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SPANISH FADs LOGBOOK: SOLVING PAST ISSUES, RESPONDING TO NEW GLOBAL REQUIREMENTS

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SUMMARY

A new renewed version of the Fish Aggregating Device logbook (FAD) is presented to compile data within the framework of the National FAD Management Plan conducted by the Spanish General Secretariat of Fisheries (Ministry of Agriculture and Fisheries, Food and Environment), in collaboration with the Spanish Institute of Oceanography (IEO - Ministry of Economy, Industry and Competitiveness). This updated version is intended for Spanish tuna freezer purse sein fleets that target tropical tunas (yellowfin, skipjack and bigeye) to comply in the Atlantic, Indian and Pacific Oceans.

The IEO, the AZTI Foundation, the International Seafood Sustainability Foundation (ISSF), OPAGAC-AGAC (*Organización de Productores de Atún Congelado*) and ANABAC (*Asociación Nacional de Armadores de Buques Atuneros Congeladores*) have collaborated since June 2016 with the intention of implementing a new format of the Spanish FAD logbook introduced in 2010. The objectives pursued in this process were as follows: i) resolve the problems encountered in the previous format, ii) develop simple instructions for the Spanish fleet and iii) respond to all the current requirements of tuna Regional Fisheries Management Organisations (RFMOs).

The Spanish tuna purse seine fleet have started to use this format at the beginning of 2017 and, since then, contact has been maintained with the captains through the shipowning companies, mainly ALBACORA S.A., collecting issues which were encountered and adapting suggestions to the format of this logbook. This work has been carried out in coordination with the companies stated in the abovementioned paragraph. This document describes the fields in the standard form, including the improvements obtained from these conversations.

The main reasons for the improvement of this FAD logbook were:

a) Provide the fleet with a version that includes a simple format adapted to its use on board, integrating concise guidelines to increase the quality of the data received by: i) merging the inventory and activity forms, ii) including instructions in the same file, iii) providing examples that include the main activities conducted by the FAD tuna purse seine fleet, iv) simplifying the identification of FADs, using the unique identifier of each buoy, as provided by the manufacturer, v) excluding unnecessary data and vi) providing a user's guide with photographs.

b) Facilitating data processing by: i) organizing data fields according to their subsequent processing, ii) including all required fields to comply with current RFMO FAD data requirements.

This document analyses the new format of the FAD logbook, field by field, pointing out the main problems encountered in previous versions and describing the improvements adopted.

A historical overview is presented of the measures adopted by the four competent RFMOs in the three oceans where tropical tuna purse seine fishing is conducted: The Inter-American Tropical Tuna Commission (IATTC), the International Commission for the Conservation of Atlantic Tunas (ICCAT), the Indian Ocean Tuna Commission (IOTC) and the Western and Central Pacific Fisheries Commission (WCPFC). This revision focuses on the request for data related to FAD characteristics and the activities carried out with them by this fleet.

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Likewise, the data currently requested by each RFMO and those provided, including this new format, are presented.

Although a lot of modifications have been made as regards to the content, the following are the most significant:

a) Use the number of the buoy as the FAD identifier as provided by the manufacturer. The number on board the floating structure caused problems as regards monitoring.

b) Add the "Modification over previous object" activity to monitor the life of FAD components.

c) Locate the drifting objects which are not "marked" by a buoy more easily.

d) Include catch data of the three main target species (yellowfin, skipjack and bigeye).

e) Incorporate drop-down menus aimed at adapting them to the experiment including new components (e.g.: biodegradable).

f) Deduct the non-drifting objects from the components registered on board (mesh size, open net or "in a sausage", net exposed to the sea or not, etc.).

All in all, this new FAD logbook format allows to collect all the different requirements by RFMOs with the aim of improving the quality of data, using simple tools that can be used on board.

This work concludes that the standardization of forms, tools and guidelines among the RFMOs is recommended to improve data integration and processing. Moreover, it should be underlined that there is little information to justify the numerous fields that are currently registered. Future analysis, feasible in the short-term, will enhance the commitment between the effort made to integrate and process the information and the benefits this provides. Finally, the importance of involving all the sectors in the development of successful FAD management plans should be pointed out. This work is an example of collaboration between scientists, shipowners and captains.

Appendix

SPANISH FADs LOGBOOK: SOLVING PAST ISSUES, RESPONDING TO NEW GLOBAL REQUIREMENTS

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1. Introduction

Drifting floating objects, not only man-made but also with a natural origin, have been regularly used by the tuna purse seine fishery in the tropical oceans of the world since the late 1980s and early 1990s (Fonteneau *et al*. 2015) to aggregate targeted species and increase fishing efficiency (**Figure 1**). Tuna catches associated to objects by the Spanish tropical purse seine fleet have accounted on average for 56%, 70%, 88% and 93% of the yearly catches in the Atlantic, Indian, Eastern Pacific (EPO) and Western Pacific Oceans (WPO), respectively for Spanish tropical tuna purse seine fishery (**Figure 2**). If these catches are grouped into five-year periods, a marked increase is observed in the global trend from almost a 60% in 1991-1995 period to nearly an 80% for the last five years analyzed (2011-2015) (**Table 1** and **Figure 3**).

The increasing use of drifting FADs by tropical tuna purse seiners and its potential effects on target and non-target species populations and ecosystem (i.e., marine pelagic and vulnerable coastal areas) is one of the major concerns of t-RFMOs. Evaluating the level of use and the operational changes of the fleet through time (i.e., number of FADs deployed and materials used for its construction) is essential for correct FAD-fishing assessment and the reliable analyses of tropical tuna catches. In this sense, efforts are being made to collect detailed information of FAD-related activities. Since 1999 the Inter-American Tropical Tuna Commission (IATTC) is collecting information on FAD structures and components in the EPO (**Figure 4**) and the International Commission for the Conservation of Atlantic Tunas (ICCAT) has been requesting this information since 2011 for the Atlantic Ocean FAD-fisheries (ICCAT 2011). Similarly, the Indian Ocean Tuna Commission (IOTC) has requested information on FADs since 2001 (IOTC 2001) (**Figure 5**). The Western and Central Pacific Fisheries Commission (WCPFC) FAD data are collected by the observers on board (WCPFC 2016).

Due to the complexity of this fishing strategy and activities and the lack of unified formats and criteria for the data collection, the information collected so far by the skippers and available for analysis has been of limited utility. Therefore, efforts from all the stakeholders are required to improve the collection of FAD-related data in a comprehensive way.

The FAD management plan resolution was agreed in ICCAT in 2011 and amended in 2013. The Spanish Ministry of Agriculture and Fisheries, Food and Environment, in close collaboration with the IEO and the Spanish tropical tuna purse seine fleet organizations (ANABAC/OPAGAC), laid down a Fish Aggregating Device Management Plan for its national fleet in 2010 which has been running since then. The preliminary data and results were presented in Delgado *et al.* (2015), where it was stated that "*it is worth to note that this plan has been the first initiative of this kind adopted by a CPC member of tuna RFMOs, and can be considered as a pioneer and the seed for the implementation of FAD management plans in Tuna RFMOs. In fact, the Spanish FAD Management Plan has been used as a template and model in Tuna RFMOs and the agreed FAD Management Plans of all Tuna RFMOs included the elements developed in the Spanish FAD Management Plan*".

From January 2017, the tropical purse seine fleet in the Eastern Pacific Ocean is recording FAD data in a new logbook form (IATTC 2016a), and the Spanish purse seiner fleet in the Atlantic, Indian and Pacific Oceans is beginning to use the new version of the Spanish FAD logbook presented in this document (**Annex 1**), an updated version of the logbook first introduced in 2010 (Delgado de Molina *et al.* 2013).

The aim of the present paper is to summarize the issues encountered when analyzing the data collected by skippers using the original FAD logbook, and discuss the solutions agreed in order to improve the data collection system and data quality. The new format presented here is the result of a collaborative work between the scientific bodies and the fishing industry, which integrates all the data requirements of the t-RFMOs in a single logbook with a user-friendly format for the skippers.

2. On the objectives, resolutions and FAD data required by t-RFMOs

The main objectives pursued and reasons to improve the current Spanish FAD logbook form are:

a) Providing a simple format adapted to be used by the crew on board with clear and concise guidelines which aim to increase data quality by: i) merging the inventory and activity forms, ii) including templates and instructions in a single file, iii) including examples of the main FAD operations performed by purse seiner vessels iv) simplifying the identification of FADs, using the unique identifier of the buoy, as provided by the manufacturer and followed by the skipper, v) avoiding filling in more data than needed and vi) attaching a user's guide with photographs.

b) Facilitating data processing by: i) organizing data fields according to their succeeding processing, ii) including all fields needed to comply with current FAD data requirements by t-RFMOs (**Figure 6**).

c) Having an easy to modify tool for future requirements and research.

The FAD report requests and data requirements by t-RFMO are detailed below:

IATTC data requirements:

- In 1998 and 1999, the IATTC expressed its concern about tuna catches and bycatch associated with FADs in two separate resolutions (IATTC 1998) (IATTC 1999). As a consequence, scientists recommended banning supply vessels in EPO and limiting the number of FADs on board. A working group was established to monitor the relationships between certain FAD characteristics and tuna catch rates. In 2004, the IATTC recommendations focused on non-entangling FAD designs, particularly for sea turtles (IATTC 2004). In 2013, this RFMO edited the first resolution on data collection and analyses on FADs (IATTC 2013), which was refined till ongoing C-16-01 resolution (IATTC 2016b). This resolution requests CPCs to collect the following information at each interaction with a FAD:

    i. Position;
    ii. Date;
    iii. Hour;
    iv. FAD identification[1];
    v. FAD type (e.g., drifting natural FAD, drifting artificial FAD);
    vi. FAD design characteristics (dimension and material of the floating part and of the underwater hanging structure);
    vii. Type of the activity (set, deployment, hauling, retrieving, loss, intervention on electronic equipment, other (specify));
    viii. If the activity is a set, the results of the set in terms of catch and bycatch; and
    ix. Characteristics of any attached buoy or positioning equipment (positioning system, whether equipped with sonar, etc.).

From January 2017, this information is being collected by the Spanish purse seine fleet in a logbook edited by the IATTC (**Figure 7**). This information has also been collected in the Spanish FAD logbook since 2012. Most recently, the IATTC Secretariat has also instructed the observer programmes to record the unique identifier established by Resolution C-16-01 in the Floating Objects Form (**Figure 4**).

[1]CPCs shall obtain unique alphanumeric codes from the IATTC staff on a periodic basis and distribute those numbers to the vessels in their fleets for FADs that may be deployed or modified, or in the alternative, if there is al-ready a unique FAD identifier associated with the FAD (e.g., the manufacturer identification code for the attached buoy), the vessel owner or operator may instead use that identifier as the unique code for each FAD that may be deployed or modified.
The alphanumeric code shall be clearly painted in characters at least 5 cm in height. The characters shall be painted on the upper portion of the attached radio or satellite buoy in a location that does not cover the solar cells used to power the equipment. For FADs without attached radio or satellite buoys, the characters shall be painted on the uppermost or emergent top portion of the FAD. The vessel owner or operator shall ensure the marking is durable (for example, use epoxy-based paint or an equivalent in terms of lasting ability) and visible at all times during day-light. In circumstances where the observer is unable to view the code, the captain or crew shall assist the observer (e.g. by providing the FAD identification code to the observer).

ICCAT reporting obligations on FADs and on support vessels (yearly):

- From 2011, ICCAT recommended to register FAD activities (deployments, retrievals and sets) in fishing logbooks, identifying these devices with a code (ICCAT 2011). The first guidelines for the preparation of FAD Management Plans were edited in 2013, and are continuously under revision since then (ICCAT 2013, 2014, 2015 and 2016). Currently, ICCAT requirements in FADs logbooks for purse seine, baitboat and support vessels are as follows (**Figure 8**) (ICCAT 2016a):

(a) Deployment of any FAD

i. Position
ii. Date
iii. FAD type (anchored FAD, drifting artificial FAD)
iv. FAD identifier (i.e., FAD Marking and buoy ID, type of buoy – e.g. simple buoy or associated with echo-sounder)
v. FAD design characteristics (material of the floating part and of the underwater hanging structure and the entangling or non-entangling feature of the underwater hanging structure)

(b) Visit on any FAD

i. Type of the visit (deployment of a FAD and/or buoy[1], retrieving FAD and/or buoy, strengthening/consolidation of FAD, intervention on electronic equipment, random encounter (without fishing) of a log or a FAD belonging to another vessel, visit (without fishing) of a FAD belonging to the vessel, fishing set on a FAD[2])
ii. Position
iii. Date
iv. FAD type (anchored FAD, drifting natural FAD, drifting artificial FAD)
v. FAD identifier (i.e., FAD Marking and buoy ID or any information allowing to identify the owner)
vi. If the visit is followed by a set, the results of the set in terms of catch and by-catch, whether retained or discarded dead or alive. If the visit is not followed by a set, note the reason (e.g. not enough fish, fish too small, etc.)

(c) Loss of any FAD

i. Last registered position
ii. Date of the last registered position
iii. FAD identifier (i.e., FAD Marking and buoy ID)

The Commission also focuses on supply vessels deployment activities, requesting the number of FADs deployed per month, area, type of object and type of beacon.

Following SCRS (Standing Committee on Research and Statistics) recommendation, the Commission requests the number of FADs actually deployed on a monthly basis per 1°x1° statistical rectangles, by FAD type, indicating the presence or absence of a beacon/buoy or of an echo-sounder associated to the FAD, as well as specifying the number of FADs deployed by associated support vessels, irrespective of their flag (ICCAT 2016a).

In response to Rec. 13-01 (ICCAT 2013), the form ST08-FadsDep was created in 2014 (**Figure 9**).

[1] Deploying a buoy on a FAD includes three aspects: deploying a buoy on a foreign FAD, transferring a buoy (which changes the FAD's owner) and changing the buoy on the same FAD (which does not change the FADs owner).
[2] A fishing set on a FAD includes two aspects: fishing after a visit to a vessel's own FAD (targeted) or fishing after a random encounter of a FAD (opportunistic).

IOTC data requests:

- The IOTC asks for FAD data through Form 3FA (**Figure 10**), requiring the number of FADs visits per month, type of FAD and type of activity (IOTC 2014).

- Type of FAD:

IOTC Code	English Description
LOG	Drifting log or debris NOT located using a tracking system (radio or satellite transmission)
LGT	Drifting log or debris located using a tracking system (radio or satellite transmission)
NFD	Drifting raft or FAD with a net NOT located using a tracking system (radio or satellite transmission)
NFT	Drifting raft or FAD with a net located using a tracking system (radio or satellite transmission)
FAD	Drifting raft or FAD without a net NOT located using a tracking system (radio or satellite transmission)
FDT	Drifting raft or FAD without a net located using a tracking system (radio or satellite transmission)
ANF	Anchored FAD
DFR	Other drifting objects NOT located using a tracking system (radio or satellite transmission) (e.g. dead animal, etc.)
DRT	Other drifting objects located using a tracking system (radio or satellite transmission) (e.g. dead animal, etc.)

- Type of visit:

IOTC Code	English Description
DD	Deployment of drifting FAD
AD	Deployment of anchored FAD
DH	Retrieval/encounter and hauling of drifting FAD
AH	Revisiting and towing of anchored FAD
DR	Retrieval of drifting FAD
AR	Revisiting anchored FAD
DL	Loss of drifting FAD (tracking signal lost)
AL	Loss of anchored FAD (detached from anchorage point or damaged heavily)
DI	Retrieval/encounter, hauling, and intervention on electronic equipment of drifting FAD

- Effort: Total number of FAD visits by purse seiners, support vessels, baitboats, or boats using other gears operating under the flag of the country reporting the data. Note that this number shall include all of the FADs visited, including visits to FADs set by the same vessel that reports the visit and other types of FAD, as defined in Type of FAD above.

- FAD sets: Indicate the number of FAD visits that ended up in a set; FAD sets can be performed following the retrieval of a FAD, drifting (DH, DR, and DI), or anchored (AH and AR).

- Catches by species: including:

  a) Retained catches: catches for each species retained on board in live weight and/or number. IOTC CPC's shall provide catches for IOTC species (**Table 3**) and other species identified by the Commission (**Table 4**) and are encouraged to provide catches for all other species that are retained on board (**Appendix V; Table 5 and Table 6**). The catches of specimens for which only part/s of their bodies is retained on board shall be always reported as retained catches, in live weight.

  b) Discard levels: discard levels for each species in live weight or number. IOTC CPC's shall provide discard levels for IOTC species (**Table 3**, page 16) and other species identified by the Commission (**Table 4**). IOTC CPC's are encouraged to provide discard levels for other species of bony fish (**Table 5**), sharks (**Table 6**), marine turtles (**Table 7**), seabirds (**Table 8**), and marine mammals (**Table 9**).

WCPFC:

In the case of the WCPFC, there are no requirements on data provision. Since 2010, purse seine vessels operating in the Convention Area of this t-RFMO have a 100% observer coverage since 2010 (as established by CMM2008-01 and following Conservation and Management Measures). The Regional Observer Program includes data collection on FAD activities (WCPFC 2017). Some preliminary data have been obtained as of these observer data (Abascal *et al.* 2014).

3. New Spanish FAD logbook

The FAD data collection forms have been reviewed, modified and adapted for its use on board purse-seine and supply vessels, in response to the t-RFMOs requirements and previous experiences on data collection and processing. The new model of the Spanish FADs logbook described in this document includes the main data requested by t-RFMOs (**Figure 6**). The specific analysis of the information recorded in the logbook is presented in this section, field by field:

- Position → A fundamental problem found with these data comes from its format. It is important to provide a field easy to fill, easy to use in data processing and in accordance with the one generally used on board.

Two fields are provided in FAD logbook with a familiar format for the captains:

FADs Logbook:

Position	
Lat	Lon
ggmm	gggmm
01º30'S	009º58'W

Instructions:

	Field	Format	Description	Example
POSITION	**Lat**	ggmm	Grades (gg): Two digits, e.g. 03 (*initial 0 is not needed*) Minutes (mm): Two digits, e.g. 08 Begin with **sign '-'** for *south latitude*. Format ggºmm'N/S will automatically appear in the field	-203 (for 02º03'S)
	Lon	ggmm	Grades (gg): Three digits, e.g. 050 (*initial 0 is not needed*) Minutes (mm): Two digits (e.g. 08) Begin with **sign '-'** for *western longitude*. Format gggºmm'E/W will automatically appear in the field	5023 (for 050º23'E)

- Date and hour → The variability in the formatting of date and time usually results in bugs in data processing. Two fields are included in FADs logbook, with a familiar format for the captains. Time is recorded in GMT:

FADs Logbook:

Date	Time (GMT)
DDMMYYYY	HHMM
01/12/2017	09:01

Instructions:

Field	Format	Description	Example
Date	DDMMYYYY	Day (DD): Two digits (e.g. 15) Month (MM): Two digits (e.g. 06) Year (YYYY): Four digits (e.g. 2017) *Format 'dd/mm/yyyy will automatically appear in the field*	28092017
Time (GMT)	HHMM	Hour **GMT** (HH): Two digits (e.g. 12) Minutes (MM): two digits (e.g. 08) *Format 'HH:MM' will automatically appear in the field*	603

- FAD identification → As buoys are often re-used and some vessels renumber them in order to have an easy to use inventory on board, in the 2nd FAD Working Group of ICCAT it was concluded that the FADs should be tracked by the buoy unique ID attached to the FAD (given by the buoy manufacturer), recording in the logbook details of all changes (ICCAT 2016b). Any modification on the tracking system (i.e. buoys) of a FAD is registered in a new line, following the initial activity with the object, as "modification over previous object", allowing the individual tracking of FADs.

These fields ask for this unique buoy ID and the model (manufacturer's brand) of the buoy in order to deduce its characteristics (echo-sounder, GPS, radar reflectors, visible distance…)

An open drop-down menu with the list of most frequent models has been included to facilitate data entry. It also allows for the inclusion of free text (new models) as this technology is constantly improving:

FADs Logbook:

Buoy	
Model	**Numeric ID**
m3i+	133259

Instructions:

	Field	Format	Description	Example
BUOY	**Model**		Select from the drop-down menu the model of the buoy (d+, dl+, ds+, dsl+, te7, m3i, m4i…) In case of not being included in the list, select **"Other"** and **overwrite** the new model. Avoid generic names as: Nautical, Tunabal, Satlink…	ds+
	Numeric ID	number	Register the unique ID number used to identify the buoy (the one usually written after the model) without spaces or symbols	13448

The previous FAD forms included both the FAD and buoy IDs. Several issues were identified when trying to track FADs by these codes. Since the practical totality of FADs used by the fleet are tracked with satellite buoys, most of the skippers named the FADs with the beacon ID. Once the buoy was reused in a new FAD, it resulted in a non-unique identifier. In other instances, captains used their own codes, but these were not usually kept by other skippers. Given its simplicity, this coding resulted in frequent duplicates, as well. Therefore, it was decided to use the buoy ID as the unique identifier.

The use of the buoy ID as unique identifier has the inconvenient that it is useful as long as these IDs are visible, the activity is carried out by, or with the permission of, the buoy owner or the FAD is hauled onboard. Of course, this does not cover activities with FADs tracked using other type of locating buoys, which may not have unique identification codes printed externally (not the case of the Spanish fleet).

Some solutions, like the labeling of the FAD/buoy are being explored by t-RFMOs, although its feasibility is still under discussion (e.g. readability, covering of solar cells, etc.).

- FAD type → It has been considered to distinguish between i) drifting (DFAD) and anchored (AFAD) objects (Field: 'FAD Type'), ii) own and external origin (Field: 'Owner'), iii) natural and artificial objects (commonly 'rafts') (Fields: 'Origin' and 'Buoy?' and the following FAD characteristics) and iv) tracked or not (Field: 'Buoy?').

FADs Logbook:

Owner	Buoy? (Y/N)	FAD Type
Vessel-1	Y	Drifting

Table 0:

Owner	
Own	Device belonging to the own vessel
"Vessel name"	If the object belongs to another known vessel, select this option and overwrite its name
Unknown	If the owner is unknown
Non aplicable	For objects (including rafts) without a tracking system **('logs')**

Table 2:

FAD Type	Description/Comments
Drifting	Any drifting object
Anchored	Supply vessel anchored to a seamount

Instructions:

Field	Format	Description/Comments	Example
Owner		Select from the drop-down menu depending on the origin of the object (see **Table 0**)	Own
Buoy?	S/N	Select '**Y**' (Yes) if the object has a buoy or '**N**' (No) if not *This field has been designed to easily register objects without buoys, not only with natural origin but also man-made (nets, carrion, herbs, pallet…) If a buoy or any other element is added, register a new line with the new FAD characteristics (See **Table 1** – Modifications over previous object and Examples Sheet)*	Y
FAD Type		Select from the drop-down menu the type of object (*See Table 2 and Examples Sheet*) *NOTE: The characteristics of FADs are not registered (floating part and hanging structure) if the activity is focused on an anchored FAD (e.g. supply vessel)*	Anchored

Any addition of a tracking system and/or modification in logs structure (e.g., joining a raft) is registered in a new line, associated to the activity: 'Modifications over previous object'. These records make viable tracking the modifications made.

- FAD design characteristics → For every activity on an object, captains register the materials located/employed, its characteristics and dimensions. With a view to identify entangling objects, it has been introduced two fields that detect nets mesh size not only in the more superficial part of the floating structure but also becoming part of the underwater structure. This is also effective for drifting nets (e.g., gillnets).

FADs Logbook:

Floating part					Underwater hanging structure				Depth (m)
Material / Structure	Floating devices	Superficial covering material	Superficial covering net mesh	Dimensions aaxbbxcc	Material / Structure	Supplements	Ballast	Net mesh NOT 'in a sausage'	
Bamboo	Corks	Net	< 3 cm	2x3x0,5	Sausage form	Man-made	Ring/Eyebolt	NO mesh	20.5

Instructions:

	Field	Format	Description	Example
FLOATING PART	**Material / Structure**		Select form the drop-down menu the main material of the floating (or half-submerged) structure of the object (See **Table 3**)	Bamboo
	Floating devices		Select form the drop-down menu the main material used to keep FAD buoyancy (See **Table 4**)	Corks
	Superficial covering material		Select form the drop-down menu the main material used to wrap **the most superficial** part of the FAD (See **Table 5**)	Net
	Superficial covering net mesh		Select *'NO mesh*' if **the most superficial** covering of the floating part has NO **any** net. If the superficial covering has, at any section, net mesh, select its range from the drop-down menu.	< 3 cm
	Dimensions	aaxbbxcc	Write down in this field the digits required to indicate the length (aa), the width (bb) and height (cc), in **meters**	2x1x0.3
UNDERWATER HANGING STRUCTURE	**Material / Structure**		Select form the drop-down menu the main material/structure used in the hanging structure (See **Table 6**)	Net with 'sails'
	Supplements		Select from the drop-down menu the group of materials added to the main structure. *If they are mixed (natural+man-made), select 'Both' option* (See **Table 7**)	Coloured tapes
	Ballast		Select from the drop-down menu the material used as ballast of the FAD (See **Table 8**)	None
	Net mesh NOT 'in a sausage'		Select from the drop-down menu the net mesh range if any **section** of the underwater hanging structure or any **supplement** presents a net. If there is no net, select 'NO mesh'	NO mesh
	Depth (m)	number	Write down, with digits, the maximum depth reached by the FAD	30

Tables:

Table 3. MATERIAL / STRUCTURE (Floating part)	Description/Comments
Bamboo	Floating part (or half-submerged) made of bamboo stalks
Metal	Floating part (or half-submerged) made of metal
Plastic / PVC	Floating part (or half-submerged) made of plastic and/or PVC
Bamboo + Plastic/PVC	Floating part (or half-submerged) made of bamboo and plastic/PVC
Bamboo + Metal	Floating part (or half-submerged) made of bamboo and metal
Natural logs	Any object with natural origin that was NOT DESIGNED to aggregate tuna (**carrion**, **trunk, herbs…**)
Man-made logs	Any object with a man-made origin that was NOT DESIGNED to aggregate tuna (**gillnet, pallet, ropes…**)
Mixed	Floating part (or half-submerged) combining the previously cited materials listed in this table or VARIOUS types of objects (e.g. rafts) joined, including natural objects (*describe in the 'Observations' field*)
Single buoy	Select if any activity is carried out a single buoy (NO object associated) *It is NOT required the registration of the rest of the components (floating part, hanging structure)*
Other	Floating part (or half-submerged) made of any material not included in the previously cited types (bamboo stalks and net in a 'sausage' form, corks and net in a 'sausage' form, big containers, ropes and net….)
Unknown floating structure	ONLY when there is no way to know or approximate the main material of the floating part

Table 4. FLOATING DEVICES	Description/Comments
Containers	Floating device made of plastic containers
Corks	Floating device made of corks or plastic floats
'Balls'	Floating device made of plastic spherical balls
Other	Floating device made of **any other material** or **mixed materials** *(describe in the 'Observations' field)*

Table 5. SUPERFICIAL COVERING MATERIAL	Description/Comments
Raffia/Nylon	Select if any kind of cloth is employed to cover the floating part of the object (raffia, nylon, sailcloth…)
Net	Select if any kid of net with any mesh is employed to cover the floating part of the object (purse seine, gillnet, trawl net…)
NO covering	Select if the floating part of the object lacks of a covering
Other	Select if the covering is made of **any other** kind of material or if it is made of **mixed** materials *(describe in the 'Observations' field)*

Table 6. MATERIAL / STRUCTURE (Hanging structure)	Description/Comments
Net in a 'sausage' form	Net in a 'sausage' form **along its entire length**
Open net	Open net **along its entire length**
Net with 'sails'	**Sections** of open net ('sails')
Ropes	Ropes / 'rope ends' as major or unique material
Other	**Any other kind** of material not listed in the previous lines of this table or **mixed materials** *(describe in the 'Observations' field)*
Unknown extension	ONLY when there is no way to know or approximate the main material of the hanging structure

Table 7. SUPPLEMENTS	Description/Comments
Natural origin	Palm leafs or any other natural component in the underwater hanging structure
Man-made origin	Coloured tapes, plastic bags, pieces of sacks, remains of orange floats… in the underwater hanging structure
Both	If both, natural and man-made components become part of the underwater hanging structure
None	If NO components were added to the structure selected from Table 6

Table 8. BALLAST	Description/Comments
Metal rings / Eye bolts	Metal rings, eye bolts or any other similar material as ballast
Metal wire	Metal wires (e.g., pieces of purseline) or any other similar material as ballast

Stone	Stones as ballast
Cinder block	Cinder blocks or pieces of them as ballast
None	If NO components were added as ballast to the structure selected from **Table 6**
Other	Select if the ballast is made of **any other** kind of material or if it is made of **mixed** materials *(describe in the 'Observations' field)*

Drop-down menu for the net mesh:

Net mesh
NO mesh
< 3 cm
3-7 cm
> 7 cm

These fields are designed to improve the knowledge about FAD characteristics since all of them are adjustable to the new situations on FAD fishing. One important improvement consists on registering modifications and replacements on the structure as new lines. New materials not included in the drop-down menu can be identified in the "Observations" field. In this sense, as the FAD design evolves, new materials will be included in the drop-down menus of the logbook.

- Type of activity → Keeping in mind the main activities performed by the purse-seine vessels with objects and taking into account the significance of tracking the objects paths, it has been considered to register the following activities. The combination of some of them point out the active FADs at any one time per vessel:

Logbook:

Activity
Set

Instructions:

Field	Format	Description	Example
Activity		Identify the activity performed on the object **(or buoy)** in the drop-down menu (see **Table 1** and the *examples sheet*)	Retrieval at sea

Tables:

Table 1. ACTIVITY	Description/Comments
Deployment	If a FAD is deployed (NO for markings of natural objects with a buoy. See 'Modifications over p*revious* o*bject*') (*Check the rest of the fields in this table and the examples sheet)*
Verification (visit)	With every visit, **NOT** if the object is **retrieved** or if a **set** is performed, regardless of its modification (see the *examples sheet*)
Set	If a set is performed on any kind of object. Add **one line for every group of species** captured (see **Table 8**, filling in the following lines only those fields concerning to bycatch (see the *examples sheet*) If the object is **modified** or **retrieved** at sea, add a new line registering the activity '*Modifications over previous object*' or '*Retrieval at sea*'
Modifications over previous object	This activity should be registered in a new line **after a set or a verification** if: (i) a buoy is added to a log, (ii) a buoy is changed and/or (iii) the structure of the object is modified, filling in **only** the fields modified (see the *examples sheet*)
Retrieval at sea	If an object is retrieved and not returned to sea. **After a set**, this activity will be registered in a **new line** (see the *examples sheet*)
Loss	If the signal of the **buoy** is lost. Register the last position detected (fields '*Lat'* and '*Lon'*), '*Date*' and '*Time'*
Recovering at port	Recovering of **buoys** at port. Fill in only those data concerning to the buoy (fields '*Model*' and '*Numeric ID*' and those indicating the '*Date*', '*Time*' and position ('*Lat*' and '*Lon*')

Some Spanish purse-seine vessels work in collaboration with other purse seiners and/or with supply vessels. In these cases it is important to clarify that every vessel is obliged to register its own activities, even when they are supporting other vessels (e.g., deployment of buoys for another vessel).

- Catch and Bycatch → In order to get information and improve the knowledge about impacts on targeted and non-targeted species, it has been considered to include both fields. Though catch data are received in logbooks, it takes a year to process them. This way, catch data of target species (loads and discards together) associated to object schools are available in a shorter period.

Bycatch data are registered by observers on board purse seiner and the coverage of National Data Collection Program is only a 10% of the national fishing trips. So the FADs logbooks provide this data with a 100% of coverage, including supply vessels.

The list of groups of bycatch species includes small tuna and tuna-like species.

Logbook:

School estimate (tons)	Catch (tons)			Bycatch			
				Group	In number or weight (t)	N/W	Nº/Weight specimens released alive
	SKJ	YFT	BET				
30	10	2	1	Whale shark	1	N	1

Instructions:

	Field	Format	Description	Example
	School estimate (tons)	Round number	Note down a unique number of **tons** the catch of SKJ, YFT and/or BET estimated if the set is not performed. Register a '**0**' if any other kind of trick or fishes is detected (bony fishes, bait, garbage…)	5
Catch (tons)	SKJ	number	Catches of SKJ (*Katsuwonus pelamis*) loaded plus the discards of this species, in tons	10
	YFT	number	Catches of YFT (*Thunnus albacares*) loaded plus the discards of this species, in tons	2
	BET	number	Catches of BET (*Thunnus obesus*) loaded plus the discards of this species, in tons	1
Bycatch	**Group**		Select from the drop-down menu the group of species caught. If more than one group is caught, note them down in the following lines (one by group) (see the *examples sheet*) (see **Table 9**)	Bony fishes
	In number or weight (t)	number	Number of specimens or weight (*in tons*) of the group of species (one number for every group). It is not necessary to indicate numbers by species, only by group. **If part of the catch is estimated in number and part in weight, register them in two consecutive lines**	0.5
	N/W		Select '**N**' (number) or '**W**' (weight)	W
	Nº/Weight specimens released alive	number	Register, with number, the number or weight of the specimens of the group released alive. It is not necessary to indicate numbers by species, only by group	0.1

Tables:

Table 9. GROUP*	Description/Comments
Small tuna and tuna-like fish	Select small tuna if specimens of black skipjack (*Euthynnus lineatus*), kawakawa (*E. affinis*), frigate tunas (*Auxis thazard*), bullet tunas (*Auxis rochei*), bonito (*Sarda spp.*) or similar are caught, regardless of its destiny
Sharks (hammerhead, shortfin mako, silky shark…)	Select sharks if specimens of this group are caught, regardless of its destiny. *NOTE: DO NOT select for whale sharks*
Billfishes	Select billfishes if specimens known as spearfishes, sailfishes, marlins or swordfish are caught, regardless of its destiny
Turtles	Select turtles if any specimen of this group is caught, regardless of its destiny
Rays and manta-rays	Select this group if rays, mantas or manta-rays are caught, regardless of its destiny
Marine mammals (whales, dolphins…)	Select marine mammals if any specimen is rounded by the purse seine net, regardless of its destiny
Whale shark	Select whale shark if any specimen is rounded by the purse seine net, regardless of its destiny
Other bony fishes (triggerfishes, rainbow runner, dolphinfishes…)	Select bony fishes if any specimen not included in the previous lines is caught, regardless of its destiny
***NOTE: All those specimens rounded by the purse seine net at the eyebolts raising time (purseline closure) must be included, regardless of its destiny**	

4. Conclusions and recommendations

The analysis of data collected thanks to the Spanish Fish Aggregating Device Management Plan has allowed to detect the improvements needed in the data collection system for its adaptation to the use on board. The current version presented in this document integrates all the data requirements from t-RFMOs in a user-friendly format for the skippers, increasing the quality of the information obtained.

On the other hand, there is of course much room for improvement. In our view, the current system is excessively time-consuming, and the development of a specific tool for data entry is required (e.g., forms that upload the latest known configuration of a FAD, once the ID is entered, with checkboxes instead of dropdown menus, etc.).

Standardization of templates, tools and guidelines at the RFMO level and, if possible, among t-RFMOs, would be highly desirable, and would no doubt improve data usability. It must also be noted that there is little information that supports the collection of many of the current fields. Future analyses, feasible in the short-term, are required to fine-tune the trade-offs between the efforts and benefits in the acquisition of FAD-related information.

Finally, it is important to note the need of involving all the stakeholders in the elaboration of successful FAD management plans. The current work is an example of the collaboration between scientists and fishing companies, which has proved essential to develop a method for data compilation that is efficient and, at the same time, takes into consideration practicalities on-board.

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Table 1. Percentages of catches associated to floating objects by t-RFMO areas and year for Spanish tropical purse-seine fishery and means of percentages in five-year periods. For WPO it has been taken into account 2002-2015 period to calculate averages.

YEAR / AREA	ATL	IND	EPO	WPO	
1991	53%	51%	46%		
1992	49%	60%	21%		
1993	46%	51%	71%		
1994	46%	53%	80%		
1995	53%	70%	91%		
1996	59%	58%	93%		
1997	42%	76%	100%		
1998	29%	74%	99%		
1999	35%	79%	95%	99%	
2000	52%	77%	99%	100%	
2001	46%	66%	97%		
2002	46%	76%	96%	100%	
2003	43%	63%	98%	100%	
2004	43%	55%	97%	100%	
2005	63%	62%	94%	94%	
2006	58%	74%	100%	100%	
2007	62%	72%	95%	71%	
2008	64%	68%	98%	100%	
2009	55%	83%	100%	89%	
2010	66%	87%	100%	97%	
2011	77%	83%	100%	97%	
2012	76%	73%	69%	95%	
2013	83%	88%	100%	90%	
2014	84%	86%	81%	84%	
2015	73%	78%	90%	90%	
TOTAL MEAN	**56%**	**71%**	**88%**	**93%**	**AVERAGE of means**
MEAN (1991-1995)	49%	57%	62%		**56%** (except for WPO)
MEAN (1996-2000)	44%	73%	97%		**71%** (except for WPO)
MEAN (2001-2005)	48%	64%	96%		**70%** (except for WPO)
MEAN (2006-2010)	61%	77%	99%	91%	**82%**
MEAN (2011-2015)	79%	82%	88%	91%	**85%**

Figure 1. Main types of objects visited by the Spanish tuna purse-seine fleet.

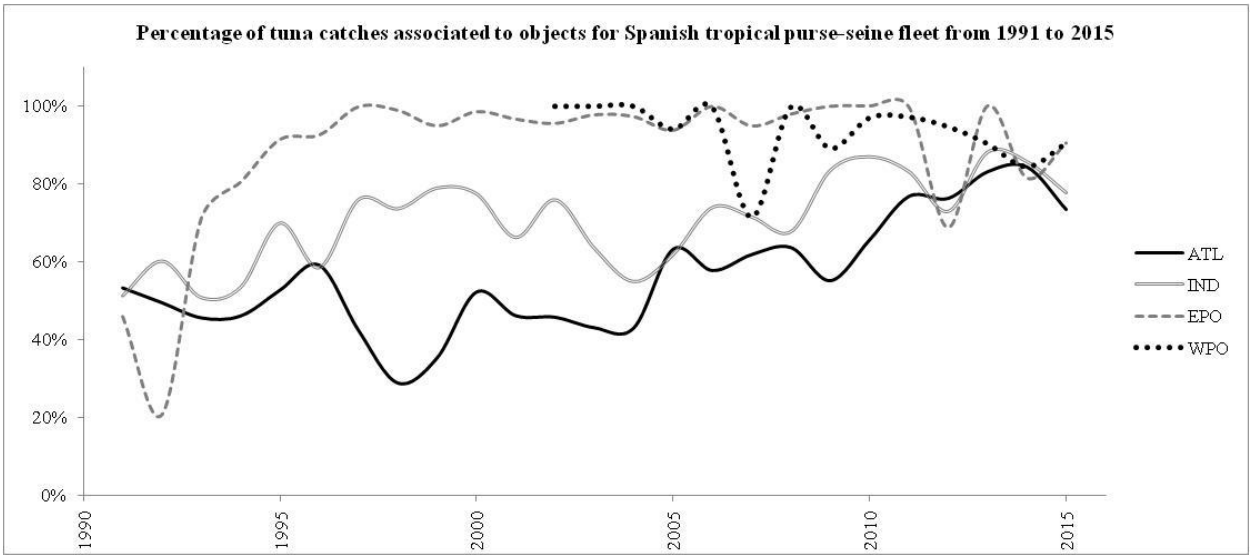

Figure 2. Percentages of tuna catches associated to objects by t-RFMO area for Spanish purse-seine fleet from 1991 to 2015. For WPO area data represented correspond to the 2002-2015 period.

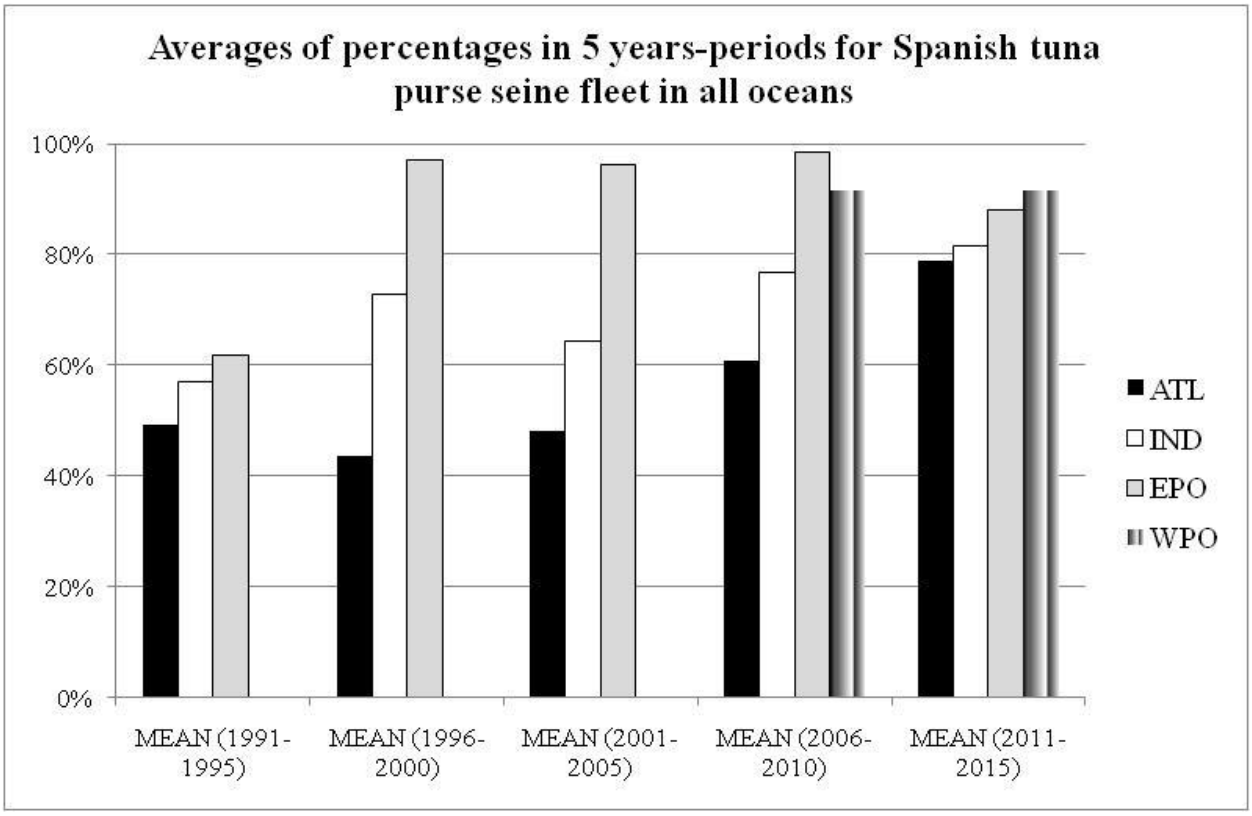

Figure 3. Means of percentages of tuna catches associated to objects by t-RFMO from 1991 to 2015, grouped in five-year periods. For WPO area data represented correspond to the 2006-2015 period.

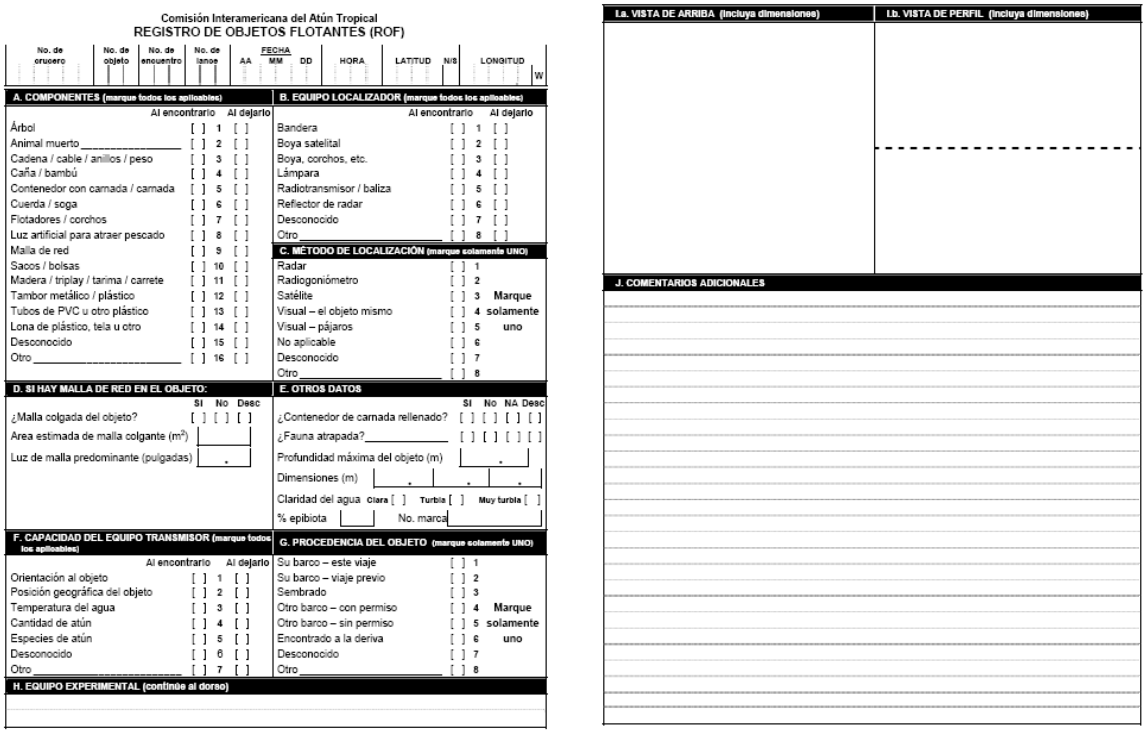

Figure 4. IATTC Floating Objects Form for observers on board purse seiners in the IATTC area.

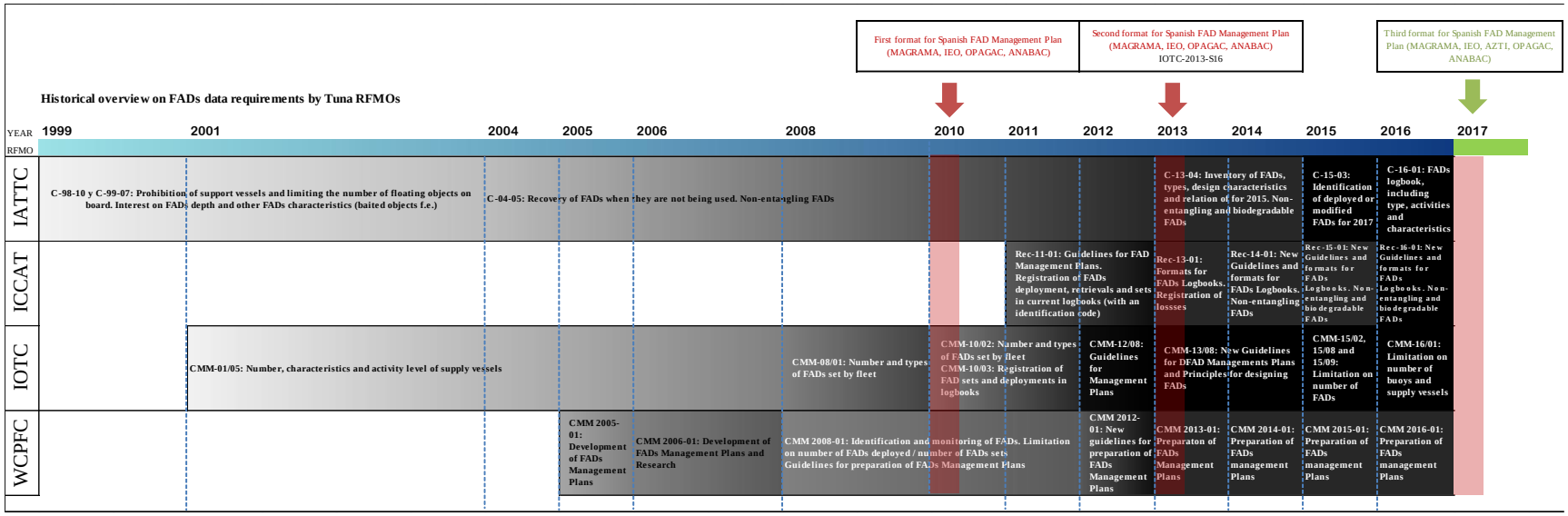

Figure 5. Historical overview on FAD data requirements and report requests by Tuna RFMOs. Remark of Spanish response.

										FAD design characteristics										
	Vessel name	**Number of trip**	**Registration**	**Position**	**Date**	**Hour**	**FAD identification**	**FAD type**	**General FAD design characteristics**	**Raft**	**Covering**	**Floating devices**	**Hanging structure materials**	**Hanging structure configuration**	**Type of buoy**	**Type of the activity (hauling, intervention on electronic equipment, other (specify))**	**Type of activity with the buoy**	**If the activity is a set, the results of the set in terms of catch and bycatch**	**Characteristics of any attached buoy or positioning equipment**	**Observations**
IATTC **RESOLUTION C-16-01 AMENDMENT OF RESOLUTION C-15-03 ON THE COLLECTION AND ANALYSES OF DATA ON FISH-AGGREGATING DEVICES**	☐	X	☐	X	X	X	Serial number	Natural, Own, External or Anchored	Dimension and material of the floating part and of the underwater hanging structure	Bamboo raft, bamboo in a sausage form, metallic, PVC/Plastic, no raft or other	Entangling net, non-entangling net, cloth, palm fronds, no wrapping, other	Corks, buoys, containers, no floats, other	Nylon, plam fronds, bamboo, no tail, other	Sausage, ropes, cloth, other	GPS, with echosounder, no echosounder, other…	Set, Deployment, Retrieving, Loss, Intervention on electronic equipment	Derived from the type of activity	Tuna catch (YFT, BET, SKJ, OTHER) and bycatch (sharks, billfishes, manta-rays, other) NUMBER or WEIGHT	Positioning system, whether equipped with sonar, etc.	☐
ICCAT **16-01-TRO RECOMMENDATION BY ICCAT ON A MULTI-ANNUAL CONSERVATION AND MANAGEMENT PROGRAMME FOR TROPICAL TUNAS**	☐	☐	☐	X	X	X	Mandatory readable buoy identification	Log (related or not with fishing activities, animals or plants), Artificial or Anchored	Material of the floating part and of the underwater hanging structure and the entangling or non-entangling feature of the underwater hanging structure	☐	☐	☐	☐	☐	Simple buoy (GPS) or associated with echo-sounder	Set (targeted or oportunistic), Deployment, Retrieving, Visit to an own or foreign object, Strengthening or consolidation	Tagging, Removing or Loss	Tuna catch (SKJ, YFT, BET) and bycatch (group, number or weight, n° of specimens released alive)	☐	☐
IOTC **GUIDELINES FOR THE REPORTING OF FISHERIES STATISTICS TO THE IOTC - 2014 AND RESOLUTION 15/08 PROCEDURES ON A FISH AGGREGATING DEVICES (FADS) MANAGEMENT PLAN, INCLUDING A LIMITATION ON THE NUMBER OF FADS, MORE DETAILED SPECIFICATIONS OF CATCH REPORTING FROM FAD SETS, AND THE DEVELOPMENT OF IMPROVED FAD DESIGNS TO REDUCE THE INCIDENCE OF ENTANGLEMENT OF NON-TARGET SPECIES**	☐	☐	☐	☐	☐	☐	Marking or beacon ID (unique and readable identificator)	Log, Raft with net, Raft without net, Anchored or Other (located or not with a tracking system)	Dimension and material of the floating part and of the underwater hanging structure	With or without a net. Detect entangling and not bidegradable materials	With or without a net. Detect entangling and not bidegradable materials	☐	With or without a net. Detect entangling and not bidegradable materials	With or without a net. Detect entangling and not bidegradable materials	☐	Set, deployment, retrieval, visiting, loss and intervention on FADs	Loss	Weight and/or number of retained catches and discard levels (n°/weight) of target and bycatch species	☐	☐
WCFC **CMM-2016-01 PREPARATION OF FAD MANAGEMENT PLANS (NO LOGBOOK)**	X	☐	☐	X	X	X	Marking and identifiers	Natural, Raft with or without a net, or Anchored	Dimension and material of raft and net. Description of design	☐	☐	☐	☐	☐	GPS, radio, visual	Deployment, verification, set, hauling (retrieval)	☐	☐		☐
NEW SPANISH PROPOSAL	X	X	X	X	X	X	Model and readable identification number	Drifting or anchored	Dimension, material and characteristics of the floating and underwater parts (entangling, biodegradable…)	Bamboo, metallic, PVC/Plastic, log (man-made or natural), mixed, other	Entangling or non-entangling nets, no coverng, other	Containers, corks or buoys, plastic balls, other, no floats	Addings: natural, man-made, both, other Ballast: ring, eyebolt, steel rope, stones, concrete blocks, other, no addings	Net in a 'sausage' form, open net, mixed net form (with 'sails'), ropes, other	Derived from model registration (radio, GPS, echo-sound…)	Deployment, verification, set, object modifications, retrieval, recovering at port, loss	Deployment, removing, recovering or loss	Tuna catch (SKJ, YFT, BET) and bycatch (group, number or weight, n° of specimens released alive) Groups: Sharks, billfishes, rays and manta-rays. marine mammals, whale-shark, bony fishes, small tuna	Derived from model registration (radio, GPS, echo-sound…)	X

Figure 6. Main Tuna RFMOs current requests on FAD characteristics and activity data. The '**X**' symbol means that the data is being collected. The '**-**' symbol means that the particular FAD design characteristic is not defined in the guidelines provided.

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ACTIVIDAD DE LOS PLANTADOS

BUQUE		IATTC Ves. No		NO. VIAJE		Trip. No.		Matrícula	

				Posición Geográfica		Captura de túnidos				Captura incidental: Número [N] o tonelaje [t].										
Fecha	Hora	Identificación	Actividad	Latitud N/S	Longitud E/W	YFT	BET	SKJ	OTR	TIB	N/t	TORT	N/t	PIC	N/t	MANT	N/t	OTR	N/t	Comentarios / Observaciones
CAPTURA INCIDENTAL LIBERADA VIVA:																				
CAPTURA INCIDENTAL LIBERADA VIVA:																				
CAPTURA INCIDENTAL LIBERADA VIVA:																				
CAPTURA INCIDENTAL LIBERADA VIVA:																				
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FAD FORM 3.1.3 SPN.DOCX 21-sep-16

COMISION INTERAMERICANA DEL ATUN TROPICAL – INTER-AMERICAN TROPICAL TUNA COMMISSION

INFORMACIÓN DE LOS PLANTADOS

		Materiales en superficie			Dimensiones (m)			Materiales y configuración de la parte sumergida (rabo)					
Identificación	Descripción	Balsa	Recubri-miento	Flotadores	A	L	P	Mat. 1	Mat. 2	Config.	Luz malla (mm)	Tipo de baliza	Comentarios / Observaciones

FAD FORM 3.1.3 SPN.DOCX 21-sep-16

Figure 7. IATTC FAD logbook

FAD logbook

FAD marking	*Buoys ID*	*FAD type*	*Type of visit*	*Date*	*Time*	*Position*		*Estimated catches*			*By-catch*				*Observations*
						Latitude	*Longitude*	*SKJ*	*YFT*	*BET*	*Taxonomic group*	*Estimated catches*	*Unit*	*Specimen released alive*	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(7)	(8)	(8)	(8)	(9)	(10)	(11)	(12)	(13)
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

(1,2) If FAD marking and associated beacon/buoy ID are absent or unreadable, report it in this section. However, if FAD marking and associated beacon/buoy ID are absent or unreadable, the FAD shall not be deployed
(3) Anchored FAD, drifting natural FAD or drifting artificial FAD.
(4) I.e., deployment, hauling, strengthening/consolidation, removing/retrieving, changing the beacon, loss and mention if the visit has been followed by a set.
(5) dd/mm/yy.
(6) hh:mm.
(7) N/S/mm/dd or °E/W/mm/dd.
(8) Estimated catches expressed in metric tons.
(9) Use a line per taxonomic group.
(10) Estimated catches expressed in weight or in number.
(11) Unit used.
(12) Expressed as number of specimen.
(13) If no FAD marking neither associated beacon ID is available, report in this section all available information which may help to describe the FAD and to identify the owner of the FAD.

List of deployed FADs and buoys on a monthly basis

Month:

FAD Identifier		*FAD & electronic equipment types*		*FAD*				*Observation*
FAD Marking	*Associated buoy ID*	*FAD Type*	*Type of the associated buoy and/or electronic devices*	*FAD floating part*	*FAD underwater hanging structure*			
(1)	(1)	(2)	(3)	(4)	(5)			(6)
...	...	...	...		...			...
...	...	...	...		...			...

(1) If FAD marking and associated beacon/buoy ID are absent or unreadable, the FAD shall not be deployed.
(2) Anchored FAD, drifting natural FAD or drifting artificial FAD.
(3) E.g. GPS, sounder, etc. If no electronic device is associated to the FAD, note this absence of equipment.
(4) Mention the material of the structure and of the cover and if biodegradable.
(5) E.g. nets, ropes, palms, etc., and mention the entangling and/or biodegradable features of the material.
(6) Lighting specifications, radar reflectors and visible distances shall be reported in this section.

Table 1. Codes, names and examples of different types of floating object that should be collected in the fishing logbook as a minimum data requirement. Table from 2016 SCRS report (section 18.2 Table 7).

Code	*Name*	*Example*
DFAD	Drifting FAD	Bamboo or metal raft
AFAD	Anchored FAD	Very large buoy
FALOG	Artificial log resulting from related to human activity (and related to fishing activities)	Nets, wreck, ropes
HALOG	Artificial log resulting from human activity (not related to fishing activities)	Washing machine, oil tank
ANLOG	Natural log of animal origin	Carcasses, whale shark
VNLOG	Natural log of plant origin	Branches, trunk, palm leaf

Table 2. Names and description of the activities related to floating objects and buoys that should be collected in the fishing logbook as a minimum data requirement (codes are not listed here). Table from 2016 SCRS report (section 18.2 Table 8).

	Name	*Description*
FOB	Encounter	Random encounter (without fishing) of a log or a FAD belonging to another vessel (unknown position)
	Visit	Visit (without fishing) of a FOB (known position)
	Deployment	FAD deployed at sea
	Strengthening	Consolidation of a FOB
	Remove FAD	FAD retrieval
	Fishing	Fishing set on a FOB[1]
Buoy	Tagging	Deployment of a buoy on FOB[2]
	Remove BUOY	Retrieval of the buoy equipping the FOB
	Loss	Loss of the buoy/End of transmission of the buoy

[1] A fishing set on a Fishing Object (FOB) includes two aspects: fishing after a visit to a vessel's own FOB (targeted) or fishing after a random encounter of a FOB (opportunistic).
[2] Deploying a buoy on a FOB includes three aspects: deploying a buoy on a foreign FOB, transferring a buoy (which changes the FOB owner) and changing the buoy on the same FOB (which does not change the FOB owner).

Figure 8. ICCAT logbook model

Flag (current) cod.	Month	FAD type	Lat	Lon	No. Deployed with beacons	Type of beacon deployed	Average No. Active beacons followed per vessel	Average No. Deactivated beacons followed per vessel	No. Deployed without beacons	Average No. of active lost FADs	No. Of FADs deployed by support vessels
FlagCodeCur	Month	FadType	Lat	Lon	NoDepBeaconsYes	BeaconType	NoBeaconsFollowed	NoDeactivBeacons	NoDepBeaconsNo	NoLostFADS	SuppFads
Table. Fad types											
FadTypeCode	FadType										
FAA	Anchored FAD										
FADN	Drifting Natural FAD										
FADA	Drifting artifical FAD										
Table. Beacon types											
BeaconCode	BeaconType										
RDF	Radio direction finder										
RDFGPS	Radio direction finder and GPS										
GPS	GPS										
SON	Sonar										
SONES	Sonar with echo-sounder										
SATES	Satellite and echo-sounder										
SAT	Satellite without echo-sounder										

Figure 9. ICCAT ST08 Form.

MONTH	GRID				AREA	ESTIMATION	Type of FAD	Type of Visit	NO. SET ON FAD	EFFORT	SPECIES / CATCH UNITS
	SIZE	QUADRANT	LATITUDE	LONGITUDE							

Figure 9. IOTC 3FA Form

Annex

Annex 1. New Spanish FADs logbook form
(*see Excel file in original language only, available on the ownCloud*).

Excel description:

Sheet 1 - Registration

Sheet 2 - Instructions

Sheet 3 - Tables

Sheet 4 - Examples