possible. In addition, the Class-2 vessel has space limitations, so accommodating an observer could be difficult.

4.2. Project timeline

The estimated times required to complete the various activities (Appendix 1) were based on recommendations from scientists with experience in similar projects with large purse-seine vessels in other oceans. However, in some cases more time may be needed for collecting the data, due to the challenges listed above. Moreover, analysis of the EM data (Activity 4) is a new venture for the IATTC staff, who are also typically involved in multiple projects at a time, so the estimates of time allowed for those analyses may be optimistic, and an extension may be necessary.

Figures

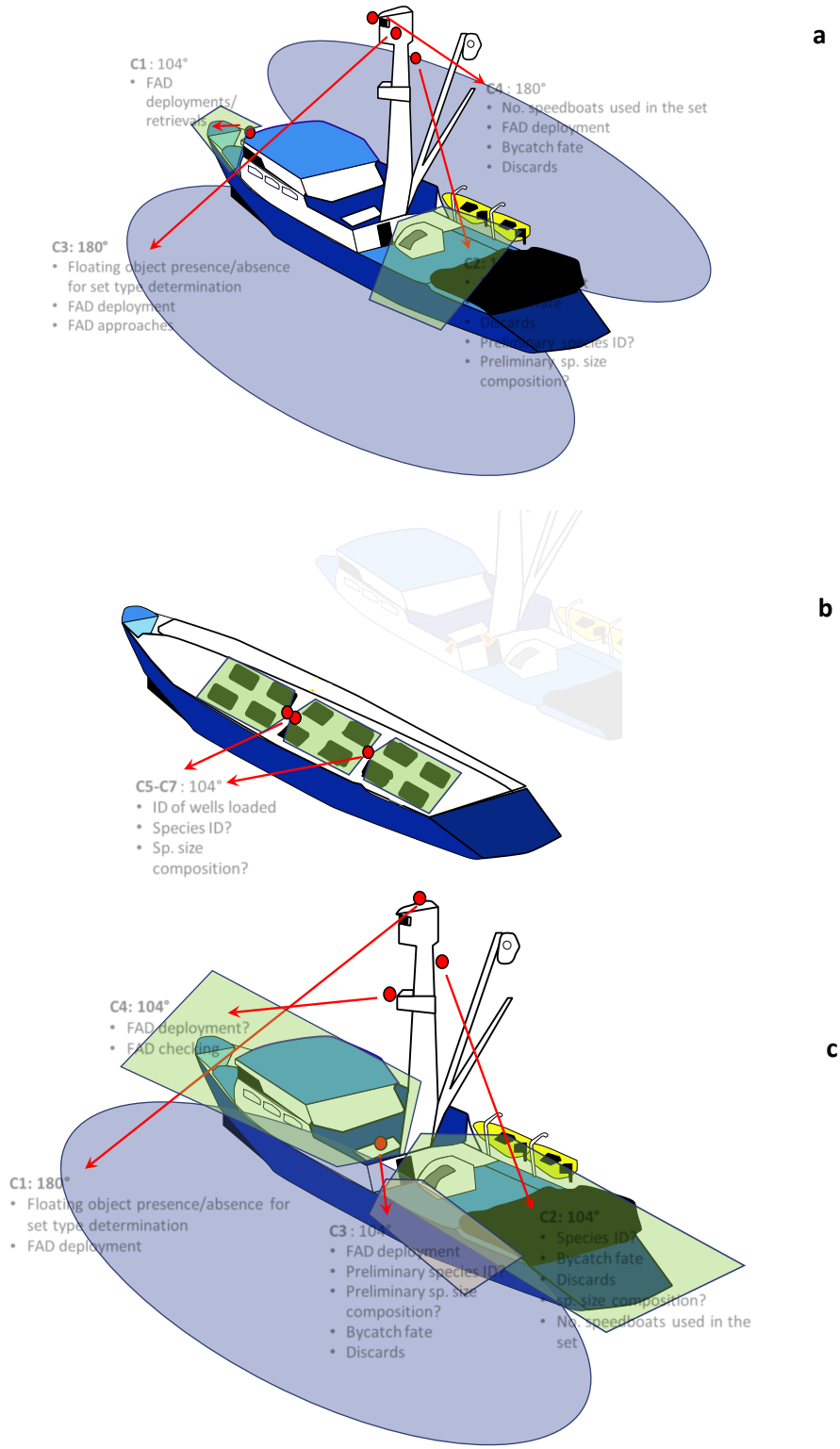
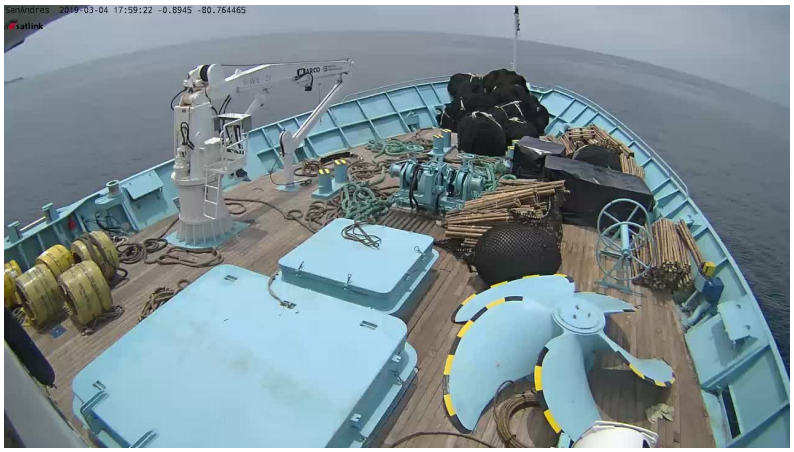


FIGURE 1. Location of cameras on the deck (a) and well deck (b) of the *Charo* and *San Andrés*, and on the *Romeo* (c).

FIGURA 1. Ubicación de las cámaras en la cubierta (a) y la cubierta de bodegas (b) del *Charo* y *San Andrés*, y en el *Romeo* (c).

a



b

c

FIGURE 2. Images from cameras on the *San Andrés*, aimed at the port side (a), bow (b), and well deck (c).
FIGURA 2. Imágenes de las cámaras en el *San Andrés*, apuntando al lado de babor (a), a la proa (b) y a la cubierta de bodegas (c).




FIGURE 3. Installation of cameras on the *Romeo*. Checking cameras (a) aimed at sacking area (b), work deck (c), bow and port side (d).
FIGURA 3. Instalación de cámaras en el *Romeo*. Revisión de cámaras (a) apuntando al área de embolse (b), a la cubierta de trabajo (c), a la proa y al lado de babor (d).

Appendix 1.

Timetable and expected results for each activity of Project D.2.a. Activities: 1: Investigation; 2: Preparation; 3: Implementation; 4: Analysis; 5: Pilot study		
2018	Activity	
Jan-Feb	1	Investigate capabilities of EM systems from different manufacturers
Mar-Aug	2	Survey brailing procedures and fishing gear configuration of Class 1-5 vessels
Mar-Dec	2	Identify vessels willing to participate in study
Sep-Dec	2	Purchase EM equipment
2019		
Jan	2	Identify vessels willing to participate in study (cont.)
Feb-Dec	3	EM and observer data collection aboard Class 1-5 and Class 6 vessels
May-Dec	4	Processing of EM data
2020		
Jan	3	EM and observer data collection aboard Class 1-5 and Class 6 vessels (cont.)
Jan-May	4	Processing of EM data (cont.)
Jun-Aug	4	• Statistical comparisons of EM and observer data • Determine data that EM can reliably collect on Class-6 vessels as accurately as the observer • Project report
If warranted:		
Sep-Oct	5	Develop sampling design for a pilot study using EM on Class 1-5 vessels

Appendix 2.

Budget for Project D.2.a, as of April 2019	Budgeted		Spent
	€	US$	US$
Activities 1 + 2 (investigation and preparation)			
1. Investigate EM equipment; travel	7,900	8,927	4,387
2. Travel to select vessels for project	7,000	7,910	0
3. EM equipment purchase	68,150	77,010	30,495
Sub-total	**83,050**	**93,847**	**34,882**
Activity 3 (implementation)			
1. Collect data; travel to fishing ports	7,000	7,910	0
2. Collect data; observer compensation, bonuses	14,200	16,046	0
3. EM data interpretation: equipment	15,750	17,798	6,500
Sub-total	**36,950**	**41,754**	**6,500**
Total	**120,000**	**135,601**	**41,382**