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INNOVATION | TECHNOLOGY | SUSTAINABILITY

**PILOT PROJECT ON A REMOTE
ELECTRONIC MONITORING (REM) SYSTEM
FOR BLUEFIN TUNA PROCESSING VESSELS
PHASE 1 REPORT**

PHASE 1

INTRODUCTION

Satlink is an international technology company that develops solutions to support sustainable fisheries and assist in improving the management of ocean resources, working closely with industry, governments, and NGOs.

Digital Observer Services (DOS) is an EM consultancy company and part of the Satlink group, that supports Satlink and clients with the analysis and management of Remote Electronic Monitoring (REM) data.

The SeaTube is a fully customizable REM system that has been proven as a reliable on-board solution to gather data to achieve scientific, management and compliance monitoring objectives.

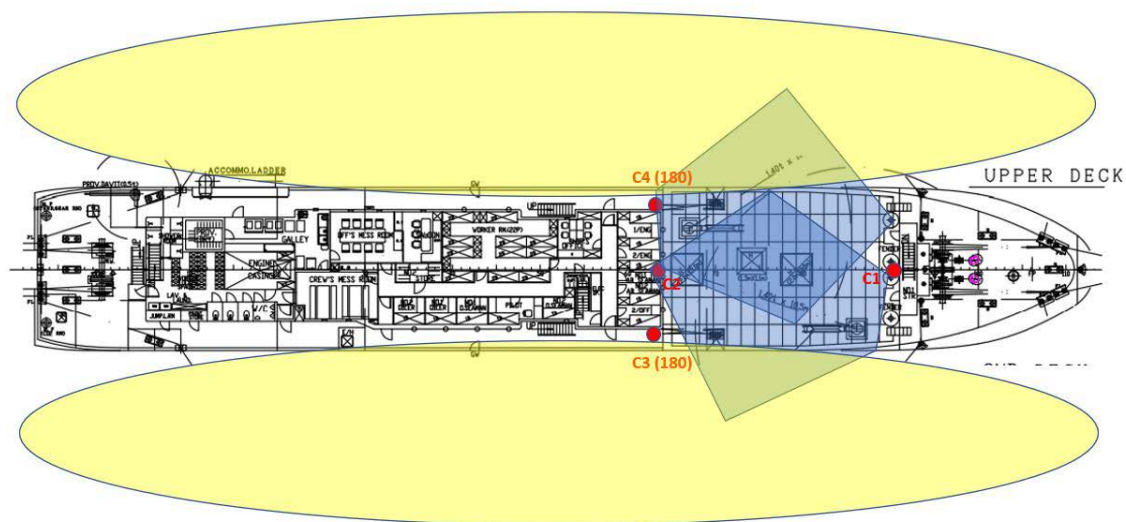
The SeaTube is fully developed and manufactured by Satlink, which means that every unit includes the latest technology developments and let us upgrade the systems according to any technological advancements. The system has been designed to be robust, both physically and in terms of operation, to prevent the loss of valuable fishing information. Satlink understand the harsh environment in which the SeaTube systems are installed and thus, the equipment and its components are designed to be installed on fishing vessels.



INSTALLATION

○ Planning

For the present project, two different tuna freezing carriers were selected: Paloma Reefer and Princesa Guasimara. Due to this project characteristics the following 4-camera placement was proposed, so all wells and board-side interactions could be registered:



Besides the cameras, the complete systems initially proposed for each vessel are:

- 1 x SeaTube Nano+ Control Unit
- 1 x ELB2020(VMS/Satcom Unit)
- 1 x 4G Router
- 1 x APC UPS
- 3 x 100° Camera
- 1 x 180° Camera
- 1 x Sensor Box
- 3 x Temperature Sensor
- 3 x Door Sensor
- 1 x Crane Scale

Once the camera proposal was ready and the whole solution tailored to the vessels, a Vessel Monitoring Plan was redacted and presented to the shipowner of both vessels for their approval.



- **Equipment installation**

The installation of each vessel was made at the port they were working at:

- **Paloma Reefer**

Paloma Reefer was installed at Cartagena, Spain, by Radiobuques S.L. a local company that was assisted by Satlink during the whole process.

Installation took place in two different times due to a problem with one of the cameras and the vessel having to go back to work. The first part of the installation was finished on December 1st, 2022, while the fourth camera and a power transformer were added on December 22nd.

- **Princesa Guasimara**

Princesa Guasimara was installed at La Valletta, Malta, by SeaBrave Boats S.L. a local company that was assisted by Satlink during the whole process.

Full installation of the equipment was successfully finished on November 11th.

The following system was installed on board of the Paloma Reefer and Princesa Guasimara vessels:

- 1 x SeaTube Nano+ Control Unit
- 1 x ELB2020 (VMS / Satcom Unit)
- 1 x 4G Router
- 1 x APC UPS
- 3 x 100° Camera
- 1 x 180° Camera

The following set of sensors could not be installed:

- 1 x Sensor Box
- 3 x Temperature Sensor
- 3 x Door Sensor
- 1 x Crane Scale

The schedule did not allow its installation, so it is proposed to install the door and crane scale sensors, since the temperature sensors were rejected because they do not provide relevant data for the monitoring of transshipment objective of this project.

It is proposed to install them in a second phase of the project, which would mean the extension of the initial planning but in accordance with the contract between ICCAT and Satlink, which already foresaw the extension for 12 months.



PHASE 1 PILOT

○ **Data Recording**

During this pilot, 45 days were recorded onboard Paloma Reefer and 54 days onboard Princesa Guasimara, adding up to 1285GB worth of data between raw footage and REM metadata.

The only issue detected since the installation of both systems was a communications blockage for Princesa Guasimara on December 15th. Which was deemed as uneventful since no evidence of loss of information was found on the checks performed on the SeaTube afterwards.

○ **Equipment Decommission**

Once the bluefin tuna season ended, both systems were uninstalled by Radiobuques at Cartagena port, Paloma Reefer on January 16th and Princesa Guasimara on January 25th, 2023, without further issues, and they were shipped to Satlink’s premises for safekeeping and data analysis.

○ **Data Analysis**

One hard drive per vessel was sent to DOS, company in charge of the analysis of this project’s REM data. As a result, DOS identified and described 28 transshipments for Paloma Reefer and 25 events for Princesa Guasimara.

In this phase of the project, the weight of the pieces is estimated using a conversion formula, available in DOS reports, since no sensors were installed.

During the Phase 1 pilot period, Paloma Reefer made two different trips totaling 40 at-sea days and 28 transshipments:

- December 2nd to December 22nd: with 14 different transshipment events

	DOS	Logbook
Individuals	2178	2178
Weight (kg)	560780	562498

- December 25th to January 14th: with 14 different transshipment events

	DOS	Logbook
Individuals	2538	2539
Weight (kg)	588577	590676



Princesa Guasimara performed three different trips, 44 at-sea days with a total of 25 transshipping events:

- November 30th to December 14th: with 8 different transshipment events

	DOS	Logbook
Individuals	1759	1765
Weight (kg)	410780	371241

- December 16th to December 27th: with 9 different transshipment events

	DOS	Logbook
Individuals	1558	1556
Weight (kg)	384815	364697

- January 6th to January 25th: with 8 different transshipment events

	DOS	Logbook
Individuals	1604	1604
Weight (kg)	378899	379826

The table below shows the effort undertaken by DOS' staff to fully, and manually, analyze all the detected transshipments:

Vessel's trip	Analysis hours	Days	Transshipments	Tuna pieces
TOTAL	140,9	82	53	9637
A_PalomaReefer_20221202	25,2	20	14	2178
A_PrincesaGuasimara_20221130	25,4	14	8	1759
A_PrincesaGuasimara_20221216	25,5	11	9	1558
A_PrincesaGuasimara_20230106	34,2	19	8	1604
A_PalomaReefer_20221225	30,6	18	14	2538

Using this project's prices and case numbers as a guide, considering that only target days with vessel activity are analyzed, we get that a 65% of days in a trip will be analyzed which prizes the analysis of a month of footage in, around, 65€ x 20 days = 1300€, as mean value.

We have to always consider that there are many factors that can affect the speed and price of analysis, such as footage quality, length of the transshipment or the complexity of the analysis or analysis object.



CONCLUSIONS & NEXT STEPS

○ **Lessons Learned**

We have to stress the importance of respecting the time requested to plan installations, since rushing to ship equipment and have install doesn't only lead to possible mistakes, but also can affect the final outcome of both analysis quality and equipment lifespan.

Constant communication with the equipment has proved, again, its utility in both giving remote maintenance through alarms management and assessing the gravity of any small issues.

Regarding the analysis, although the camera setting provides a bit of redundancy, it was proven worthy since different camera angles proved useful when not all the cameras were kept clean, or due to the vessel's operation part of the framing was obscured for one camera but not the other ones.

After analyzing the data, DOS has determined that, with the camera disposition used in this SeaTube installation, there is enough evidence to perform the analysis required for data comparison with the logbook. Besides, the addition of sensors that help with event detection and weight data input should improve both analysis speed and data quality of future data analysis.

○ **Next Steps**

In this moment, June 2023, the project is at a pause while this year's campaign starts again in summer, August 2023.

Then, both vessels will be reinstalled in July 2023 with the Electronic Monitoring System (SeaTube Nano+) plus the sensor array that couldn't make it for the first phase, which would mean the extension of the initial planning but in line with the contract between ICCAT and Satlink, that already provided for the extension for 12 months.

Now that the current project has finished, with all the data gathered and the result of its analysis, we consider it would be a good opportunity to have a second shot at these vessels, considering the following:

1. The vessel's crew are already instructed and familiarized with the equipment, which will result in a smoother implementation of the maintenance protocol, hence ensuring that footage will be of good quality.
2. The results from the analysis show promising expectations for REM onboard this type of vessels, but the lack of overall data asks for a bigger dataset, even if we'd be repeating test subjects.



3. With a second phase, we'd be able to add the sensor array to the equipment, which will give an extra layer of depth to said dataset and will help comparing cost-effectiveness with the "artisanal" way of analyzing from the previous phase.
4. The sensors to be installed are:
 - a. Crane scales: which will send data on the weight of each swing of tuna made to and from the vessel. This is added value to the estimations made by the analysts on the previous phase using conversion charts.
 - b. Door sensors: these sensors will trigger every time the door to the hatches are opened, making it faster and easier to the analysts to identify when a transshipping event is underway.

Hope these reasons are enough to make it possible to add an extension for the next work season of the vessels, which will finish by January 24th, shall it be accepted, we have all the means to perform the works mentioned as well as the re-installation of the equipment.

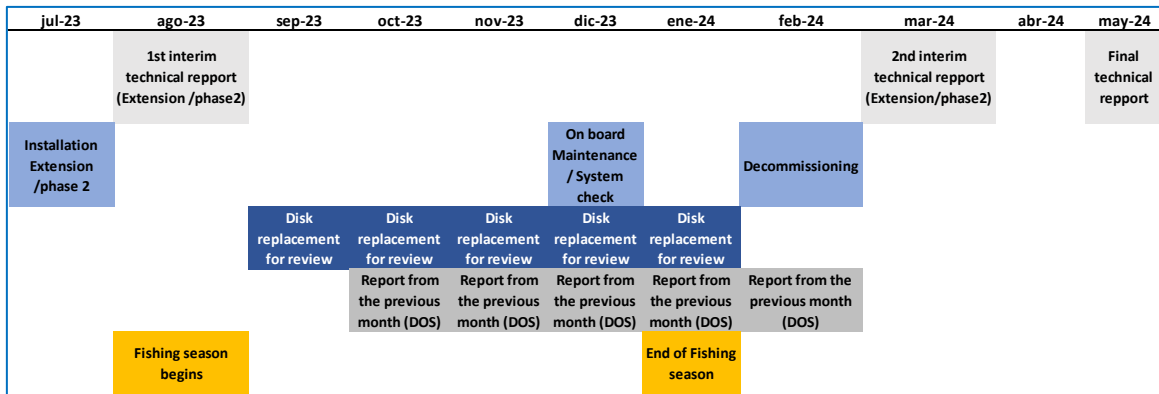
For the second phase of the project the vessel Princesa Guasimara will be reinstalled in La Valleta (Malta) and the Paloma Reefer vessel in Las Palmas de Gran Canaria (Spain).

In phase two the following system will be installed on board of each vessel:

- 1 x SeaTube Nano+ Control Unit
- 1 x ELB2020 (VMS/Satcom Unit)
- 1 x 4G Router
- 1 x APC UPS
- 3 x 100° Camera
- 1 x 180° Camera
- 1 x Sensor Box
- 3 x Door Sensor
- 1 x Crane Scale



Satlink proposes the following new schedule for the extension/phase 2:



ACKNOWLEDGEMENTS

This work was carried out under the provision of the ICCAT. The contents of this document do not necessarily reflect the point of view of ICCAT, which has no responsibility over them, and in no way anticipates the Commission’s future policy in this area.

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