Redesigning the logbook of French purse seiners to meet increasingly complex data reporting requirements

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Abstract

Logbooks are one of the key tools to monitor a fishery and are required for multiple needs and by multiple end users. In the case of the French and Italian tropical tuna purse seiners (PS) operating in the Atlantic and Indian Oceans, logbooks have been used since the start of the fishery, respectively during the 1960s and the 1980s. Overall, despite increasingly complex data reporting requirements, their structure has not changed much over time. Here, we present the structure of a fully redesigned logbook, with an in-depth revision aiming at making the logbooks more user friendly for captains, using data entry forms. This structural change also allows designing a database-like logbook, with a healthier data structure, separating data entry tasks from analysis and reporting needs. Future steps, including the validation of the current format and training of captains to this new reporting tool are also presented.

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Introduction

Logbooks are one the key tools to monitor a fishery and are required for multiple needs and by multiple end users. In the case of the French and Italian tropical tuna purse seiners (PS) operating in the Atlantic and Indian Oceans, logbooks have been used since the start of the fishery, respectively during the 1960s and the 1980s (Pianet, 1999). Overall, despite increasingly complex data reporting requirements, their structure has not changed much over time (see Hallier *et al.*, 1992; Pianet, 1999; Maufroy and Goujon, 2019 for a comparison of formats).

The main changes have consisted in moving from a paper to an Excel format during the 2000s that was improved in 2013 to facilitate the reporting to flag State and local authorities. This format was further improved in 2020 to allow an automatized treatment of logbooks with R or PostgreSQL scripts, by removing unsuitable formatting (e.g. merged cells and multiple data fields in a single column, (Maufroy and Goujon, 2019a). New columns have also been progressively added and refined to improve the monitoring of activities with Floating OBjects (FOBs) and their instrumented buoys, in compliance with Conservation and Management Measures in place in IOTC and ICCAT (e.g. IOTC Resolution 19/02; ICCAT Recommendation 22-01), the logbook being used both in the Indian and Atlantic Oceans.

Yet, in 2023, there are still a number of improvements that could be done on Excel logbooks to make sure they really address all the needs of their multiple users, starting with those of the captains that fill the logbooks. Indeed, their structure, which combines the fishing logbook with the so-called "FAD logbook" implemented in IOTC since 2014 (IOTC Resolution 13/08) contains multiple columns, which does not facilitate data entry and can therefore affect data quality (Maufroy *et al.*, 2022). Since the IOTC form to report FOB and buoy activities has been revised throughout 2022 and 2023 (IOTC Secretariat, 2023), it is now critical that fishing/FOB logbooks allow reporting data of optimal quality.

In addition, information contained in logbooks are transmitted to a wide range of recipients with their own needs. This covers, among others :

(1) The flag State and European Union (EU) authorities, especially to cover data collection on FOBs and buoys, the Electronic Reporting System (ERS) being revised too unfrequently to remain up to date with RFMO requirements

(2) The authorities of coastal States in the frame of fishing agreements, with formats that may differ between fishing agreements

(3) The authorities of the port where the purse seiner is landing its catches

(4) National scientists of the Institute for Research and sustainable Development (IRD) to allow organizing the sampling of retained catches at port and to cover other monitoring needs

(5) The fishing company and the Producer Organization to monitor quota consumption in near real-time

It is therefore necessary that logbooks not only facilitate data entry by captains, but also contains export formats that meet the needs of each type of end-user.

From October 2022 to November 2023, an in-depth revision of the Excel logbook used by French and Italian purse seiners was therefore operated. This document presents the data structure and formats developed throughout this year of work so as to receive feedback from the IOTC WPDCS, before the implementation of this new tool in 2024.

2. Drafting the specifications for a new logbook

2.1 Electronic Reporting system or separated electronic logbook?

The EU Electronic Reporting System (ERS) has been implemented since 2013 onboard French tropical tuna purse seiners, in agreement with the EU Control Regulation (EU Regulation 1224/2009). The ERS consists of a series of electronic declarations or *reports* that are common to all types of EU fishing vessels (Table 1). Each fleet of EU member States use these reports, though the detailed structure of the ERS differs between member States. Only the French ERS will be discussed here.

Table 1 : Types of reports in the EU Electronic Reporting System (ERS).

Abbreviation	Full name	Description
DEP	DEparture from Port	Report of departure from port including catch on board from previous fishing trip
FAR	Fishing Activity Report	Report of fishing activity, including catches in case of fishing sets or position at midday in case of day without fishing set
DIS	Discards	Report of discarded catches
COE	Catch On Entry	Report of zone entry, including catches present onboard at the time of zone entry
COX	Catch On eXit	Report of zone exit, including catches present onboard at the time of zone exit
RTP	Return To Port	Report of return to port, including reason for returning to port
LAN	LANding	Report of amount of landed catches
TRA	TRAnshipment	Report of amount of transhipped catches, only allowed at port on carrier vessels for tropical tuna purse seiners

In 2019, to deal with the specificities of tropical tuna purse seine fisheries, a “FAD module” was implemented as an extension of the ERS Fishing Activity Reports (FAR). As the ERS v3 did not allow meeting all IOTC and ICCAT data collection and reporting requirements on FOBs, the decision was made to develop a temporary solution, by adding new columns to the existing Excel logbook (Maufroy and Goujon, 2019a).

4 years later, the solution of keeping a separate electronic fishing logbook is not temporary anymore and even appears to be the best option. Indeed, though new management measures should be implemented within a few months in IOTC and ICCAT (adoption in May or November, implemented in January of the following year), each revision of the ERS requires several years. Using a more flexible tool, designed separately from the ERS, remains therefore necessary to comply with new t-RFMO rules in due time. On the other hand, making this decision implies a double reporting for captains, at least for vessel movements and catches, as this information would be required both in the ERS and the electronic fishing logbook.

The following decisions were therefore made :

(1) Develop a fully redesigned electronic fishing logbook, that would be kept separate from the ERS, so as to allow quick structural changes if needed

(2) Align the structure of the redesigned electronic fishing logbook on the ERS as much as possible, by using, for the names of ERS reports

2.2 Designing a user-friendly and database-like logbook

In its current version, the Excel logbook of French and Italian purse seiners still very much look like a paper form in an Excel format. Its multiple columns, especially with the new columns added on FOBs and buoys since 2020 (see Annex 1) cannot be displayed at once on a computer screen, which does not facilitate data entry by captains. Solutions to this exist, with data entry forms that can be designed in Excel (see section 3) or in a dedicated software, and that can easily be connected to a main menu using graphic codes that most users of dashboards or applications are used to.

This option also allows moving from a paper-like to a database-like data structure, in which data entry tasks are separated from data analysis needs. Figure 1 presents the main menu developed for the redesigned logbook of French and Italian purse seiners in 2023. Secondary menus to enter the data are separated from menus to visualise and export the data and the data structure follows as much as possible the terminology of the EU ERS.

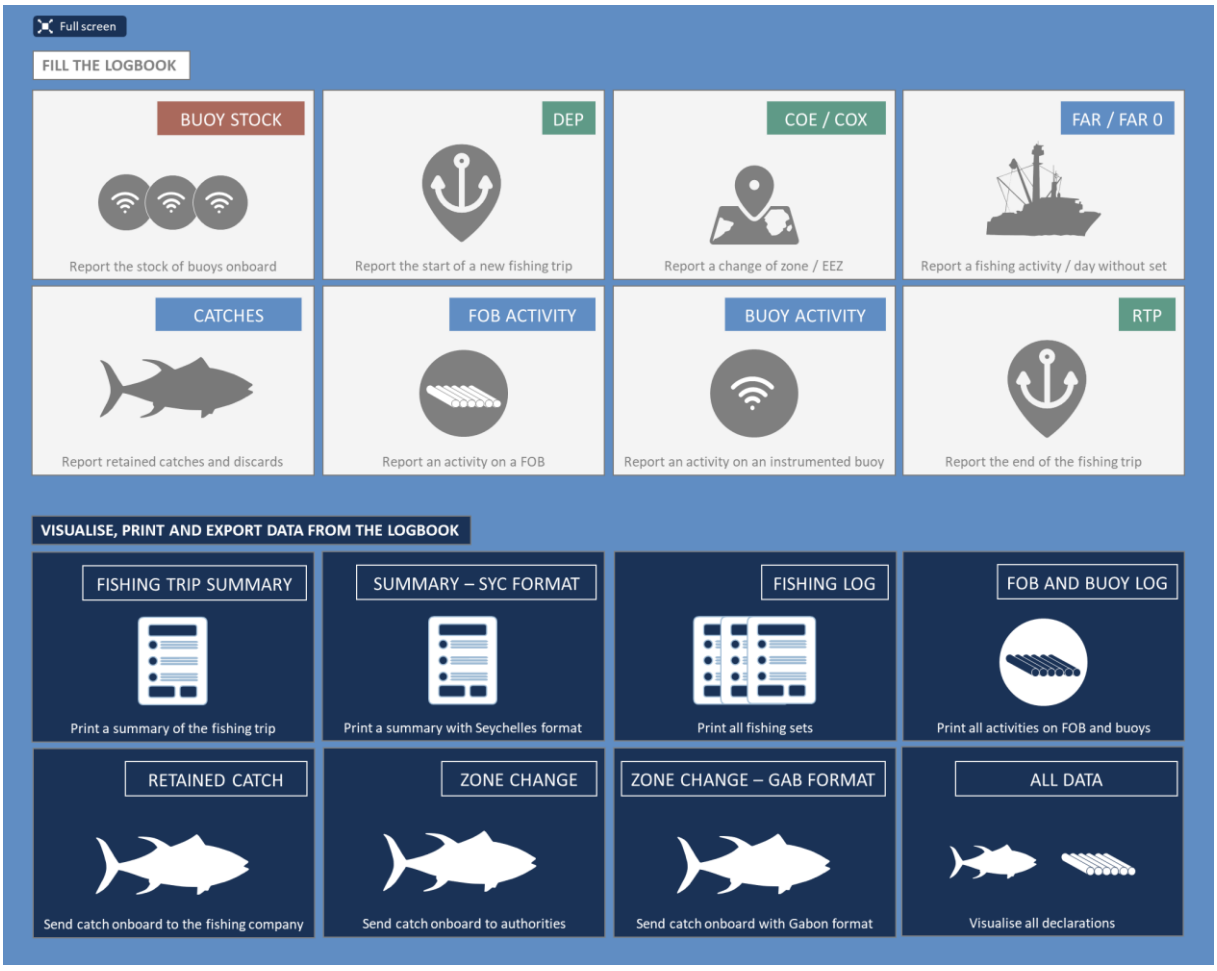


Figure 1 : Main menu of the redesigned logbook of French and Italian tropical tuna purse seiners of the Indian Ocean. Secondary menus are presented in section 3.

3. Menus to fill the logbook

3.1 Buoys in stock onboard

In compliance with IOTC Resolution 19/02, purse seiners and their support vessels should report at the beginning and the end of their fishing trip the full list of buoys present onboard. A dedicated Excel form has been implemented in the logbook of French and Italian tropical tuna purse seiners since 2020 (Maufroy and Goujon, 2019a).

Figure 1 presents the updated version of this form in the redesigned logbook. A dedicated data entry form has been developed, as well as an export format that the fishing crew can use at the start and the end of the fishing trip to make an inventory of buoys. In addition, the *buoys in stock* and *buoy operations* (see section 3.8) have been linked to update the inventory of buoys onboard each time a buoy is deployed or retrieved.

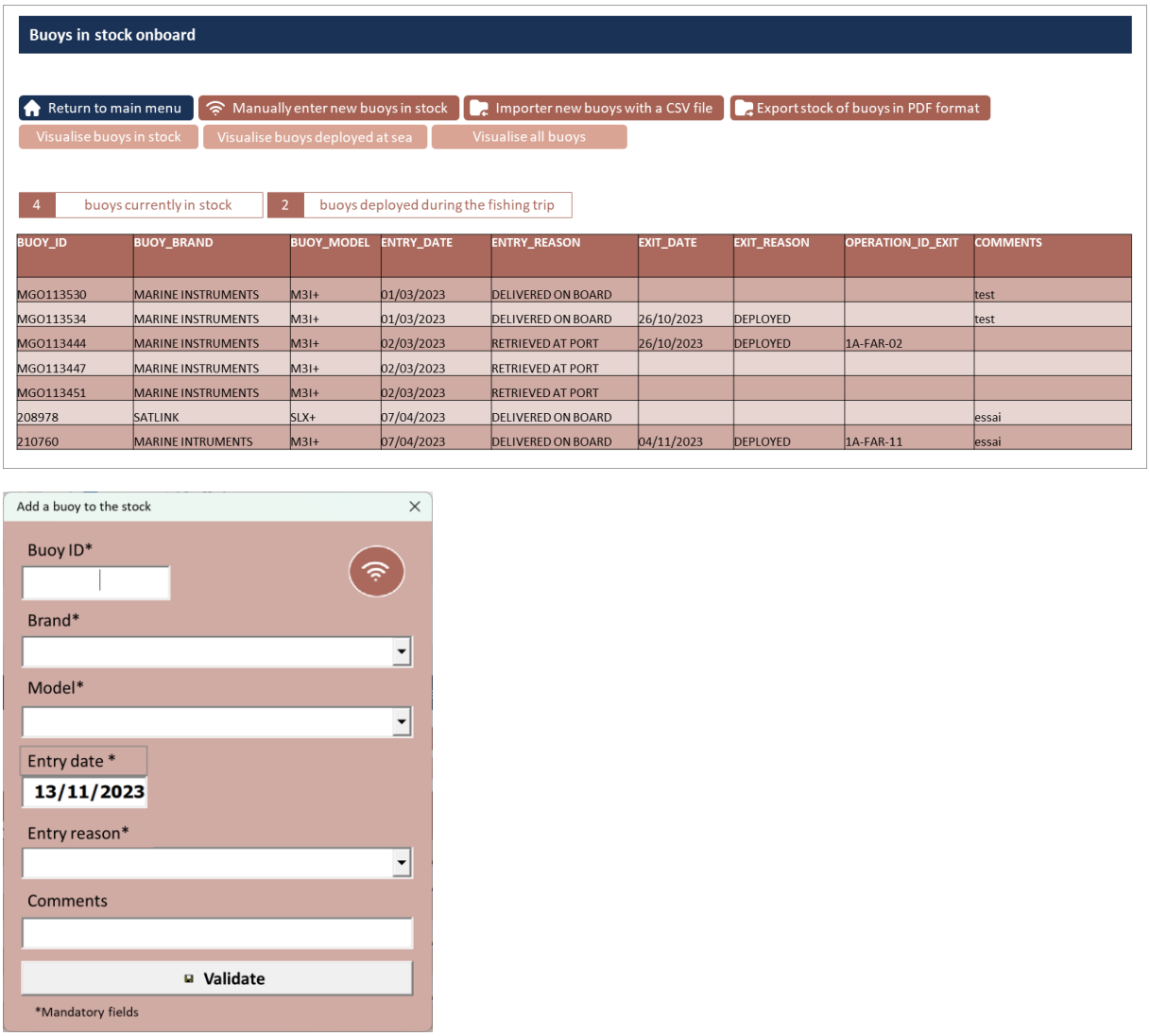


Figure 1 : Buoys in stock menu (top panel) and data entry form (bottom panel)

3.2 Beginning and end of the fishing trip

In compliance with IOTC Resolution 15/01, the logbook should contain information on the trip start date, trip start port, trip end date and trip end port. This also aligns with reporting requirements for tropical tuna purse seiners operating in the Atlantic Ocean (Monteagudo, 2016). In addition, to align with EU reporting requirements of the ERS, information at the start of the trip should also contain estimated catches remaining onboard from the previous fishing trip (Commission Implementing Regulation N°404/2011). Figure 2 presents the structure of the data entry form and reporting menu for the beginning and the end of the fishing trip.

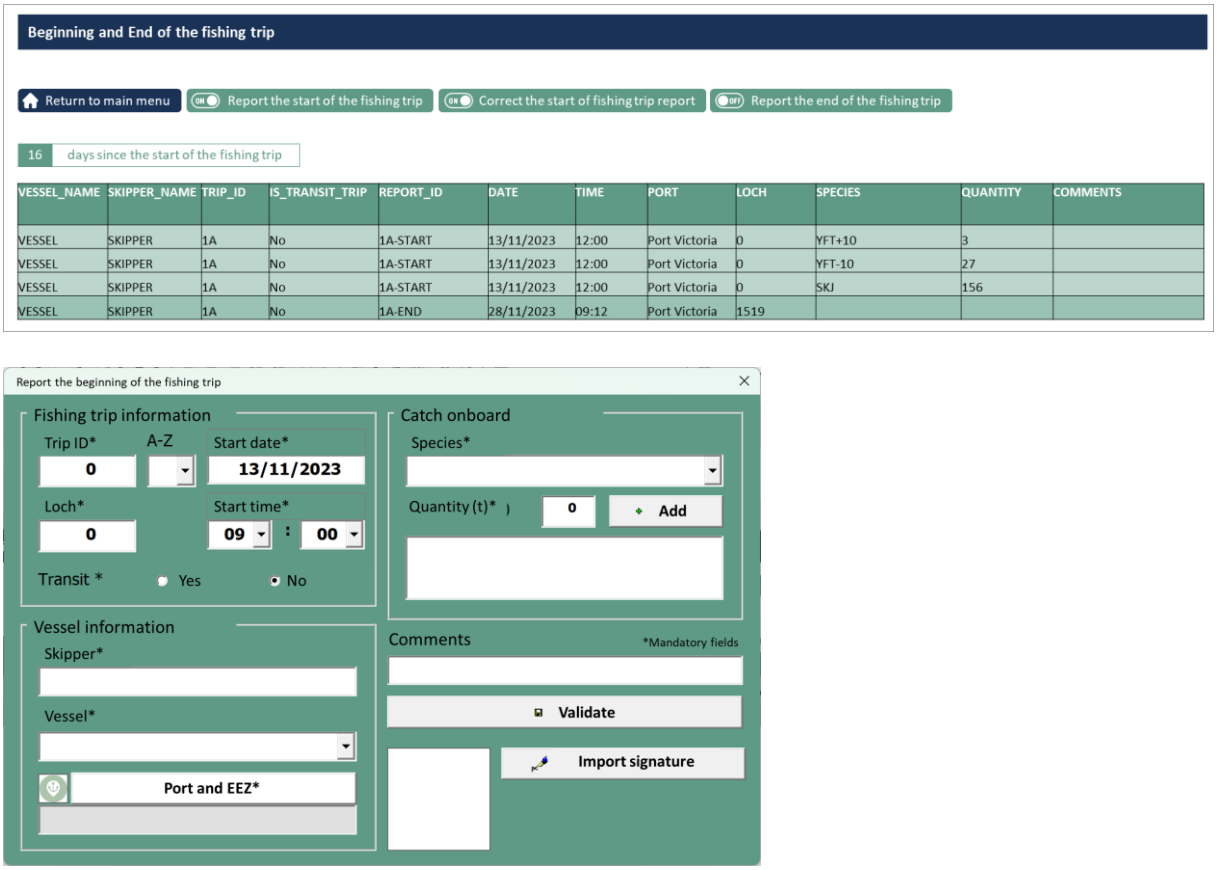


Figure 2 : Beginning and end of the fishing trip menu (top panel) and data entry form to report on the beginning of the fishing trip (bottom panel).

The beginning and end of the fishing trip menu is linked to all other menus of the logbook and in particular to the Fishing Activity Reports (FAR) to ensure that all required data are fully reported. The end of the fishing trip can only be reported if all the required data of FARs and associated catches, operations on FOBs and operations on buoys are complete (see sections 3.5 to 3.8).

The menu is also linked to all visualisation and export menus to generate printable fishing and FOB logbooks (see sections 4.1 and 4.3). Vessel information required by IOTC and ICCAT (IOTC, 2015; Monteagudo, 2016) are automatically generated using the vessel name and are therefore not required to be manually entered at the start of the fishing trip.

3.3 Departure (DEP) and return to port (RTP)

In addition to reporting information at the beginning and the end of the fishing trip, each return to port followed by a new departure during the fishing trip should be reported (EU Commission Implementing Regulation N°404/2011). Figure 3 presents the structure of the data entry form and reporting menu for the departures and returns to port. Note that the first departure from port is automatically generated by the report on the beginning of the trip described in the previous section.

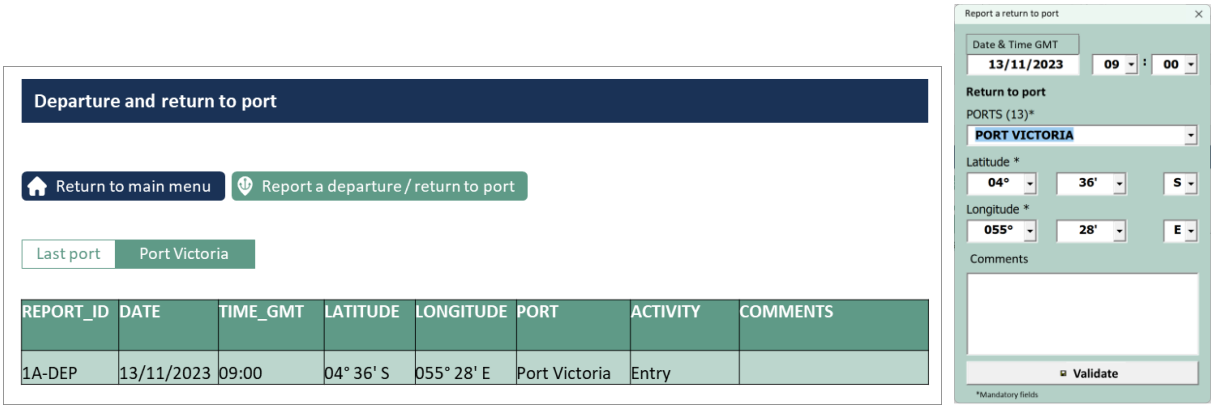


Figure 3 : Departure and return to port menu (left panel) and data entry form to report on a return to port (right panel).

3.4 Entry (COE) and exit from EEZ (COX)

Each entry and exit from an EEZ should be reported in the EU ERS and should contain information on the date, position and catches present onboard (Commission Implementing Regulation N°404/2011). This information is also required as part of bilateral fishing agreements and should be reported to authorities of the relevant State, as a mean to monitor catches in EEZs that the vessel has access to. Figure 4 presents the structure of the data entry form and reporting menu for the entry and exits of EEZs. An entry/exit report can automatically be generated and exported in pdf format using these information (see section 4.2). Note that an entry to the EEZ where the port is located is automatically generated by the report on the beginning of the trip described in section 3.2.

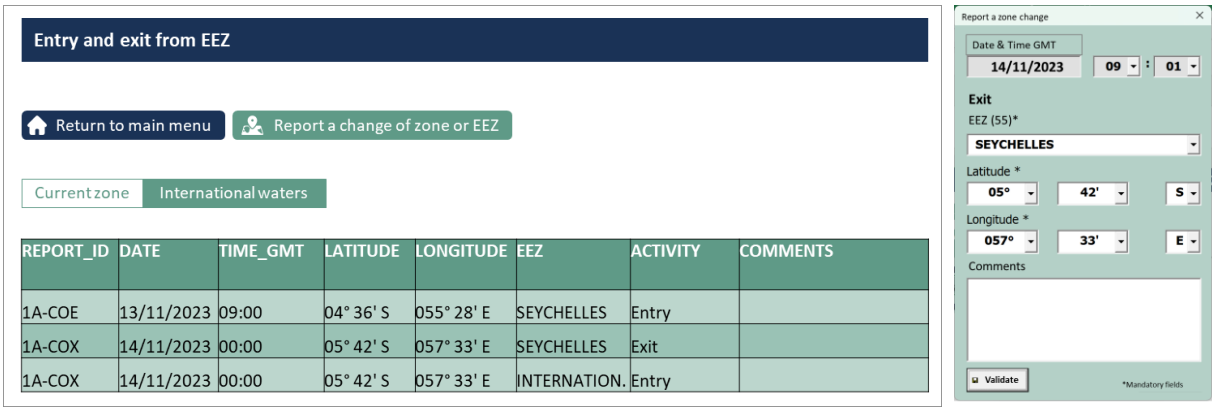


Figure 4 : Entry and exist from EEZ menu (left panel) and data entry form to report on an exit from an EEZ (right panel).

3.5 Fishing Activity Report (FAR)

In concordance with the EU Council Regulation N°1224/2009 and IOTC Resolution 15/01, a fishing activity is defined as a combination of fishing operations that may comprise :

(1) fishing sets with (positive) or without (nil) catches
(2) operations with FOBs
(3) operations with instrumented buoys

IOTC, ICCAT and EU CMMs all require that such operations are reported for fishing and non-fishing days (EU Commission Implementing Regulation N°404/2011; IOTC Resolution 15/01, IOTC Resolution 19/02; Monteagudo, 2016; ICCAT Recommendation 22-01), a specific combination of data entry forms was developed for Fishing Activity Reports and associated fishing, FOB and buoy operations.

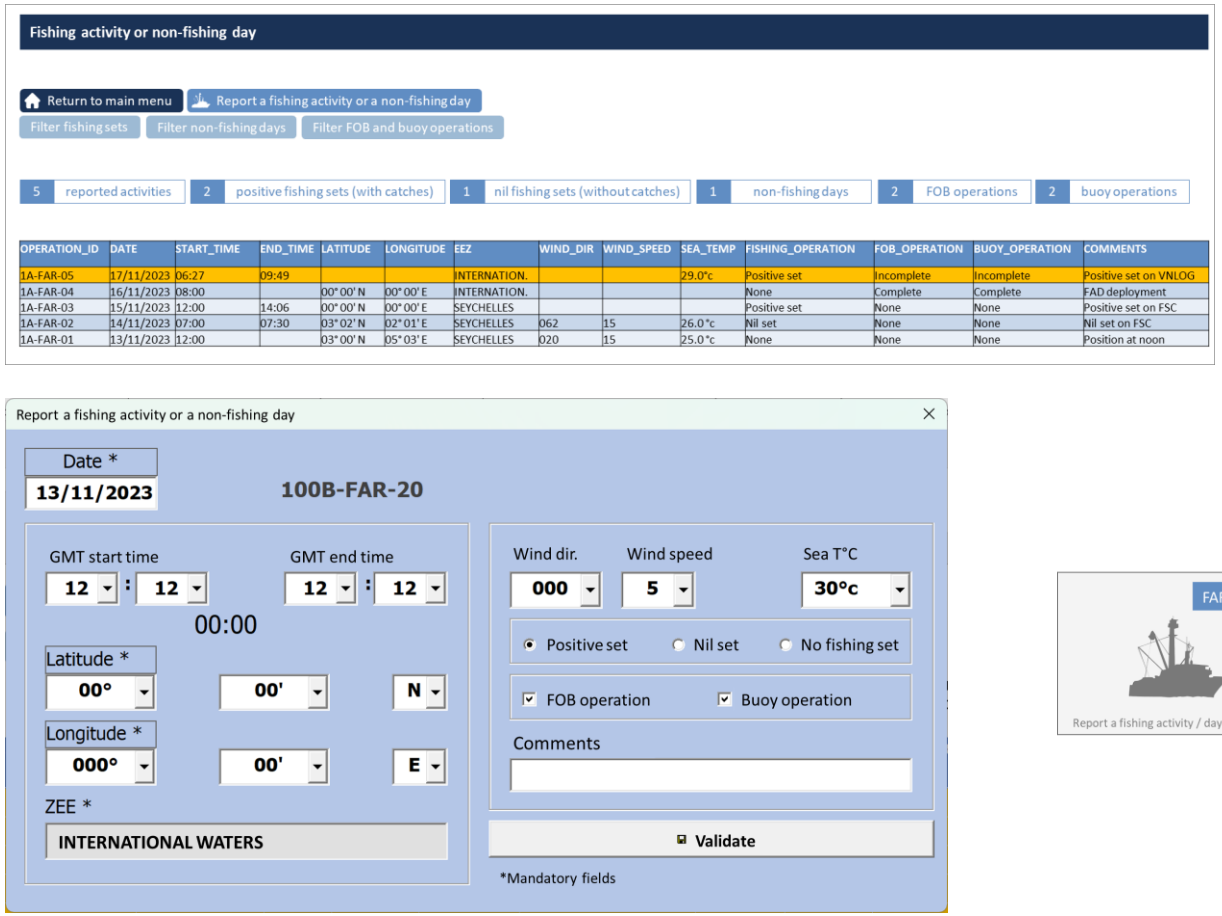
Figure 5 presents the structure of the corresponding FAR menu and data entry form. The FAR menu is linked to the *Catch*, *FOB operation* and *Buoy operation* through a unique *Operation_ID* that serves as a foreign key in the structure of the relational database. In the data entry form, captains should report on the presence/absence of a fishing set, a FOB operation or a buoy operation. If these operations are selected, information on catches, FOBs and buoys should be reported in the corresponding menus. As long as these information are not complete in the corresponding menu, the row remains highlighted and the captain cannot report on the end of the fishing trip (see section 3.2).

Days without fishing set must also be reported and a row is automatically generated to report the position at noon if no fishing set occurred during the day. The row remains highlighted as long as no information has been provided for a given day.

Contrary to the Excel fishing/FOB logbook that is still currently used by French and Italian tropical tuna purse seiners, the type of fishing set is not directly declared by the captain, but inferred from a report of an activity with a FOB. This allows avoiding reporting the same information in multiple columns, as captains currently report :

(1) the type of fishing set in a dedicated column
(2) the FOB activity “fishing set” in the *FOB activity* data field
(3) the presence of a FOB in the *Association* data field

This, of course, implicitly assumes that tuna schools observed at immediate proximity of a FOB are associated schools only, which should in principle not be a problematic assumption.



OPERATION_ID	DATE	START_TIME	END_TIME	LATITUDE	LONGITUDE	EEZ	WIND_DIR	WIND_SPEED	SEA_TEMP	FISHING_OPERATION	FOB_OPERATION	BUOY_OPERATION	COMMENTS
1A-FAR-05	17/11/2023	06:27	09:49			INTERNATION.			29.0°c	Positive set	Incomplete	Incomplete	Positive set on VNLOG
1A-FAR-04	16/11/2023	08:00		00° 00' N	00° 00' E	INTERNATION.				None	Complete	Complete	FAD deployment
1A-FAR-03	15/11/2023	12:00	14:06	00° 00' N	00° 00' E	SEYCHELLES				Positive set	None	None	Positive set on FSC
1A-FAR-02	14/11/2023	07:00	07:30	03° 02' N	02° 01' E	SEYCHELLES	062	15	26.0°c	Nil set	None	None	Nil set on FSC
1A-FAR-01	13/11/2023	12:00		03° 00' N	05° 03' E	SEYCHELLES	020	15	25.0°c	None	None	None	Position at noon

Figure 5 : FAR menu (top panel), FAR data entry form (bottom left panel) and link between the FAR, CATCHES, FOB ACTIVITY and BUOY ACTIVITY menus (bottom right panel).

3.6 Catch report of the FAR

The resulting catches of a given positive fish set should be reported in the FAR messages for retained catches and DIS messages for discards or release of sensitive species (European Commission Implementing Regulation N°404/2011). For the sake of simplification, the decision was made to combine all types of catches (retained catch, discards, incidental catches) in a single data entry form. Figure 6 presents the structure of the data entry form and reporting menu for catches, discards and interactions with protected species.

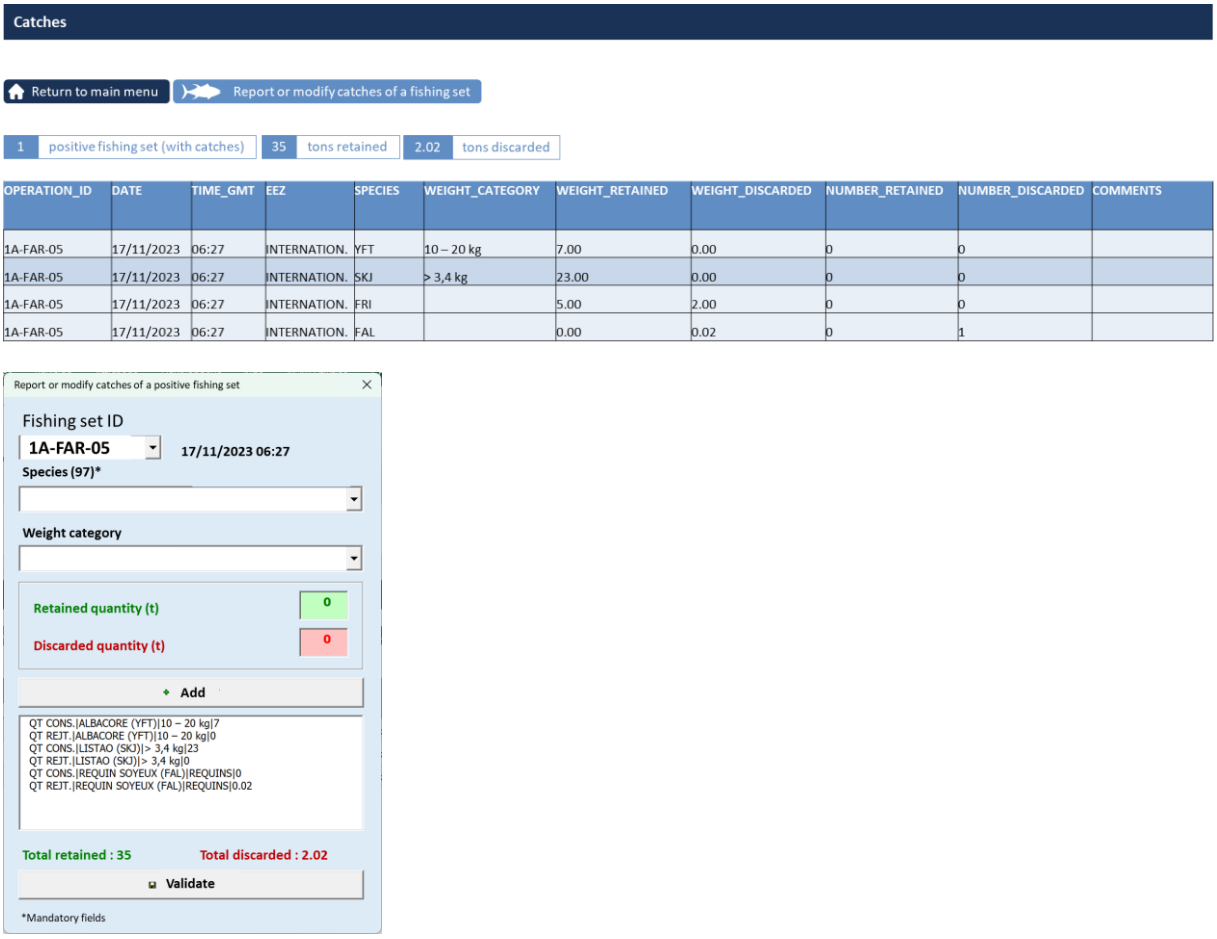


Figure 6 : catch report menu (top panel) and data entry form (bottom panel).

In concordance with current estimation procedures of the fishing crew and onboard scientific observers (Duparc *et al.*, 2020; Sabarros, 2020), the following estimates will be reported :

(1) for target species retained onboard, estimates in weight by the vessel crew
(2) for bycatch species retained onboard, estimates in weight of the onboard observer
(3) for bycatch species discarded at sea, estimates in weight of the onboard observer
(4) for incidental catches released at sea, estimates in number of the onboard observer, automatically converted to weight using mean weight relationships implemented in IRD Observe v9 (Cauquil, 2022).

This approach will allow maintaining the consistency between logbook and observer data. However, for vessels monitored with EMS in the Indian Ocean (6 French flagged purse seiners, Briand *et al.*,

2023), estimates of bycatch and incidental catches of electronic observers are not available in near-real time to fill logbooks. Skippers will therefore provide their own estimates in the logbook.

3.7 FOB report of the FAR

Information on the operations with FOBs and their instrumented buoys have been requested in IOTC since the implementation of IOTC Resolution 13/08. Mandatory information comprise :

(1) the type of FOB
(2) the type of FOB operation
(3) a description of the materials and dimensions of the FOB

The IOTC form to report FOB and buoy activities has been revised throughout 2022 and 2023 (IOTC Secretariat, 2023) and will soon allow reporting more detailed information to IOTC Secretariat using the terminology proposed in the CECOFAD project (Gaertner *et al.*, 2016) and refined by Maufroy et al. (2022) for FOB types and FOB activities.

Regarding the description of the materials and dimensions of the FOB, until now, the choice had been made to implemented a predefined list of dFAD designs and to describe the materials used for their construction and their dimensions in more details in the French FOB management plan (Maufroy and Goujon, 2019a). Detailed information are required in the revised IOTC form to report FOB and buoy activities, separating the surface structure (that can be observed at the time of visit of the FOB) from the subsurface structure (rarely observable at the time of visit of the FOB).

However, a more detailed data collection on the type of design of FOBs, in particular of dFADs may be useful for scientific and operational needs. This detailed data collection is complex due to the constant evolution of dFAD designs. For example, in recent years, dFAD designs have evolved towards subsurface rafts and subsurface *cages* (Maufroy *et al.*, 2022) and hybrids of rafts and cages have been proposed such as the biodegradable *jelly-FAD* (Moreno *et al.*, 2021). To overcome this issue, in the redesigned logbook of French and Italian purse seiners, dFADs will be described as a combination of a surface or surbsurface raft, one or several tails, a cage (Figure 7).

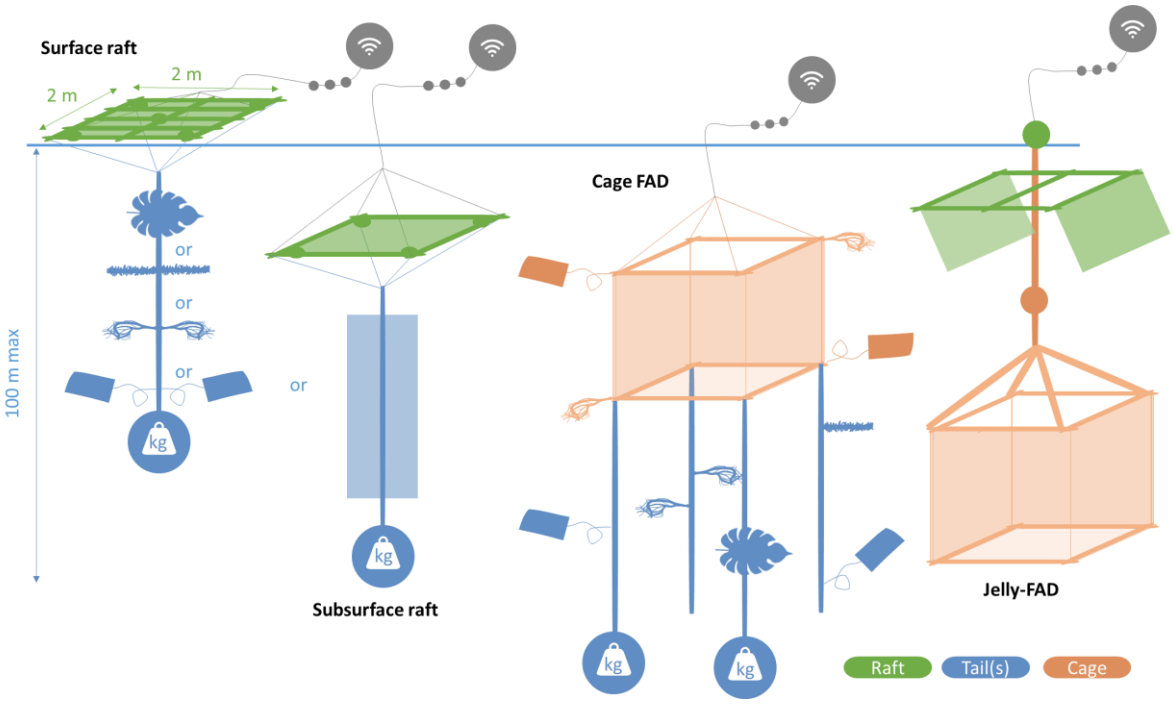


Figure 7 : Examples of dFAD design using the raft, tail and cage components.

This data structure should in theory cover changes in the structure of dFAD designs in coming years and has been implemented in a dedicated entry form. Figure 8 describes the FOB operation menu and associated data entry forms. The first step consists in selecting a FOB operation type to be associated to a given FAR (e.g. dFAD deployment, FOB visit followed by a fishing set, see Maufroy *et al.*, 2022 for the full list of possible FOB activities). This first step opens a second data entry form, with various degrees of complexity, depending on the complexity of the FOB (single dFAD vs combination of FOBs) and of the operation (simple deployment or visit vs visit with dFAD added on the FOB).

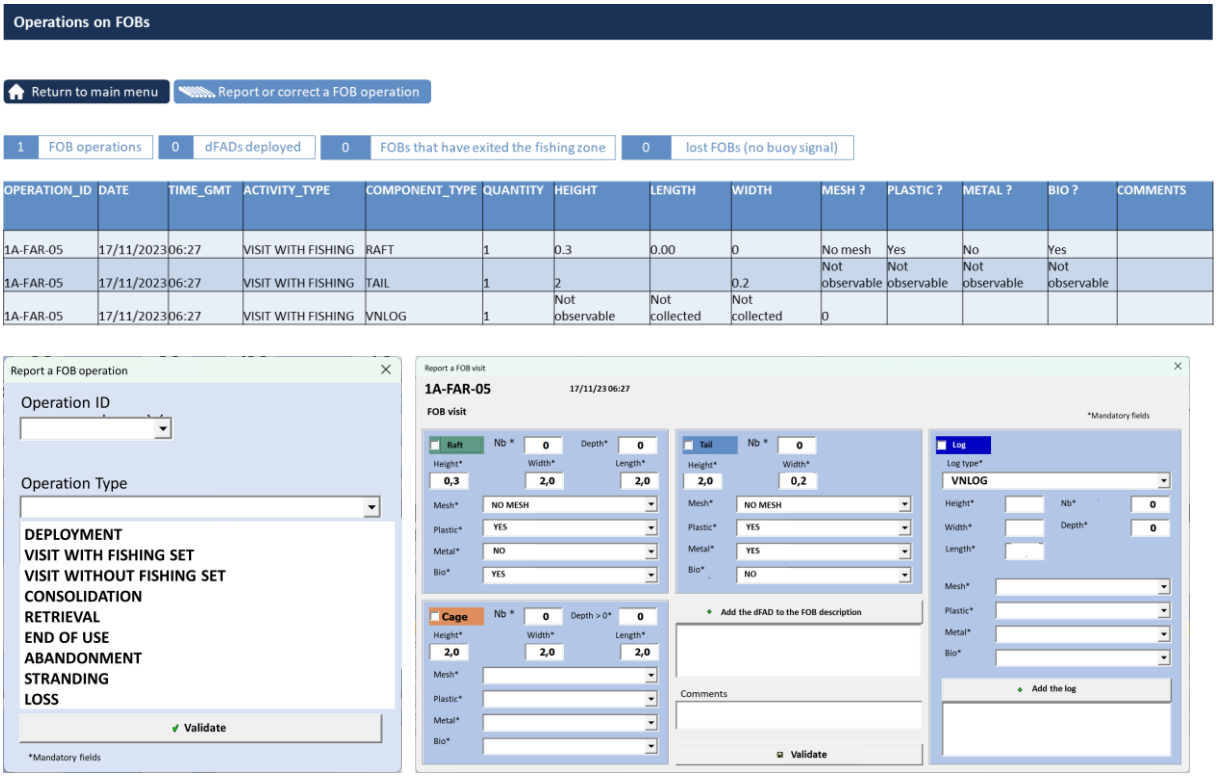


Figure 8 : Operations on FOBs menu (top panel), selection of FOB operation (bottom left panel) and data entry form in the example of a FOB visit (bottom right panel).

A few elements should still be validated for the reporting of FOB operations, in particular on how to report the absence of information on the dimensions of visited FOBs (numeric field vs not collected or not observable).

3.8 Buoy report of the FAR

Information on the operations with instrumented buoys is also required since the implementation of IOTC Resolution 13/08. Mandatory information comprise:

(1) the type and identifier of the buoy
(2) the type of buoy operation

As for operations on FOBs, the redesigned structure of the logbook of French and Italian purse seiners uses the data structure of the refined CECOFAD classification of buoy operations (Gaertner *et al.*, 2016; Maufroy *et al.*, 2022), implemented in the revised form to report FOB and buoy activities (IOTC Secretariat, 2023).

Figure 9 describes the buoy operation menu and associated data entry forms. The first step consists in selecting a buoy operation type to be associated to a given FAR. This first step opens a second data entry form, with various degrees of complexity, depending on the number of buoys to be reported (one for buoy deployments and simple visits, two in case of buoy change).

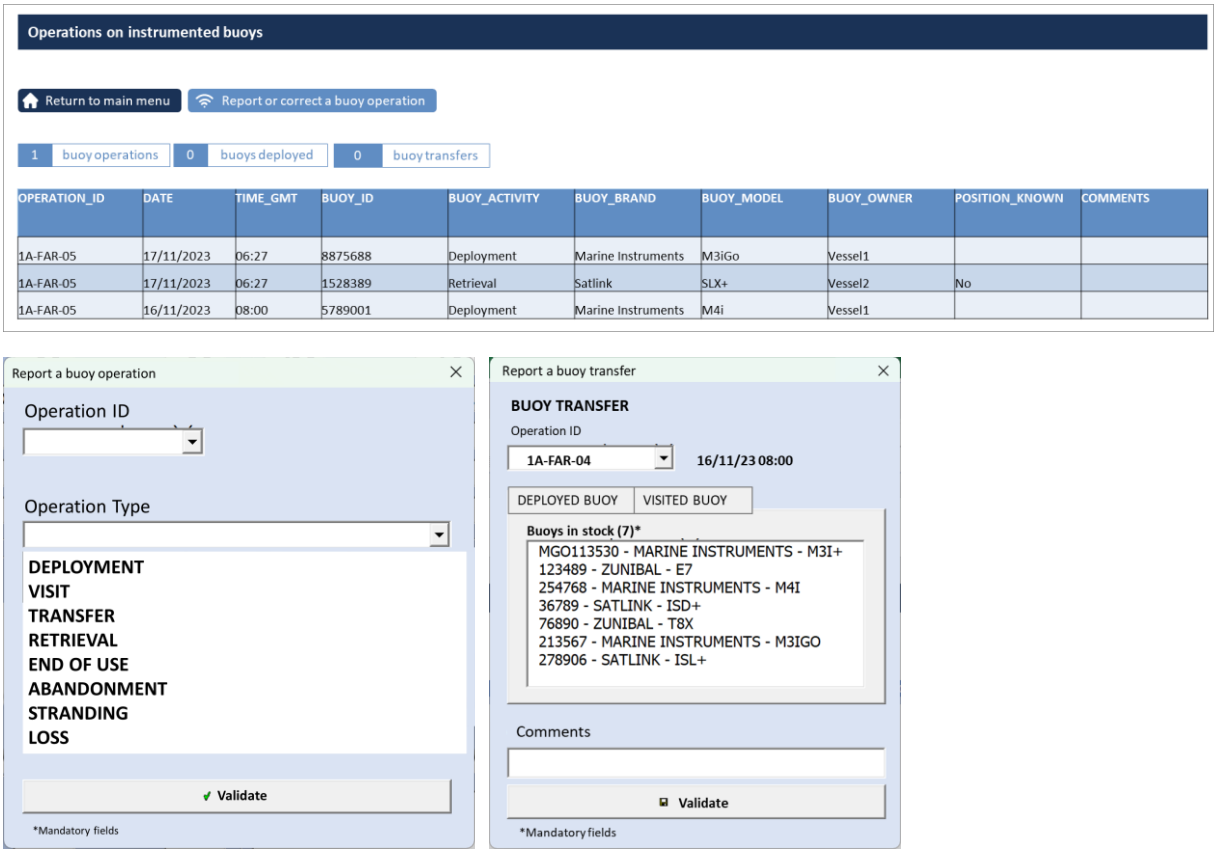


Figure 9 : Operations on buoys menu (top panel), selection of buoy operation (bottom left panel) and data entry form in the example of a buoy transfer visit (bottom right panel).

For buoy visits, the data entry form contains a “owner” and “position_known” data fields, since both information may be useful for scientific purposes.

4. Menus to visualise and export the data

4.1 Fishing trip summary and fishing log export

The printable version of the current Excel logbook of French and Italian tropical tuna purse seiners, that is collected by port authorities at return to port, is composed of two elements :

(1) a fishing trip summary that summarises the main information on the fishing trip, including the number of fishing sets and retained catches from the fishing trip and the previous fishing trip

(2) a fishing log that summarizes daily activities of purse seiners, with a focus on catches

Figure 10 presents the structure of the fishing trip summary export that will be implemented in the redesigned logbook. Its structure has been slightly revised to add information on discards. Some elements, such as the list of species presented in this summary are currently being refined, so as to meet specific requirements of local port authorities. The full list of data fields should also be checked to ensure all data fields required by IOTC Resolution 15/01 and ICCAT CMMs are provided.

FISHING TRIP SUMMARY

Vessel	
Flag	
Registration number	
Registration port	
International call sign	
IMO number	
CFR number	

Captain	
Fishing trip	

Departure - Port	
Date	
Time	
Loch	

Return - Port	
Date	
Time	
Loch	

Days at sea during the fishing trip	
NM travelled during the fishing trip	

Number of fishing sets - Positive	
Nil	
Total	

Retained catch from previous fishing trip	
YFT+10	0 t
YFT-10	0 t
SKJ	0 t
BET+10	0 t
BET-10	0 t
ALB	0 t
OTHER	0 t
Total	0 t

Retained catch of the fishing trip	
YFT+10	0 t
YFT-10	0 t
SKJ	0 t
BET+10	0 t
BET-10	0 t
ALB	0 t
OTHER	0 t
Total	0 t

Discards of the fishing trip	
YFT+10	0 t
YFT-10	0 t
SKJ	0 t
BET+10	0 t
BET-10	0 t
ALB	0 t
OTHER	0 t
Total	0 t

Figure 10 : Fishing trip summary export

Figure 11 presents the structure of the fishing log export that will be implemented in the redesigned logbook. Its structure has been slightly revised to ensure that information on departure/return to port, EEZ entry/exit and non-fishing days are systematically made available. In addition, rather than having multiple columns for a given list of species, catches are presented in row. At this stage, this format should still be validated with future recipients.

FISHING LOG

Vessel Flag Registration number Registration port International call sign OMI number CFR number		CAPTAIN		DEPART / SALIDA / DEPARTURE	ARRIVEE / LLEGAGA / ARRIVAL	FEUILLE / HOJA / SHEET
		FISHING TRIP		PORT / PUERTO / PORT DATE / FECHA / DATE HEURE / HORA / HOUR LOCH / CORREDA / LOCH	PORT / PUERTO / PORT DATE / FECHA / DATE HEURE / HORA / HOUR LOCH / CORREDA / LOCH	1/N

DATE	HEURE	LATITUDE chaque calée ou à midi	LONGITUDE chaque calée ou à midi	ZEE / PORT	T°C mer	VENT VIENTO WIND		ACTIVITE calée ou changement de zone	TYPE DE BANC en cas de calée	ESPECE code FAO	CATEGORIE DE POIDS en kg	QUANTITE CONSERVEE en tonnes	QUANTITE REJETEE en tonnes	COMMENTAIRES
FECHA	HORA	LATITUD cada lance o mediada	LONGITUD cada lance o mediada	ZEE / PUERTO	T°C mar	Direction /Dirección /Direction Degrés / Grados / Degrees	Vitesse / Velocidad / Speed Nœuds / Nudos / Knots	ACTIVIDAD lance o xxxxxx	LANCE TYPO xxxx	ESPECIES en tonneladas	CATEGORIA DE PESO en kg	CAPTURA RETENIDA en tonneladas	XXXX en tonneladas	COMMENTARIOS
DATE	TIME	LATITUDE each set or at midday	LONGITUDE each set or at midday	EEZ / PORT	T°C sea			ACTIVITY fishing or zone change	FISHING SET TYPE in case of a fishing set	SPECIES FAO code	WEIGHT CATEGORY in kg	RETAINED CATCHES in tons	DISCARDS in tons	COMMENTS

Figure 11 : Fishing log export

4.2 Catches on board and EEZ entry/exit export

During the fishing trip, the information on catches stored onboard are required for two needs :

(1) providing information to the fishing company and the Producer Organisation ORTHONGEL to monitor the consumption of quotas (Maufroy and Goujon, 2019b) and organise the landing of catches

(2) providing information on catches made in EEZs to relevant authorities, in compliance with rules of bilateral fishing agreements

Figure 12 presents the structure of the catches onboard and EEZ entry/exit exports that will be implemented in the redesigned logbook. Note that in the frame of some fishing agreements, a specific EEZ entry/exit export is required (e.g. for Gabon, with a structure that will be implemented in the redesigned logbook).

EEZ ENTRY/EXIT

Vessel	
E-mail	
Tel V-SAT	
IMO Number	
Registration number	
International call sign	
EEZ	
Reported activity (entry/exit)	
Date	
Time GMT	
Position of entry/exit	
Activity in EEZ	

Catch onboard	
YFT+10	0 t
YFT-10	0 t
SKJ	0 t
BET+10	0 t
BET-10	0 t
ALB	0 t
OTHERS	0 t
Total	0 t

CATCHES ONBOARD

Vessel	
Date	

Quantity per species and weight category	
YFT+10	0 t
YFT-10	0 t
SKJ	0 t
BET+10	0 t
BET-10	0 t
ALB	0 t
OTHERS	0 t
Total	0 t

Figure 12 : EEZ entry/exit (left panel) and catches onboard (right panel export)

4.3 FOB and buoy log export

Though information on FOB and buoy operations are usually transmitted electronically (e.g. to national scientists of IRD), a printable export has been developed in the redesigned logbook. Figure 13 presents the structure of this export that contains daily information on all operations with FOBs and buoys. A visualisation that combines the fishing log and FOB and buoy log is also available for the needs of captains and fishing companies.

FOB AND BUOY OPERATIONS LOG

Vessel Flag Registration number Registration port International call sign OMI number CFR number		CAPTAIN		DEPART / SALIDA / DEPARTURE		ARRIVEE / LLEGAGA / ARRIVAL			FEUILLE / HOJA / SHEET
				PORT / PUERTO / PORT		PORT / PUERTO / PORT			1/N
		FISHING TRIP		DATE / FECHA / DATE		DATE / FECHA / DATE			
				HEURE / HORA / HOUR		HEURE / HORA / HOUR			
				LOCH / CORREDA / LOCH		LOCH / CORREDA / LOCH			

DATE	HEURE	LATITUDE chaque calée ou à midi	LONGITUDE chaque calée ou à midi	ZEE	OBJET FLOTTANT / OBJETO / FLOATING OBJECT										BOUEE INSTRUMENTEE / BOYA / INSTRUMENTED BUOY					COMMENTAIRES
FECHA	HORA	LATITUD cada lance o mediada	LONGITUD cada lance o mediada	ZEE	ACTIVITE	COMPOSANTS	NOMBRE	HAUTEUR	LONGUEUR	LARGEUR	PROFONDEUR sous la surface	MAILLES	PLASTIQUE	METAL	BIO	ACTIVITE	POSITION CONNUE ? en cas de visite	NAVIRE PROPRIETAIRE en cas de visite	BOUEE VISITEE	BOUEE DEPLOYEE	COMMENTARIOS
DATE	TIME	LATITUDE each set or at midday	LONGITUDE each set or at midday	EEZ	ACTIVIDAD	COMPONENTE	NOMBRE	ALTURA	LONGITUD	ANCHO	PROFONDEUR sous la surface	MALLAS	PLASTICO	METAL	BIO	ACTIVIDAD	POSICION CONOCIDA ?	PROPIETARIO	BOYA	BOYA	COMMENTS
					ACTIVITY	COMPONENTS	NUMBER	HEIGHT	LENGTH	WIDTH	DEPTH under the sea surface	MESH	PLASTIC	METAL	BIO	ACTIVITY	POSITION KNOWN ? in case of a visit	OWNER VESSEL in case of a visit	VISITED BUOY	DEPLOYED BUOY	

Figure 13 : FOB and buoy log export

5. Discussion

Reporting requirements have become increasingly complex over time but the structure of fishing/FOB logbooks used by tropical tuna purse seiners of the Atlantic and Indian oceans had not evolved much since the 1990s. Here, we presented the structure of a fully redesigned logbook, with an in-depth revision aiming at making the logbooks more user friendly for captains, using data entry forms. This structural change also allowed designing a database-like logbook, with a healthier data structure, separating data entry tasks from analysis and reporting needs.

At this stage, this solution has been developed in an Excel format, that still require to be fully verified, through tests with captains and fully verified with future recipients of the redesigned logbook. Since this may require additional months, a temporary solution will be implemented, using a combination of the fishing trip summary, fishing log, FOB and buoy log, buoys on stock and catch onboard export. Purse seine and support vessel captains will be trained to the redesigned data format that they contain, in particular for FOB and buoy operations that contain multiple fields. The training sessions are expected to start in December 2023, to implement the temporary solution for fishing trips starting in January 2023.

In any case, the redesign of the fishing/FOB logbook used by French and Italian tropical tuna purse seiners demonstrates that designing appropriate reporting tools, that address increasingly complex reporting requirements and multiple needs of diverse users is complex. Should new reporting requirements be added for purse seiners, as it can be expected from recent discussions at the IOTC Commission level, sufficient time should be allocated to their development, testing and implementation.

Finally, it is essential that reporting requirements truly reflect the reality of fisheries. They should, among others, consider carefully how the data will be collected and for what purposes, so as to avoid requesting information that will not be used or useful. Though efforts can be made to collect requested data, as shown here in the example of French and Italian PS with their logbook, reporting data takes time for fishers and data validation also takes time for the fishing company, the Producer Organization or national scientists. Carefully thought reporting requirements, updated as frequently as needed (e.g. IOTC 19/02 Annex I does not reflect dFAD designs anymore), are key both for science and compliance needs.

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Annex 1 : structure of the logbook of French tropical tuna purse seiners used from 2020 to 2023 in the Atlantic and Indian Oceans

DATE	HEURE	LATITUDE chaque calée ou à midi	LONGITUDE chaque calée ou à midi	ZEE	T°C mer	VENT		CALEE			CAPTURE ESTIMEE (en tonnes)																		
						VIENTO		LANCE			ESTIMATION DE LA CAPTURA (en toneladas)																		
						WIND		FISHING SET			ESTIMATED CATCH (metric tons)																		
FECHA	HORA	LATITUDE cada lance o mediada	LONGITUD cada lance o mediada	ZEE	T°C mar	Direction / Direccion / Direction Degrés / Grados / Degrees	Vitesse / Velocidad / Speed Nœuds / Nudos / Knots	Portante / Positivo / Successful	Nulle / Nullo / Nil	Type de calée / Lance typo / Fishing set type	1				2		3				4		5			6		
											ALBACORE				LISTAO		PATUDO				GERMON		AUTRES ESPECES			REJETS		
											RABIL				LISTADO		PATUDO				ALBACORA		OTRAS ESPECIES			DESCARTES		
DATE	TIME	LATITUDE each set or at midday	LONGITUD each set or at midday	EEZ	T°C sea						YELLOWFIN				SKIPJACK		BIGEYE				ALBACORE		OTHER SPECIES			DISCARDS		
											YFT +10		YFT-10		SKJ		BET +10		BET - 10		ALB		OTH			DSC		
											Taille	Capture	Taille	Capture	Taille	Capture	Taille	Capture	Taille	Capture	Taille	Capture	Espèce	Taille	Capture	Espèce	Taille	Capture
											Tailla	Captura	Tailla	Captura	Tailla	Captura	Tailla	Captura	Tailla	Captura	Tailla	Captura	Especie	Tailla	Captura	Especie	Tailla	Captura
											Size	Catch	Size	Catch	Size	Catch	Size	Catch	Size	Catch	Size	Catch	Species	Size	Catch	Species	Size	Catch

ASSOCIATION	OBJET FLOTTANT	BOUEE INSTRUMENTEE	COMMENTAIRES
ASSOCIACION	OBJETO	BOYA	COMMENTARIOS
ASSOCIATION	FLOATING OBJECT	INSTRUMENTED BUOY	COMMENTS

Banc Libre / Banco Libre / Free School	Objet flottant / Objeto / FOB	Balise / Balisa / Beacon	Baliseur / Barco de appoyo Support vessel	Requin baleine / Tiburon ballena Whale shark	Baleine / Ballena / Whale	Oiseaux / Aves / Birds	ACTIVITE SUR L'OBJET	TYPE D'OBJET	TYPE DE DCP DERIVANT	RISQUE DE MAILLAGE / RIESGO DE ENMALLAMIENTO		ACTIVITE SUR LA BOUEE	BOUEE DÉJÀ PRESENTE / BOYA ANTIGUA		BOUEE DEPLOYEE / BOYA NUEVA		Problèmes divers Détails sur les prises accessoires Taille du banc Autres associations Autres remarques
							ACTIVIDAD SOBRE EL OBJETO	TIPO DE OBJETO	TIPO DE DCP	ENTANGLING RISK		ACTIVIDAD SOBRE LA BOYA	BUOY ALREADY ON THE FOB		DEPLOYED BUOY		
										En surface Parte superficial Surface	Sous la surface Parte sumergida Underwater		TYPE	NUMERO	TYPE	NUMERO	
							FOB ACTIVITY	FOB TYPE	DFAD TYPE			BUOY ACTIVITY	TIPO	NUMERO	TIPO	NUMERO	
													TYPE	ID	TYPE	ID	