Electronic Monitoring System Vendors & Service Providers

EMS Vendor	Overview	Tuna experience	Website
Anchor Labs	Electronic Monitoring Systems used mainly in EU fisheries (demersal mixed fisheries) related to the Landing Obligation. Can be customized and adapted to meet specific requirements from catch handling to gear activities and discard estimation. Hardware-software-development-data archival-data analysis and reporting.	No	http://anchorlab.net/Systems.aspx
Archipelago Marine Research	One of the first and most important EM systems vendors Using Marine Instruments hardware, Archipelago plan, design and manage the EM System and review/analyse the collected data. Hardware/software (Marine Instruments)-development-data archival-data analysis and reporting.	Yes	https://www.archipelago.ca/fisheries-monitoring/electronic-monitoring/
Datafish	EM service provider working with a wide range of technologies; ZUNIBAL, Marine Observe and Archipelago. Datafish provide all services included in EM systems, including design, installation, data analysis and reporting. Datafish works with FISH VUE and ZUNIREM software to provide fishing activities data, discard estimation and ETP interaction in all fishing gears	Yes	https://datafishts.com
Digital Observer Services	Digital Observer Services is an EM service provider and partners with Satlink to provide EMS systems but also EM video data archive and review and data processing. Hardware-software-development-data archival-data analysis and reporting.	Yes	http://digitalobserver.org/en/
Ecotrust Canada	Ecotrust has developed EM projects in different fisheries, particularly in small scale coastal fisheries in Washington State's Quinault crab fishery and New England Groundfish fishery. However, they have not their own hardware/equipment. Development-data archival-data analysis and reporting.	No	http://ecotrust.ca/project/electronic-monitoring/
Electricedge	They launched FACTS - Fishing activity and catch tracking system – customed tailored project of Electronic Reporting and catch tracking systems. They are not EMS vendors but can develop project to install EMS systems in vessels.	No	http://www.electricedgesystems.com

Fish Trax	More focused on e-logbook and e-reporting but not on electronic monitoring systems.	No	http://fishtrax.org
Flywire	Flywire is focused on low-cost miniature systems more focused for small-scale fisheries. Hardware-software-development-data archival-data analysis and reporting.	No	https://www.flywirecameras.com
Integrated Monitoring	Integrated Monitoring expanded its expertise on telecom and satellite communication to Fishery monitoring systems, providing VMS, e-logbooks, e-reporting and EMS to vessels including the possibility for real-time data transfer. Hardware-software-development-data archival-data analysis and reporting.	Yes	http://www.integratedmonitoring.net
SatLink	SatLink works primarily with tuna vessels providing EMS solutions from installing the cameras to analyse the data. Hardware-software-development-data archival-data analysis and reporting.	Yes	https://satlink.es/es/soluciones/gestion-y-monitorizacion-de-flotas/electronic-monitoring
Saltwater, Inc.	Saltwater has EM systems in a variety of fisheries and is the vendor for the US Atlantic HMS fishery. Hardware-software-development-data archival-data analysis and reporting.	Yes	https://www.saltwaterinc.com/electronic-monitoring/
Shellcatch	Shellcatch produces low-cost cellular-based video systems for small-scale and artisanal fisheries. Hardware-software-data archival.	Yes	https://web.shellcatch.com/emonitoring
SnapIT	SnapIT provides satellite communications, VMS, e-reporting and EMS systems. End to end solutions from camera deployment to data storage, transmission and analysis. Hardware-software-development-data archival-data analysis and reporting.	Yes	https://www.snapit.group
Teem Fish	Teem Fish offers end to end solutions from camera deployment to data storage, transmission and analysis. Hardware, software development, data analysis and reporting. Our Electronic Monitoring (EM) systems improve cost and operational efficiencies, for profitable and responsible fishing practices.	No	https://www.teem.fish/em-products
Thalos	OceanLive, Electronic Monitoring System (EMS), is an embedded video system dedicated to ship operations supervision and control. Hardware-software-development-data archival-data analysis and reporting.	Yes	https://www.thalos.fr/en/digital-solutions/operational-efficiency/oceanlive/
Trident System	Working in collaboration with SnapIT cameras and hardware to provide EMS Services.	No	http://www.tridentsystems.co.nz/our-work/collecting-data/video-observation/

Zunibal	Zunibal offers a comprehensive electronic monitoring solution tailored to the tuna industry and other fisheries. Zunibal EMS includes onboard systems, a web-based monitoring platform, reporting tools, analysis software and AI integration.	Yes	https://zunibal.com/en/electronic-monitoring/

FAD buoy daily position[1] and echosounder acoustic biomass[2] data to tuna RFMOs and Scientific Institutions[3]			
Ocean	**Institution**	**Contact Person**	**E-mail**
East Pacific	IATTC	Jon Lopez Marlon Roman	jlopez@iattc.org mroman@iattc.org
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	AZTI	Josu Santiago	jsantiago@azti.es
	IRD	Laurent Dagorn Julien Lebranchu	laurent.dagorn@ird.fr julien.lebranchu@ird.fr
Indian	IOTC	Emmanuel Chassot	Emmanuel.Chassot@fao.org
	AZTI	Josu Santiago	jsantiago@azti.es
	IRD	Laurent Dagorn	laurent.dagorn@ird.fr
	SFA	Vincent Lucas	vlucas@sfa.sc
All	ISSF	Victor Restrepo Hilario Murua	vrestrepo@iss-foundation.org hmurua@iss-foundation.org
	IEO	Francisco Abascal	francisco.abascal@ieo.es
	AZTI	Josu Santiago	jsantiago@azti.es

[1] ISSF CM 3.7 requirement from 1 January 2023
[2] ISSF CM 3.7 requirement from 1 April 2024
[3] See Annex 1 for guidance

Voluntary LL Bycatch Data to tunaRFMOs and Scientific Institutions[4]			
Ocean	**Institution**	**Contact Person**	**E-mail**
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	IRD	Laurent Dagorn Julien Lebranchu	laurent.dagorn@ird.fr julien.lebranchu@ird.fr
Indian	IOTC	Emmanuel Chassot	Emmanuel.Chassot@fao.org
	IRD	Laurent Dagorn	laurent.dagorn@ird.fr
All	ISSF	Victor Restrepo Hilario Murua	vrestrepo@iss-foundation.org hmurua@iss-foundation.org
	IEO	Francisco Abascal	francisco.abascal@ieo.es

[4] See Annex 2 for guidance

Annex 1

FAD operational position and buoy echosounder acoustic biomass data submission format guidance

The FAD raw data should be provided by the FAD buoy service providers directly to the CPCs/RFMOs and should be identical in form and content to the raw satellite buoy data provided by the buoy manufacturers to the original users (i.e., vessels and vessel administrators). There are four main companies that supply satellite-transmitting buoys to the purse-seine fleet: Marine Instruments, Satlink, Zunibal, and Kato. Each buoy has a unique alphanumeric identifier code, provided by the manufacturer, which is associated with a vessel.

Data should be received in csv files named "X-YYYY-MM-ZZZZZZZ.csv" where X is the code of the buoy manufacturer (M, S, Z, K for Marine Instruments, Satlink, Zunibal, and Kato, respectively), YYYY is the year, MM the month, and ZZZZZZZ the purse-seine vessel's name and/or IMO number. The general file format will be as follows: CSV format, columns separated by commas (,) and decimals represented by periods(.)

Each file should contain the records (one position record per line and acoustic record when available – note that not all position records include a biomass record from the echosounder) of all FADs/buoys managed by each individual vessel from deployment or buoy activation until final deactivation.

The following data fields recorded during the day should be included for all buoys:

- Unique buoy identifier code [ID Buoy – which could be composed of brand-model-unique identification code; e.g., DSL+35408],
- Vessel name (associated with the buoy and receiving buoy information),
- IMO number,
- Date [YYYY/MM/DD],
- Time [hh:mm],
- Latitude and longitude [expressed in degrees and minutes in decimal values],
- Speed [knots],
- Drift,
- And the acoustic sounder[5], the acoustic biomass estimation by layer. [Each brand provides a different range and structure of layers of information, so the empty layers (columns) should be filled with NA values].
    - In multifrequency acoustic buoys, acoustic biomass data from each frequency should be included by adding a field specifying the exact acoustic frequency (see the example table below).

When available, the following information corresponding to each position transmission should also be included:

- Water temperature,

[5] Some buoys record acoustic biomass data along with corresponding timestamps, but not position information. As a result, the files may contain rows with position data but no acoustic biomass information, as well as acoustic biomass data without associated position data, concatenated one after another.

- Buoy in the water (only for those buoys with sensors that allow identifying buoys in the water),
- Activation and deactivation dates and position (lat/long), and
- State of transmission mode of the buoy (e.g. immediate information, retrieving, etc.).

Example of the data that could be received:

Buoy	Vessel	IMO	Timestamp transmission	Timestamp Sounding	Lat	Long	Bat	Temp	Speed	Drift	Layer1	Layer…	Layer10	Layer…	Layer50
For single frequency buoys															
DSL+35408	X	Y	03/03/2012 10:53	03/03/2012 10:53	y	x	-	-	0.681	1.420	NA	NA	NA	NA	NA
DSL+35408	X	Y	03/03/2012 11:02	03/03/2012 11:02	y	x	-	-	0.681	1.420	X	X	X	NA	NA
M3+699963	X	Y	13/03/2012 2:50	13/03/2012 2:50	y	x	-	-	0.681	1.420	X	X	X	X	X
For multi-frequency buoys															
M3+ MGO127814	X	Y	13/03/2012 2:50	13/03/2012 2:50	y	x	-	-	0.681	1.420	X	X	X	X	X
M3+ MGO127814	X	Y	13/03/2012 2:50	13/03/2012 2:50	y	x	-	-	0.681	1.420	X	X	X	X	X

In addition to these common fields, it should be noted that each provider shares data using the following specific fields:

- ***Satlink***: Files with acoustic and position data integrated (ESDumpHR): “Name“, buoy identifier; “MD“, descriptor (160, 161, and 162 for position data, without sounder data, and 163, 168, 169, and 174 for sounder data); “StoredTime“, date (dd/mm/yyyy) and time (H:MM) of the record; “Latitude“, position in decimal format; “Longitude“, position in decimal format; “Bat“: Battery level (percentage); “Temp“, surface water temperature recorded in degrees; “Speed“, in knots; “Drift“, current direction in degrees; “Layer1-Layer10“, estimated biomass per layer in tons; “Sum“, sum of estimated biomass in all layers; “Max“, maximum estimated biomass in the layers; “Mag1 – Mag8“ magnitudes: quantification of detected objects based on the peak detection TS.

- ***Marine Instrument***: "TransmissionDate", date and time of transmission (dd/MM/yyyy HH:mm); "FactoryCode", buoy identifier; "Latitude", position in decimal format; "Longitude", position in decimal format; "Speed", peed in knots; "Direction", current direction in degrees; "Status", buoy mode; "Flash", flash On/Off; "Temperature", sea surface water temperature in degrees; "Vcc", battery level (0 to 17.7); "SounderFrecuency", sounding frequency; "SounderDate", date and time of sounding (dd/MM/yyyy HH:mm); "Gain", 0,1,2 or 3 level; "Resolution", number of bits per line (3 or 4); "Levels", number of layers (fixed value of 50); "DeepLevel", maximum depth (150m); and "SounderValue", total biomass estimation; "DataText" acoustic signal intensity per layer (highest record registered in the layer).
- **Zunibal**: "Buoy code", buoy identifier; "Transmission date/time ", record date and time of transmission (dd/MM/yyyy HH.mm); "Lat", position in decimal format; "Lon", position in decimal format; "message_type ", acustic sounding or position; "course" in degrees; "speed", in knots; "water temperature", in degree Celsius; "buoy in water", yes/no; "last activation", date and time of transmission (dd/MM/yyyy HH.mm); "biomass total tons", total recorded tons; and "biomass by layer", estimated biomass per layer (12 layers each 10 meters, from 0 to 120 m).
- **Kato**: "Buoy", buoy identifier; "Date/Time", date and time of transmission (dd/MM/yyyy HH:mm); "Lat", position in decimal format; "Long", position in decimal format; "Bat", Battery level; "Temp", temperature; "Speed", speed in knots; "Drift", current direction in degrees; "SounderData", estimated biomass per layer (intensity values from 0 to 15, 12 layers).

BUOY ID examples for the different types of buoys

SATLINK			
Model	Code	Digits	Example of Buoy ID
D+ batteries	D+	5-6 digits	D+873984
D+ batteries	DS+	5-6 digits	DS+873984
D+ solar	DL+	5-6 digits	DL+873984
D+ solar	DSL+	5-6 digits	DSL+873984
IDP solar	ISL+	5-6 digits	ISL+873984
IDP solar	ISD+	5-6 digits	ISD+873984
SLX solar	SLX+	5-6 digits ECO buoy; less plastic, partly recycled, higher resolution echo-sounder, etc.	SLX+873984

Marine Instruments			
Model	Code	Digits	Example of Buoy ID
MDP	MDP	5-6 digits	MDP873984
MDS	MDS	5-6 digits	MDS873984
M2D	M2D	5-6 digits	M2D873984
MSI	MSI	5-6 digits	MSI873984
M3i	M3I	5-6 digits	M3I873984
M3i+	M3+	5-6 digits	M3+873984
M4I	M4I	5-6 digits; Multifrecuencia 50, 120, 200	M4I873984

M4i+	M4+	5-6 digits; Multifrecuencia 50, 120, 200	M4+873984

ZUNIBAL			
Model	Code	Digits	Example of Buoy ID
Tunabal-7	T07	9 digits	T07-874973336
Tunabal-e7	Te7	9 digits	Te7-874973336
Tunabal-e7+	T7+	9 digits	T7+874973336
Tuna8 Explorer	T8E	9 digits	T8E-874973336
Tuna8 Xtreme	T8X	6 digits; ID Buoy with 6 digits instead of 9	T8X-874973336
Tunabal-7 (F series)	F07	9 digits;	F07-874973336
Tunabal-e7 (F series)	Fe7	9 digits;	Fe7-874973336
Tunabal-e7+ (F-series)	F7+	9 digits;	F7+874973336
Tuna8 Explorer (F-series)	F8E	9 digits;	F8E-874973336
Zunibal without sounder	Z07	9 digits; only position, no sounder	Z07-874973336
Zunibal without sounder	Ze7	9 digits; only position, no sounder	Ze7-874973336

KATO				
Model	Code	Echosounder	Digits	Example of Buoy ID
KT-800D	K….	no	4 digits	K1234
KT-800D	AT….N	no	4 digits	AT1234N
KT-690SF	P….F	Yes, single freq	4 digits	P1234F
KT-690SF	P….	no	4 digits	P1234
KT-690SF	G….F	Yes, single freq	4 digits	G1234F
KTI-21SF	…..	no	5 digits	10234
KTI-21SF	…F	Yes, single freq	5 digits	12345F
KT-690SF	A…FF	Yes, single freq	5 digits	A12345FF

Annex 2

Voluntary Longline Bycatch Data Submission Guidance

The four tropical tuna RFMO Secretariats or science providers (IATTC, ICCAT, IOTC, and WCPFC-SPC) are in a position and willing to receive voluntary longline bycatch data from vessels/FIPs to enhance the availability of bycatch data that supports scientific advice for tuna sustainability. Each tuna RFMO, however, has its own format and specifications for bycatch and observer data submission. Below, each RFMO's bycatch/observer data forms are provided for use when submitting relevant data in the area of operation of the fishery/vessel/FIPs.

IATTC bycatch/observer data forms

The main task of scientific observers and/or EM is to record, consistent with the data standards established by the IATTC, the catches of targeted fish species, species composition, and any available biological information, as well as any interactions with non-target species such as sea turtles, seabirds, and sharks.

The observer data, both human and/or EM, reporting requirements established by the IATTC for longline vessels can be found in Annex B of IATTC C-19-08 Resolution on Scientific Observers for Longline Vessels. Vessels/FIPs can submit operational data collected by observers consistent with te Minimum Data Reporting Standards developed by the IATTC as outlined in Annex B of C-19-08.

Two options to report observer/EM minimum data requirement standards were established by the IATTC Scientific Advisory Committee:

- Option 1: Harmonized with WCPFC observer minimum data requirement standards, and
- Option 2: IATTC-developed longline observer data forms

Although the preference is for Option 1, as this allows harmonization with WCPFC data standards and reporting forms, Option 2 is also available for reporting EM data. Please note that Option 2 is not a requirement to use those data forms, but rather to collect the data fields contained in them.

ICCAT bycatch/observer data form

Several ICCAT CPCs have human observer programs in place, using human observers, and in some cases complemented by electronic monitoring. The information collected from such programs is being provided to ICCAT. The SCRS has recommended that Contracting Parties, and Cooperating non-Contracting Parties, Entities or Fishing Entities, when possible, should provide their observer data to the Secretariat using the ST-09 form, indicating whether the data were collected by human observers and/or electronic monitoring, and whether they are confidential or not. The ST-09 form can accommodate information for multiple trips but is also valid for reporting the data of a single trip.

The ST-09 observer data form can be downloaded from:
https://www.iccat.int/en/submitSTAT.html

The above web page also provides a general description of the fishery data, including observer data, to be submitted to ICCAT.

IOTC bycatch/observer data form

The IOTC developed data forms for reporting purse seine and longline Regional Observer Scheme (ROS) data, based on the Regional Observer Scheme specifications, which include the details of the data fields to be collected. These forms can accommodate information for multiple trips but also are valid for reporting the data of a single trip. Although originally developed for collecting and reporting human observer data, since the adoption of Resolution 23/08 on Electronic Monitoring Standards for IOTC fisheries, these forms can also be used to report EM observer data.

The official IOTC ROS data reporting forms for longline (and other gears) can be downloaded from: https://iotc.org/science/regional-observer-scheme-science

General instructions for collecting and submitting ROS data can be found at: https://iotc.org/documents/ROS/DataStandards

WCPFC bycatch/observer data form

The Pacific Community (SPC) developed draft standards and data forms to report longline Electronic Monitoring observer data to the WCPFC, based on the current draft EM LL standards under discussion at the WCPFC, which were presented at the SPC 12th Data Collection Committee (DCC 12, December 13 2022).

The Draft Longline EM minimum data field standards are available to SPC/FFA member countries for use when embarking on trials or implementation of E-Monitoring (EM) for longline vessels licensed to operate in PICTs EEZ waters (and adjacent waters). These standards should be provided to the EM technical provider to ensure the minimum data fields specified here are generated by the EM system, following the EM Protocol notes provided.

The draft Longline EM minimum data field standards can be downloaded from: https://oceanfish.spc.int/index.php?option=com_docman&task=doc_download&gid=2071&Itemid=77