IOTC-2018-CoC15-10 Add1_Rev2 [E]

COLLECTION OF DRIFTING FISH AGGREGATING DEVICES MANAGEMENT PLANS

Prepared by: IOTC Secretariat, 3 May, 2018

At its 21st Session, the Commission adopted Resolution 17/08 *Procedures on a fish aggregating devices (FADs) management plan, including 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*.

The paragraph 1 describes the application of Resolution 17/08:

> *"This Resolution shall apply to **CPCs having purse seine vessels and fishing on Fish Aggregating Devices (FADs), equipped with instrumented buoys** for the purpose of aggregating tuna target species, in the IOTC area of competence."*

This document contains the FAD management plans made available to the Commission in accordance with IOTC Resolution 17/08, to assist CPCs in analysing the FADs management plans, as required in paragraph 11, and in particular with the provisions of paragraph 11 of the Resolution:

> *"**CPCs having vessels fishing on FADs shall submit, to the Commission, on an annual basis, Management Plans for the use of FADs by each of their purse seine vessels covered at paragraph 1**. Due to their specificity in terms of users, number deployed, type of boat/vessel involved, fishing method and gear used and materials used in their construction, the Management Plans and Reporting Requirements for Drifting FADs (DFAD) and Anchored FADs (AFAD) shall be addressed separately for the purposes of this Resolution. The Plans shall at a minimum meet the Suggested Guidelines for Preparation for FAD Management Plans by each CPC as provided for DFADs in Annex I and AFADs in Annex II. For the purpose of this Resolution, the term Fish Aggregating Device means drifting (DFAD) or anchored floating or submerged objects (AFAD) deployed for the purpose of aggregating target tuna species."*

Drifting fish aggregating devices (FADs)

The following ten CPCs have purse seine vessels registered in the IOTC Record of Authorised Vessels: Australia, EU (France, Italy and Spain), Indonesia, Iran (Islamic Rep. of), Japan, Korea (Rep. of), Mauritius, Philippines, Seychelles and Thailand.

From the above-mentioned ten CPCs, nine have provided a DFAD management plan. Three revised DFAD management plans were provided in 2018. The DFAD management plans available to the Commission are presented in Annex 1, and dates of submission are summarised in the following table.

Reception of DFAD MGT PLANS	AUS	EU (FRA, ITA)	EU (ESP)	IDN	IRN	JPN	KOR	MUS	SYC
2013	N/S	N/S	N/S	N/S	N/S	25 December	31 December	N/S	N/S
2014	01 May	N/S	15 January	N/S	26 January	26 December	N/S	14 March	N/S
2015	N/S	N/S	N/S	12 January	N/S	N/S	N/S	N/S	27 April
2016	N/S	11 March	11 March	N/S	N/S	N/S	16 March	N/S	N/S
2017	N/S	13 April	19 April	N/S	N/S	10 April	21 March	N/S	N/S
2018	N/S	19 January	14 March	N/S	N/S	N/S	16 March	N/S	N/S

N/S	Not submitted

Thailand has provided an AFAD management plan on 30 of June 2017. It is to be noted that Resolution 17/08, like its predecessor, Resolution 15/08, had maintained elements pertaining to anchored FADs, while paragraph 1 of both of these resolutions clearly indicate that this measure is only applicable to CPCs having purse seine vessels and fishing on Drifting Fish Aggregating Devices (DFADs). The IOTC Secretariat is of the opinion that the remnant references to AFAD in Resolution 17/08, which superseded Resolution 15/08, should have been deleted when the latter superseded Resolution 13/08.

Philippines has 48 purse seine vessels on the record of authorized vessels, and has not submitted a DFAD management plan.

The following two CPCs have reported they will provide a DFAD management plan:

- Mozambique, which had previously indicated that it is preparing to implement its fleet development plan for tuna fisheries and will take first steps in order to develop a FAD management plan, has now informed that it does not have a purse seine fleet yet and consequently does not use FADs in its fishery.
- Sri Lanka had initially indicated, in its Report of Implementation for the year 2013 that a plan will be submitted. However, it has since then indicated that it does not operate a purse seine fleet and, therefore, is not subject to this measure.

Progress report on implementation of DFADs

IOTC Resolution 17/08, paragraph 13, request CPCs to provide a report on the progress of the management plan:

> *"The Management Plans shall include initiatives or surveys to investigate, and to the extent possible minimise the capture of small Bigeye tuna and Yellowfin tuna and non-target species associated with fishing on FADs. Management Plans shall also include guidelines to prevent, to the extent possible, the loss or abandonment of FADs. To reduce the entanglement of sharks, marine turtles or any other species, the design and deployment of FADs shall be based on the principles set out in Annex III, which will be applied gradually from 2014.* ***From 2015 on, CPCs shall submit to the Commission, 60 days***

***before the Annual Meeting, a report on the progress of the management plans of FADs**, including reviews of the initially submitted Management Plans, and including reviews of the application of the principles set out in Annex III".*

From the eight CPCs that have provided a DFADs management plan, five CPCs have provided a report on the progress of implementation of the DFADs management plan in 2017 or 2018 or for both years, as summarised in the following table.

Reception of progress report on DFAD MGT PLANS	**AUS**	**EU (FRA, ITA)**	**EU (ESP)**	**IDN**	**IRN**	**JPN**	**KOR**	**MUS**	**SYC**
2017	N/A	22 March	22 March	17 March	N/S	15 March	21 March	17 March	N/S
2018	N/A	15 March	15 March	16 March	15 March	16 March	16 March	16 March	12 April

N/A	Not applicable

N/S	Not submitted

Australia has indicated that no FAD fishery was authorised in 2016 and 2017 in IOTC fisheries (*Source: IOTC-2017-CoC14-IR01 and Source: IOTC-2018-CoC15-IR01*).

Two CPCs, Iran (Islamic Rep. of) and Seychelles, have not provided a report on the progress of implementation of the DFADs management plan in 2017.

Food and Agriculture Organization of the United Nations

Indian Ocean Tuna Commission
Commission des Thons de l'Ocean Indien
iotc ctoi

Annex 1

Collection of DFADs management plans

Australia DFADs Management Plan

Received 01.05.2014

Australian Government
Australian Fisheries Management Authority

Fish Aggregation Device (FAD) Management Plan in Australia's Tropical Tuna Fisheries

2013

Version 1.2

Important Note:

This is not a statutory Management Plan under the *Fisheries Management Act 1991*.

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Document Information

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Version Control

#	Status	Change Description	Author(s)	Date
01	Version 1.0	Drafting the FAD Management Plan	Nigel W. Abery	27 Aug 2012
02	Version 1.1	Review by AFMA's Foreign Compliance Section		28 Sep 2012
03	Version 1.2	Review by AFMA's Bycatch Section		12 Nov 2012

ACRONYMS

AFMA	Australian Fisheries Management Authority
FAD	Fish Aggregation Device
IOTC	Indian Ocean Tuna Commission
WCPFC	Western and Central Pacific Fisheries Commission

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SCOPE OF THIS POLICY

The Australian Fisheries Management Authority (AFMA) is the Australian Government agency responsible for the efficient management and sustainable use of Commonwealth fish resources on behalf of the Australian community.

This policy applies in both the Australian Fishing Zone and on the High Seas to Commonwealth managed commercial tropical tuna fisheries that permit purse seining as a fishing method. These include the Western Tuna and Billfish Fishery, the Western Skipjack Tuna Fishery and the Eastern Skipjack Tuna Fishery.

OBJECTIVE OF THIS POLICY

The objective of this policy is to describe AFMA's requirements for the use of fish aggregation devices by fishing concession holders in Commonwealth managed commercial tropical tuna fisheries.

This policy fulfils Australia's obligations to regional fisheries management organisations; the Indian Ocean Tuna Commission (IOTC) and the Western and Central Pacific Fisheries Commission (WCPFC). IOTC Resolution 12/08 (*Procedures on a Fish Aggregating Devices (FADs) Management Plan*) requires a Management Plan for the use of Fish Aggregation Devices (FADs). Management of FADs is also an issue under discussion at the WCPFC.

BACKGROUND

WHAT IS A FISH AGGREGATION DEVICE?

FADs are floating objects that attract fish. There are two main types of FADs: natural and man-made. Natural FADs are naturally occurring floating objects such as logs, branches, debri and large live marine organisms (whales, whale sharks, manta rays, etc). Man-made FADs can be found either drifting or anchored.

Tropical tuna such as Bigeye tuna, Yellowfin tuna, and Skipjack tuna show a natural behavioural tendency to aggregate around such floating objects. Fish aggregation devices are used in commercial tuna fisheries to target schooling tuna using a purse seine.

Fishing beside/under FADs takes advantage of the fact that tuna and other pelagic fish naturally congregate around floating objects in the open ocean and can be substantially more efficient than setting on unassociated schools. Man made FADs, improve the efficiency of fishing by aggregating tuna and reducing the time needed for searching. This is especially the case of technologically advanced FADs, with satellite beacons that enable fast location and sonar to monitor the presence and size of aggregations beneath them (Bromhead et al. 2003) thus, FAD fishing saves time, resources and fuel, and has

become a major tool of the industrialised purse seine tuna fleet globally. Tuna that school around FADs are also easier to encircle and catch than free-swimming schools. It is estimated that fishing sets around floating objects have a higher success rate (90%) than those made on free-swimming schools (50%) (Dagorn et al. 2012). FADs are also used by hand line, troll, pole and line and even gillnet fisheries. Livelihoods, food security and the economies of many regions and countries are dependent on FAD fishing.

ISSUES WITH FADS

Fishing by its very nature impacts the marine environment, yet fish are a vital source of protein and income for communities throughout the world. Fishing on FADs can have additional impacts compared to fishing around free schools:

1. It can increases the catch of 'non target' species and sizes of tunas (especially undersized, juvenile Bigeye and Yellowfin Tunas);
2. There can be relatively high bycatch of sharks, threatened, endangered and protected species (e.g. turtles and manta rays), and of other unmarketable fish species and sizes of fish;
3. Without clear ownership they can become persistent marine debris impacting marine habitats such as reefs; and
4. The ecological impact of a network of thousands of artificial drifting and anchored FADs aggregate tunas and other pelagic species from surrounding waters has not been assessed.

Catches associated with FADs (associated catches) typically consist of adult skipjack tuna, juvenile yellowfin tuna and juvenile bigeye tuna. Free-swimming school catches (un-associated catches) typically consist of adult yellowfin tuna and adult skipjack tuna. However, there is a large regional and seasonal variation in the catch compositions of fish caught in both FAD and free-school sets.

A summary of the divergence in catch composition between sets on FADs and free-swimming schools in different regions for the period 2000-2009 is provided in Table 1.

FADs also attract non-tuna species (byproduct and bycatch) (e.g., sharks, turtles, cetaceans, rays, whale sharks, countless variety of other bony fishes) which can be caught with the purse seine in associated sets on FADs. Free-swimming school catches typically contain low levels of non-target (non-tuna) species. It is estimated that the amount of non-tuna and discarded tuna is between 2.8 to 6.7 times more in FAD associated catches than free-swimming school catches (Dagorn et al. 2012).

Large numbers of FADs put into the ocean may change the movement behaviour of tunas, as they move with the FAD instead of following their natural movement pattern exhibited without the addition of extra FADs. However, it has been suggested that where floating objects are naturally present in the environment the impact from the use of additional FADs would be minimal.

Issues of FADs have been acknowledged and are in the process of finding solutions to address these issues on a regional/international scale through Regional Fisheries Management Organisations. FAD closures are being used in the WCPFC to reduce the Bigeye catches and the IOTC requires that Contracting Parties and Cooperating non-

Contracting Parties using FADs have a FAD management plan to collect information on which to base management decisions.

Table 1. Percentage composition of catches of Yellowfin, Skipjack and Bigeye tuna under floating objects (FADs) and in free-swimming schools by region for the period 2000-2009. Reproduced from Dagorn et al. (2012).

	Floating objects			Total	Free-swimming schools			Total
Ocean	Yellowfin	Skipjack	Bigeye		Yellowfin	Skipjack	Bigeye	
Atlantic	17%	69%	14%	100%	76%	19%	5%	100%
Indian	25%	67%	8%	100%	72%	22%	6%	100%
E. Pacific	15%	57%	28%	100%	43%	56%	1%	100%
W. Pacific	14%	82%	4%	100%	22%	77%	1%	100%
Global	16%	75%	9%	100%	35%	63%	2%	100%

FADS USE IN AUSTRALIAN FISHERIES

FADs are not commonly used in Australian fisheries as Australia's skipjack tuna fisheries have been in-active for the past several years for economic reasons.

COMMONWEALTH FISHERIES FAD MANAGEMENT

Purse seining can be used in the Western Tuna and Billfish Fishery, Western Skipjack Tuna Fishery and Eastern Skipjack Tuna Fishery. Fishing concession holders in these fisheries wishing to utilise FADs must apply to AFMA in writing[1].

Upon application the use of FADs in these fisheries is:

1. allowed anywhere in the Western Tuna and Billfish Fishery and Western Skipjack Tuna Fishery.
2. prohibited north of the parallel of latitude 20°S in the Eastern Skipjack Tuna Fishery.

[1] Statutory Fishing Rights still require amendment

REGISTRATION OF FADS

The applications to utilise FADs must include:

1. the number of FAD(s) to be deployed;
2. the type of FAD(s) (drifting / anchored); and
3. details on the design, construction and materials utilised in the FAD(s) (including any electronic devices and their specifications including the serial numbers of radio buoys and satellite transceivers).

AFMA will then issue a unique identification number for each FAD which must be displayed on the FAD.

DEPLOYMENT AND RETRIEVAL OF FADS

Fishing concession holders or their agents are required to give prior written notice and information to AFMA of their intention to deploy and retrieve FADs. The information to be provided includes:

1. location in latitude and longitude, to the nearest second;
2. whether the FAD is being deployed or retrieved;
3. date of deployment or retrieval;
4. if the FAD is a new or replacement FAD; and
5. the FAD's identification number as issued by AFMA.

If the concession holder fails to deploy or retrieve any of the FADs in the manner reported they must immediately notify AFMA in writing of any changes to their FAD deployment(s) or retrieval(s).

LOST AND REPLACED FADS

When a FAD has been lost the fishing concession holders or their agents are required to notify AFMA immediately. The replacement FADs must be of the same type, design, construction, materials and number as the FAD being replaced. Replacement of anchored FADs shall be in the same position as the FAD being replaced.

MARKING OF FADS

All FADs must be suitably marked for visibility and identification, the raft section must be clearly painted with reflective paint so that the raft can be seen from a distance of at least one kilometre. The marking must include the name of the vessel that deployed the FAD and the identification number as issued by AFMA.

In addition, the raft section of the FAD must also support a radar reflector and flashing light that must be suspended at least two meters above the waterline of the raft. At all times, the raft must register on radar at a reasonable distance. Electronic devices such as transponders and radio beacons which automatically and continuously indicate their position by means of signals may be used. Satellite transceivers and radio beacons must have their serial numbers clearly marked. These must not be operated at radio frequencies that would conflict with other devices used for navigation and search and rescue purposes.

DESIGN, CONSTRUCTION, OPERATION AND MAINTENANCE OF FADS

The design, construction, operation and maintenance of FADs will be the responsibility of the fishing concession holder deploying the FADs.

However, FADs must be constructed from natural and/or biodegradable materials and must not be constructed of any materials (e.g. netting) that may entangle fish, sharks, turtles and/ or any other non-target species. The "*ISSF Guide for non-entangling FADs*" includes best practice design recommendations (current as at 2012).

Anchored FADs must be constructed such that they can be reliability located at their place of deployment.

The design of anchored FADs should include an appropriate number of counter weights along the rope to ensure that the rope sinks to the bottom in the event that the raft section has come detached and drifted away.

Operators who register FADs must regularly maintained them, replace them as necessary and removed them from the water when they are not in use.

LOCATION OF FADS

Navigational routes and shipping

FADs shall not be set at locations of known high volume of sea traffic. General areas where FADs are deployed shall be reported to the relevant authorities to be published as Notice to Mariners. AFMA reserves the right to refuse FAD deployment in areas of known high volume of sea traffic.

Closed areas

FADs deployment is prohibited from all waters within 12 nautical miles of any land or island. Other closed areas include the Torres Strait Protected Zone, and any other area that may from time to time be declared by relevant Government bodies to be a prohibited area.

Australia will implement any area closures for FAD use as agreed by the WCPFC and IOTC.

FISHING ON FADS

Setting the purse seine or fishing around natural FADs is permitted. It is prohibited to fish around a man-made FAD that is not registered to the fishing concession holder.

BYCATCH MINIMISATION RELATING TO FADS

Fishing around natural or man-made FADs is prohibited if any of the following are present:

- shark(s);
- whale shark(s);
- whale(s);
- manta ray(s);
- dolphin(s); or
- Sea Turtle(s).

The fishing concession holder must take all reasonable measures to ensure that any of these species that are incidentally caught are handled in an appropriate manner and released alive as quickly as possible to maximise post release survival. The ISSF Skippers' guidebook to sustainable fishing practices, Chapter 3 Bycatch mitigation and handling provides best practice guidelines on this.

Concession holders must record interactions in their logbook or listed marine and Threatened Species Forms as usual.

MANAGEMENT OF THE CATCH OF YELLOWFIN TUNA AND BIGEYE TUNA

Yellowfin Tuna and Bigeye Tuna are subject to quota in the Western Tuna and Billfish Fishery and Eastern Skipjack Tuna Fishery.

In the Western Skipjack Tuna Fishery, fishers must retain on board and land all bigeye (*Thunnus obesus*) and yellowfin (*Thunnus albacares*) tuna taken. The total live weight that may be taken must not exceed:

(a) two percent (2%) of the total live weight of skipjack tuna taken with the use of the boat during the season commencing 1 July in any year and ending on 30 June in the following year; and

(b) in any trip, fifty percent (50%) of the total live weight of skipjack tuna taken during that trip.

CATCH AND EFFORT REPORTING RELATING TO FADS

Where fish are caught using a FAD, the FAD identification number for man-made FADs or the type of FAD for natural FADs and recorded in the comments section for the corresponding shot of the vessel's logbook, currently *the Purse Seine Daily Fishing Log* (PS01A).

Relevant information collected in logbooks will be reported to the IOTC as required under their standards for scientific data according to Resolution 10/02.

INTERNATIONAL FAD MANAGMENT

Conservation and Management Measures and Resolutions agreed to by Australia at the WCPFC and IOTC will be reflected in domestic management.

IMPLEMENTATION OF THIS PLAN

This plan will be implemented through conditions on Statutory Fishing Rights or fishing permits for the relevant fisheries.

DURATION, MONITORING AND REVIEW OF THIS POLICY

This policy remains valid until revised, replaced or removed. The use and catch composition of FAD associated fishing will be monitored through the mandatory prior reporting (stated in this policy), routine observer coverage, mandatory logbook records and routine compliance activity. This policy will be reviewed after two years of data on catch and effort taken on FAD has been collected.

REFERENCES

Bromhead, D., Foster, J., Attard, R., Findlay, J. and Kalish, J. (2003) *A review of the impact of fish aggregating devices (FADs) on tuna fisheries*. Bureau of Rural Sciences, Department of Agriculture, Fisheries and Forestry. Pp 121.

Dagorn, L., Holland, K.N., Restrepo, V., and Moreno, G. (2012) *Is it good or bad to fish with FADs? What are the real impacts of the use of drifting FADs on pelagic marine ecosystems?* Fish and Fisheries. 16 May 2012 online.

Indian Ocean Tuna Commission (2012) Resolution 12/08 *Procedures on a Fish Aggregating Devices (FADs) Management Plan*.

European Union (France) DFADs Management Plan

Received 19.01.2018

FAD Management plan

in the Indian Ocean

Section I - Management measure framework

Article 1 - Reference texts

- IOTC Resolution 17/08, 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-targeted species.

- IOTC Resolution 17/01 On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock in the IOTC area of competence.

- IOTC 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.

- IOTC Resolution 16/07 On the use of artificial lights to attract fish.

-IOTC Resolution 16/08 On the use of aircrafts and unmanned aerial vehicles as fishing aids.

- FAO Guidelines to Reduce Sea Turtle Mortality in Fishing Operations adopted at the Twenty-sixth Session of the Committee on Fisheries (COFI), held in March 2005.

- Recommendations from the CECOFAD project on data collection on floating objects (Annex 1).

Article 2 – Scope

This FAD management plan applies to tuna purse seiners registered in a French port and operating in the Indian Ocean waters.

It also applies to French-flagged auxiliary vessels used as part of the tropical tuna purse seine fisheries.

It only applies to drifting FADs that are deployed in the high seas. No interaction with another fishing gear used by other fleets or conflict over usage has been noted so far.

Article 3 – Definitions

Fishing activity: Any activity related to locating fish, releasing, deploying, towing, hauling of a fishing gear, taking catch on board, transhipping, retaining on board, processing on board, transferring and landing of fish and fisheries products.
Buoy: An electronic device designed to locate or monitor a FAD.

Active Buoy: In accordance with IOTC Resolution 17/08, a buoy is considered active when it has been switched on and then deployed. A deactivated buoy may be activated only when physically present on board the purse-seine vessel to which it belongs or its supply vessel.

Owned Buoy: A buoy transmitting exclusively information (position reports and echo-sounder signal) to the vessel it has been associated to.

Common Buoy: A buoy transmitting information (position reports and echo-sounder signal) to two vessels sharing the buoy, at least.

Fish Aggregating Device (FAD): A floating and drifting object, natural or artificial, deployed or used by any fishing vessel and designed to aggregate tuna schools underneath to be harvested with purse seine. Activities related to FAD are: deployment/releasing, attaching a buoy for FAD trajectory tracking (whether deployed or encountered by the vessel), fishing on aggregated schools, visits, FAD maintenance, repairing and hauling.

Trackable Fish Aggregating Device (TFAD): A floating and drifting object, natural or artificial, equipped with a buoy for location and tracking purposes, resulting in substantial changes in the fishing strategy and fishing effort of the vessel. The activities related to TFAD are the same as the ones related to FAD, in addition with releasing, exchanging or removing a buoy for FAD trajectory tracking.

Fishing Vessel: Any vessel equipped for commercial exploitation of living fishery resources.
Auxiliary vessel: Any vessel used in support of a fishing vessel during fishing operations. The support vessel has no fishing gear.
Number of active buoys at any time: The sum of the number of active owned buoys and the number of common buoys (managed by a fishing vessel or an auxiliary vessel) divided by the number of tuna vessels using these common buoys.

Article 4 – Objectives

The French management plan has three objectives:

- **Improving the knowledge on FAD fishing:**

Increased knowledge on this fishing practice will result in a better assessment of the potential impacts and in more appropriate management measures. In this regard, the scope of data collected by the vessel masters on FAD operations will be largely increased and become mandatory.

In addition to the data on the FAD set (natural log, artificial raft, “classic” or “non-entangling” FAD) that are already reported, information on releasing, hauling, or transfer/changes in the FAD will be collected by the purse seiner masters and the support vessels on the logbooks (whose format has been changed) and through a “FAD” module in the electronic logbook (ERS) adjusted to tuna fishing and to RFMOs obligations. These data are of special interest to scientific assessments as they enable to better quantify purse seine fishing effort, improve stock assessments and can be crosschecked with scientific observer data. Additional data may be collected by the on-board observers. These data will be collected in accordance with the recommendations from the CECOFAD project (Annex 1).

Moreover, since 1st January 2010, the number of activated/deactivated buoys per vessel is quarterly reported by the buoy providers. These reports are independent from the reports from the masters and ship-owners. Two levels of control may be implemented by the relevant authority. First, at the buoy supplier level

(any INMARSAT or IRIDIUM identifier is assigned to a vessel - or to several vessels in the event of buoy-sharing). The identification of the owner(s) can be checked through the buoy supplier. Secondly, at the satellite communication supplier level (to enable satellite transmission of the buoy – position reports/echo-sounder messages- each buoy supplier has to activate the buoy transmitter for each client).

All these data will be reported as soon as possible to IRD scientists for the Joint RFMOs FAD working groups.

- **Limitation on the use of FADs**

For French ship-owners, the main management measure to regulate FAD fishing is the limitation on the use of FADs. This limitation shall apply to buoys associated with FADs (more than 90% of purse seine sets on objects are natural logs or rafts encountered and equipped with buoys). As these buoys are satellite-tracked, the most efficient and accurate way to determine the actual number of rafts deployed at sea is to use the data from the buoys (including data on their activation and deactivation). A system based on a mandatory reporting of the buoys used together with a "numerus clausus" mechanism has thus been implemented by the ship-owners.

The owner of a FAD is the vessel receiving the data transmitted by the buoy associated to a FAD.

A regulation on support vessels used by the ship-owners to manage a series of FAD has also been implemented.

- **Reducing potential ecosystem impacts of FAD**

In addition to the reduction of the potential impacts resulting from the limitation on the number of TFAD, the management plan also includes qualitative provisions resulting from additional experiments or research on the following: adoption of good practices (e.g. entangled turtles releases), improvement of selectivity (non-entangling FADs, "turtle/shark free FAD), different strategy for searching for fish, identification of fish sizes by echo integration on lateral echo-sounder...

The FAD management plan sets gradual changes in FADs so that they become fully biodegradable after a few years (by removing the nets to strengthen the raft and the tail).

Finally, measures have been proposed to reduce the damages that may arise from beaching events on coral reefs.

Chapter II - Management measures

Article 5 - Identification and markings of FADs

Any TFAD released at sea by a French tuna purse seine vessel is identified by the associated buoy serial number. It should be fully displayed without having to remove the buoy and designed to be water-resilient and readable throughout the buoy lifespan.

The FAD authorized to be used under this Management plan are not dangerous for marine shipping. Thus, it is not necessary to include a radar reflector.

Article 6 - Buoy record and monitoring

The master or ship-owner maintains a specific record on the buoys used by the vessel including:

- Its serial number;

- The vessel(s) receiving location reports from the buoy;
- Brand and type.

The use of TFAD is monitored through quarterly reports submitted by the buoys suppliers and used for FAD tracking. The quarterly reports set the number of active buoys at the beginning of the period, the number of buoys activated during the quarter, the number of buoys deactivated at the end of the period and the number of transmitting buoys during the quarter.

For scientific and statistical purposes, these data, location reports and echo-sounders data are sent to the relevant scientific institutes and fisheries management organizations, while complying with any confidentiality requirement.

Article 7 - Registration of specific FAD activities

The master of the fishing vessel or auxiliary vessel records the following activities on the logbook:

- Deployed/released FAD or marking of a FAD with a buoy
- Removal of any FAD or buoy
- Visit or fishing with or without any action on the FAD (maintenance/exchange)
- Discontinued buoys (lost FAD)

For each activity, the information collected includes:

- Date and Time
- Position (latitude, longitude) ;
- Type of FAD (natural log, of anthropogenic origin, artificial raft, “classic” or “non-entangling” FAD) with a short description, if necessary (tree trunk, pile of straw, canister, rope...);
- Type, number or ownership of the buoy associated in the event of a TFAD;
- Number or ownership of the removed buoy in the event of a TFAD;

In addition to the above information, the fishing vessel master also records on the logbook the following information for each FAD set (partly already provided for by the current rules):

- In the event of a TFAD, indicating the ownership (the master himself or belonging to a third vessel);
- Tonnages caught by species (target tuna species or bycatch);
- Possible quantities of discards

The observers on-board systematically record:

- The same information as the masters;
- The design characteristics of the FADs (Annex 1);
- Possible shark or turtle entanglements observed when some parts of the FAD are made up of nets;

For scientific and statistical purposes, data on FAD sets from the masters may be sent to the relevant scientific institutes and fisheries management organizations, while complying with any confidentiality requirement (see Article 15).

Article 8 - Limitation on the FAD number

Taking into account that no advice has been provided by the Scientific Committees of the RFMOs on this issue;

Considering that an uncontrolled FAD proliferation is threatening the sustainable tropical tuna fishery;

In line with French ship-owners commitment to curb FAD proliferation since 2010;

Aware of the scientific advice on yellowfin from the IOTC Scientific Committee at its 18th session in November 2015;

In accordance with a precautionary approach;

Considering that a limitation on the number of active buoys per vessel at any time may efficiently limit the number of FADs at sea;

Considering that to ensure a responsible and sustainable fishery, Orthongel will continue to promote the rational use of FADs through a limitation on the number of active buoys already adopted by the RFMOs and applied to all the fleets;

Encouraging the ship-owners not to increase the number of FADs above the sound levels established by OP in 2012;

Considering that IOTC limits the number of active buoys per vessel at any time at 350 and that this measure cannot ensure the sustainability of the tropical tuna resource;

The plan sets an average limit of 300 FADs deployed per vessel and ship-owner.

Vessels shall be subject to the individual limitation on FAD set by IOTC at any time.

The number of active buoys per vessel at any time shall be the sum of:

- The number of owned active buoys and
- The number of common buoys (activated by a fishing vessel or an auxiliary vessel) divided by the number of associated tuna vessels.

As the use of HF buoys cannot be controlled independently, these buoys shall be forbidden.

The masters and ship-owners shall continue to implement all the needed measures to prevent or limit lost FAD at sea.

Article 9 - Prohibition on the use of HF buoys

As the use of HF buoys cannot be controlled independently, these buoys shall be forbidden.

Article 10 - Prohibition on the use of lights to attract tuna beneath the FADs

In accordance with IOTC Resolution 16/07, the use of lights beneath the FADS shall be prohibited as well as anchoring an auxiliary vessel on the shoals, under the Resolution 61/105 on sustainable fishing adopted in December 2006 by the United Nations, providing for the need to take immediate actions to protect marine ecosystems or seamounts that are deemed vulnerable.

Article 11 – Regulation of auxiliary vessels and other devices in support of FADs

The auxiliary vessels can manage FAD provided that:

- They are listed in the specific lists of IOTC;
- They do not use lights (aerial or underwater) for the purposes of aggregating fish.
- An auxiliary vessel serves at least two purse seine vessels designated that are not associated with another auxiliary vessel.

A table listing the auxiliary vessels and their purse seine vessels associated for 2018 is annexed.

Using aircrafts and unmanned aerial vehicles from the vessels shall also be prohibited.

Article 12 - Fight against the uncontrolled TFAD drifting in sensitive areas

The masters and ship-owners shall continue to implement all the needed measures to prevent or limit lost FAD at sea.

The ship-owners agree to report the positions of the TFAD buoys entering areas where beaching on coral reefs[1] or damaging interactions with other activities (e.g. seismic surveys[2]) are likely to occur to organizations - previously identified and complying with data confidentiality requirements - that may avoid or limit to the lowest possible level the abovementioned risks.

Article 13 - Mitigation measures to limit the impact of FAD on the environment

Any action aiming at improving purse seine selectivity when fishing on FADs is encouraged to limit discards, including catches of juveniles and small individuals of target species or non-target species bycatch (with due consideration on sensitive species, as sharks).

The ship-owners shall provide the crew with the information needed to build FADs that ensure the lowest possible level -or none – of turtle and shark entanglement and provide the vessels with material needed to build these FADs. The ship-owners shall continue to hold and operate non-entangling FAD workshops based in every French purse seiner ports (Seychelles and Mauritius). The FADs used by the fleet subject to this plan are designed to

- Avoid any shark or turtle entanglement;
- Avoid any risk for marine shipping.

The ship-owners are working on biodegradable FADs to limit their impact on the environment, even when lost at sea.

Fishing vessels and auxiliary vessels are not allowed to release a FAD that is not designed to avoid shark and turtle entanglement.

Article 14 - Measures aimed at the conservation of sharks (mainly related to FADs)

The ship-owners shall encourage the crew to implement any method of shark live release that they deem more efficient and less dangerous for their safety, and standard procedures for the different catches (big sharks, small sharks, manta rays, whale sharks), and make them available.

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[1] A study on the FAD-WATCH device to inform the coastal state authority in the event of FAD beaching is ongoing. A study on the lost buoys and the main beaching areas is being conducted with the scientific organizations. A partnership with associations for the protection of the environment is also under consideration to limit the impact on FAD on the marine ecosystem (collection of FADs...). The outcomes of these works may be included, where appropriate, when this plan will be reviewed.

[2] The mechanism described in this paper has already been implemented in the seismic surveys off Gabon.

The ship-owners shall request the crew to facilitate the works of the on-board scientists to tag the sharks before releasing into sea to assess their survival rate.

The ship-owners shall provide the crew with the information and training needed to improve release of all live sharks caught by seiners in optimal safety conditions for the crew and provide vessels with handling and release devices for sharks and rays.

Article 15 - Use of supply vessels

The ship-owners commit to comply with IOTC Resolution 17/01 under which the number of auxiliary vessels is limited to two vessels per five purse seiners.

Section III – Implementation measures

Article 16 - Confidentiality requirements for data on FAD sets

All the information collected under this management plan shall be treated as confidential and its use shall be restricted solely to scientific, statistical and/or monitoring and control purposes. Any other use of this information shall be subject to the prior consent of the ship-owner.

Article 17 – Duration of the management plan

This management plan applies from 1st January 2018.

Navire	:	**CAP SAINT VINCENT**
Pavillon	:	**Français**
Numéro d'immatriculation	:	**CC 911 289**
Port d'immatriculation	:	**Concarneau**
Signal d'appel international	:	**FIPP**
Numéro OMI	:	**9225536**
Numéro CFR	:	**FRA000911289**

Patron	:	
Marée	:	**132d**

Départ	-	Port	:	**Port Victoria**
		Date	:	**04/04/2018**
		Heure	:	**10:20**
		Loch	:	**0**

Arrivée	-	Port	:	**Port Victoria**
		Date	:	**10/04/2018**
		Heure	:	**13:00**
		Loch	:	**1045**

6.11	Jours de mer pendant la marée.	**1045**	milles parcourus

Nombre de coups de filets dans la marée	Portants	:	**4**
	Nuls	:	**0**
	Total	:	**4**

Albacore	:	**22 t**
Listao	:	**74 t**
Patudo	:	**33 t**
Germon	:	**0 t**
Total	:	**129 t**

Autres	**0 t**
Rejets	**1 t**

en cas de déchargement en cours de marée merci de noter ci-dessous le ROB (Reste à bord)	
Albacore +10	xxx
Albacore -10	xxx
Listao	xxx
Patudo +10	
Patudo -10	xxx
Germon	xxx

Total ROB	0
Total Bord	129 t

DEPART / SALIDA / DEPARTURE :		ARRIVEE / LLEGADA / ARRIVAL		PATRON / PATRON / MASTER		NAVIRE / BARCO / VESSEL	FEUILLE HOJA SHEET
PORT / PUERTO / PORT	Port Victoria	PORT / PUERTO / PORT	Port Victoria	0			
DATE / FECHA / DATE	04/04/2018	DATE / FECHA / DATE	10/04/2018				
HEURE / HORA / HOUR	10:20	HEURE / HORA / HOUR	13:00	MAREE	132d		Page N° 1 / 2
LOCH / CORREDERA / LOCH	0	LOCH / CORREDERA / LOCH	1045				

DATE / FECHA / DATE	POSITION (chaque calée ou à midi) / POSICION (cada lance o mediadia) / POSITION (each set or midday)	CALEE LANCE SET			CAPTURE ESTIMEE (en tonnes) ESTIMATION DE LA CAPTURA (en toneladas) ESTIMATED CATCH (metric tons)														ASSOCIATION ASSOCIACION ASSOCIATION						Balise Boyas Buoy	DCP DCP FAD	ZEE ZEE EEZ	COMMENTAIRES COMMENTARIOS COMMENTS	T° Mer / Mar / Sea	VENT VIENTO WIND	
		Portant / Positivo / Successful	Nul / Nulo / Nil	Heure / Hora / Time TU	1 ALBACORE RABIL YELLOWFIN			2 LISTAO LISTADO SKIPJACK		3 PATUDO PATUDO BIGEYE		4 GERMON ALBACORA ALBACORE		AUTRE ESPECE Préciser Noms / OTHER SPECIES give name(s)			REJETS Préciser le / les nom(s) DESCARTES dar el / los nombre(s) DISCARDS give name(s)			Banc libre/banco libre/Free school	Epave / Objeto / Log N (naturelle/natural) A (artificielle/artificial)	Bateau d'assistance Barco de appoyo / Supply	Balise / Baliza / Beacon	Requin Baleine Tiburon Ballena /Shark Wale	Baleine / Ballena / Wale	Type : D+ M3I M4I / Numéro	CRÉER UNE LIGNE PAR EVENNEMENT SUR DCP NATUREL OU ARTIFICIEL: MISE A L'EAU DCP ECO; CHANGEMENT DE BALISE; VISITE AVEC PECHE; VISITE SANS PECHE; RETRAIT; PERTE / FIN TRANSMISSION BALISE	NOM DE LA ZEE (hors zee : indiquer eaux internatio nales)	Problèmes divers Prise accessoire Taille du banc Autres associations Autres remarques		Direction / Direccion / Direction Degrés / Grados / Degree	Vitesse / Velocidad / Speed Noeuds / Nudos / Knots
					YFT+10		YFT-10	SKJ		BET		ALB		Nom Nombre Name	Taille Talla Size	Capture Captura Catch	Nom Nomb. Name	Taille Talla Size	Capture Captura Catch											
					Taille Talla Size	Capture Captura Catch	Capture Captura Catch	Taille Talla Size	Capture Captura Catch	Taille Talla Size	Capture Captura Catch	Taille Talla Size	Capture Captura Catch																	
Une calée par ligne / Une ligne par DCP rencontré (visite / pêche / mise à l'eau, etc)																													
04/04/2018	04°28S 56°43E																								M3I 102945		Seychelles	radeau sans bouée	29°	180 °	10 nds
05/04/2018	04°22S 57°54E																								M3I 510131	VISITE SANS PECHE	Seychelles		29°	180 °	10 nds
05/04/2018	04°36S 58°08E																								M3I 104322	CHANGEMENT DE BALISE	Seychelles	radeau sapmer	29°	180 °	10 nds
05/04/2018	04°40S 58°17E																								M3I 104497	CHANGEMENT DE BALISE	Seychelles	radeau sapmer	29°	180 °	10 nds
05/04/2018	04°47S 58°10E	X			30 kg	1 t	10 t	3 kg	6 t	5 kg	1 t						C saumon	0.5 kg	1 t		N							Seychelles	13h10 épave 18t	29°	180 °	10 nds
05/04/2018	11°00S 43°14E																								M3I 113168	PERTE / FIN TRANSMISSION BALISE		Volée			
06/04/2018	05°44S 58°34E																										Seychelles	RAS	29°	180 °	15 nds
06/04/2018	06°35S 58°17E																								M3I 518763	CHANGEMENT DE BALISE	Seychelles	radeau espagnol	29°	180 °	15 nds
07/04/2018	07°19S 58°01E	X					3 t	3 kg	32 t	5 kg	2 t										A					M3I 524924	VISITE AVEC PECHE	Seychelles	10h50 épave 37t	29°	180 °	10 nds
07/04/2018	06°08S 51°24E																								M3I 533563	PERTE / FIN TRANSMISSION BALISE		Volée			
07/04/2018	12°40S 43°04E																								M3I 105615	PERTE / FIN TRANSMISSION BALISE		Volée			
08/04/2018	08°12S 56°40E	X			30 kg	1 t	6 t	3 kg	34 t	6 kg	29 t										N					M3I 518839		Seychelles	08h30 épave 70t	28°	120 °	15 nds
08/04/2018	08°16S 56°36E																								M3I 104324		Seychelles	morceau de bois	28°	120 °	15 nds
08/04/2018	08°17S 56°27E	X			30 kg	1 t		3 kg	2 t	5 kg	1 t										N					M3I 113160	MISE A L'EAU DCP ECO	Seychelles	13h15 épave 4t	28°	120 °	15 nds
08/04/2018	01°53S 55°48E																								M3I 104297	PERTE / FIN TRANSMISSION BALISE		Volée			
08/04/2018	04°09S 58°50E																								M3I 104497	PERTE / FIN TRANSMISSION BALISE		Volée			
08/04/2018	12°15S 44°51E																								M3I 242093	PERTE / FIN TRANSMISSION BALISE		Echouée			
08/04/2018	04°22S 61°52E																								M3I 260498	PERTE / FIN TRANSMISSION BALISE		Volée			
09/04/2018	08°12S																								M3I	MISE A L'EAU DCP ECO	Seychelles	radeau mouillé	27°	120 °	10 nds

European Union (Spain) DFADs Management Plan

Received on 14.03.2018

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DIRECCIÓN·GENERAL·DE·RECURSOS·PESQUEROS·
SG·de·Acuerdos·y·Organizaciones·Regionales·de·
Pesca.·¶
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(COURTESY TRANSLATION)

MANAGEMENT PLAN FOR FISH AGGREGATING DEVICES

(FAD)

1. Basis and background of this plan

The current legislation in force covers the following provisions that justify the elaboration of this management Plan for fishing aggregating devices utilized by the

Spanish purse seiner fleet targeting tropical tunas:

- The 1995 United Nations Stock Agreement has as the main goal the assuring of long term conservation and sustainable exploitation of the stocks of highly migratory species.
- FAO code of good practices, with regard to fishing investigation, sets the obligation of the reliable data collection which enables the due stock assessment just like the implementation of studios on fishing gear selectivity and its environmental impact and to promote the results of the investigation as the basis to establish the management objectives.
  FAO code of conduct points out that "fishing gear should be marked according to national legislation to identify the owner of the gear. The requirements of this marking should have into account uniform marking systems and internationally acknowledged."
  Lastly, and following the FAO Code, "the States should cooperate in the perfection and implementing of operative fishing technologies, materials and methods to minimize the loss of fishing gear and its effect as ghost fishing".
- EU Regulation 1380/2013, 20th Dec 2002, on the Common Fisheries Policy, points out as the main target is the sustainable exploitation of living aquatic and aquaculture resources in the context of sustainable development, having into account environmental, economic and social aspects in a balanced fashion. This regulation modifies EC Regulations 1954/2003 and 1224/2009, and repeals Regulations 2371/2002 and 639/2004, as well as Council Decision 2004/585.
- Law 3/2001, of Maritime Fisheries, sets amongst its goals, in article 3 the safeguard of the responsible fisheries resources exploitation, encouraging its development and adopting all necessary measures to protect, preserve and regenerate the said resources and their ecosystems and promote the fisheries and oceanographic research.

The experience from the first FAD plan in Spain of 2010, as well as the new international provisions, has led to the current revision of the Plan.

2.- Scope of application of the present plan

The present plan is aimed at Spanish-flagged freezer tuna purse seiners operating in the Indian, Atlantic and Pacific Ocean, targeting tropical tuna as well as Spanish flagged supply vessel supporting the mentioned purse seiner vessels.

The Secretary General for Fisheries shall be the authority that ensures the implementation of this plan.

3. Objectives

- Improving information collection for scientific advice purposes.

- Contributing to enhanced knowledge of catch composition in FAD sets.

- Increasing knowledge of these devices with regard to their technical features and their possible impact on ecosystems.

- Establishing information-sharing mechanisms among operators, scientists and administrations, in order to achieve better knowledge of progress made in this field and the implications thereof.

4.- Definitions

The following definitions shall only affect the present plan, in order to enhance understanding thereof.

- Main vessel: Fishing vessel making catches and to which catches made are assigned.
- Support vessel: Fishing vessel acting as an auxiliary vessel for main vessels, assisting in fishing; for example in deploying, monitoring and hauling in FADs.
- Fishing activity: Extracting fishing resources in external waters, as well as crustaceans and mollusks, using fishing gears and methods.

- Fish Aggregating Device (FAD): Natural or artificial objects deposited on the surface, under which various species aggregate, thus making them more accessible for fishing vessels to locate and catch.

Types of FADs

o Anchored FADs: Those artificially moored to the seabed to prevent drifting, including support vessels anchored to a seamount.

o Drifting raft with a net: Unanchored FADs composed of a panel— either continuous or grill-shaped— associated with a net used as a sail at sea.

o Drifting raft without a net: Unanchored FADs composed of a panel— either continuous or grill-shaped.

o Natural FADs: Any FAD found at sea (e.g. plant remains, dead animals, man-made waste) used as a FAD

o Other drifting FADs: Any FAD other than those above.

FAD-related activities

o Deployment: Operation by which a vessel release a FAD at sea.

o Verification: Operation by which a vessel monitors a previously deployed FAD in order to perform maintenance activities or to check the aggregation of fish around the device.

o Set: Fishing maneuver to catch shoals of fish associated with a FAD.

o Hauling: Operation by which a vessel retrieves a FAD from the sea.

- Beacon: Device whose purpose is locating or monitoring a FAD.

Types of beacons

o GPS beacon: Beacon accompanied by a global positioning system (GPS)

o Radio beacon: Beacon accompanied by a radio system

o Visual beacon: Beacon without any electronic device, only identifiable by sight

- Oceanographic buoy: Buoys used for oceanographic research

5.- Obligations under the RFMOS regarding FADS.

Tuna RFMO have adopted the following provisions:

WCPFC:

o Conservation and Management Measure for bigeye, skipjack and yellowfin tuna (CMM 2017-01). It includes provisions on FADs.

o Conservation and Management Measure on the application of high seas

FAD closures and catch retention (CMM 2009-02), which sets out the specifications regarding FAD closure.

o Conservation and Management Measure on instrumental buoys (CMM 2009-05)

o Conservation and Management Measure on cetaceans (CMM 2011-03)

IOTC:

o Resolution 17/08, on FAD management Plan.

o Resolution 17/01, on a yellowfin stock recovery plan in the Indian Ocean.

o Resolution 15/02, on the recording of statistical data. Sets the obligation of reporting number of FADs by quarter, including position, type and other information.

o Resolution 15/09 that sets a Working Group on FADs

o Resolution 12/03 on recording catches, including information on deployment of FADs.

o Resolution13/04, on the conservation of cetaceans.

o Resolution 13/05 on the conservation of whale sharks.

IATTC:

- Resolution 2017-02, on the multiannual program for the conservation of tunas in the East Pacific Ocean (2018-2020).

- Resolution 2016-01, on recording FAD information.

ICCAT:

- Recommendation 16-01, for the conservation of tropical tunas.

- Recommendation 16-02, on a multiannual program for the conservation of tropical tunas.

6.- Identification of FADs

Each FAD shall have a sequence of characters serving as an identifier for each device to be used. This sequence shall not vary during the device's lifespan.

Operators may choose the identification system, with the only prerequisite that it be individual and unique for each FAD.

Depending on the results obtained through the implementation of the present plan, in the future—if it is considered appropriate—a single

7. Register and information-sharing regarding FADs: Inventory and Specific Activity Register (FAD logbook). Records in fishing logbooks.

Operators will send to the General Secretariat of Fisheries information of the operational FADs and buoys associated with their corresponding identification through some files called "FAD Diaries" that contain a list of FADs. Based on this information, the SGP will have at its disposal an inventory of FAD with an identification code and with its updated information punctually through quarterly mailing of the newspapers.

The information contained in the "FAD Diaries" for each FAD is grouped by fishing vessel, respecting the format and instructions for completing them, as set out in Annex I. "FAD Journal" template.

For each FAD it is noted if it has an associated buoy ("beacon") and in this case, the moya model and its identification code. A specific activity record is included for each FAD where the activities related to each FAD are collected, with the tag's assignment being understood as deployment and the removal of the tag to be collected. In addition, the type of FAD is noted, as well as the technical characteristics of the FAD, including the floating structure and the "tail". In the case of using a natural FAD, operators must also record this information. In addition, if a FAD intends to continue being used periodically, it must be recorded.

Finally, in every activity that takes place on a FAD, all the incidents related to accidental catches must be recorded: species, number of specimens and number of specimens released alive.

When any activity is carried out on a FAD that does not initially belong to the fishing or auxiliary vessel that detects it, all the information about the activity carried out on it must also be communicated. In the section corresponding to the identification, the word "external" must be consigned accompanied by the sequence of visible characters that may lead to its identification. It must also be recorded if the FAD has been returned to

the sea or any action on it (change of beacon, change of identification, etc ...) if the vessel decides to continue using it. In the latter case, these modifications must be included in the FAD Journal, noting the information collected in Annex I.

The aim of the FAD Journals is to provide as much information as possible about the characteristics of the FADs used and to provide the scientific managers with the analysis of the entries made in the fishing journals thanks to the individual identification of each FAD.

On the other hand, the use of FAD means that its use is recorded in the corresponding section of the vessel's fishing logbook, in such a way that it must be recorded for each haul if it has been carried out on Banco Libre (BL) or on FAD (FAD)), noting in the latter case the identification code of the FAD in accordance with the criteria of the previous section.

Since 2016, different scientific bodies in Spain are working on the development of a new FAD Diaries format to solve problems of the previous format, so that its use by ship owners is easier and, to respond to data requirements of the different RFMOs. In 2017, the Spanish Institute of Oceanography presented the new format of FAD in the joint meeting of the tuna RFMOs of the working groups on FAD. The new FAD Journals include all the information of the previous format, along with additional information and changes to improve the registration of FAD and the acquisition of data by the sector. The presentation of the meeting is attached in annex II. New format of the "Diaries of FAD": solving problems and responding to new needs.

Currently, the FAD Journals in use are those that result from the analysis shown in the document in Annex II.

8. Monitoring of FADs

As far as possible, vessels must record monitoring information for each FAD, which has a satellite beacon, based on its assigned number. Moreover, efforts should be made to record information obtained from other beacons (e.g. visual, radio).

There shall be no obligation to communicate the recorded information. However, such information may be requested in order for the designated scientific personnel to conduct specific studies or in order to carry out monitoring activities. This information may be requested, prior approval by the operators for its use.

9. Measures to prevent loss of FADs

Vessel operators shall prevent, as far as possible, loss of FADs at sea.

In the event of a loss or of the impossibility of hauling in a FAD (areas or seasons closed to fishing), operators must record, in the Specific Activity Register, its last known date and position.

10. Measures to mitigate the catch of juvenile tuna and non-target species

From January 1, 2015 on, all entangling FADs should be progressively replaced by others which minimize incidental catches, including these features:

- The upper part will not be covered, and if that is metallic, the material should be tightly covered or with a maximum of net size of 3 cm.

- The tail should be of non entangling material. If that include nets, its máximum size will be 3 cm.

All withdrawal or replacements should be recorded in the In the FAD logbook and the inventory

From June, 30, 2015 on all activity on entangling FADs is forbidden.

From September, 30, 2015 on all entangling FADs must have been removed, even if they are recorded in the inventory of the vessel.

The use of methods that reduces juvenile catches and associated species is encouraged in order to get cleaner catches.

The Parties to this plan may propose pilot actions in order to advance in some of the aspects described.

11. Specific closures on fishing with FADs

11.1. WCPFC:

• Closure:

Since last February 6, 2018, fishing on FAD between July 1 and September 30 is prohibited for all purse seiners fishing in the EEZ or high seas. In addition, for the high seas three additional months of closure are fixed (between April and May or, November and December for all the purse seiners fishing).

The prohibition referred to includes:

− Hauls cannot be made in 1 nautical mile around the FAD.

− It is forbidden to catch concentrated fish under a boat or move this fish, including the use of lights and mist to attract it.

− FADs and beacons can only be withdrawn, with prior authorization, provided they are kept on board until the landing or the end of the closure and no haul is made within 7 days or within 50 nautical miles around the point of departure.

− In addition, in relation to the previous section, two vessels cannot cooperate to avoid this measure by prohibiting hauls of any ship in a nautical mile around the FAD withdrawal point in the following 24 hours.

In order to comply with the Recommendation, each vessels must submit the available information on satellite tracking of all FADs and beacons on a weekly basis during the closure period.

• Limitation of the number of buoys:

No more than 350 FAD can be deployed with active instrumented buoys, (clearly identified and equipped with a tracking system).

For the follow-up of this measure, each vessel operating in the WCPFC area shall send a certificate from the buoy supplier company that collects the number of active buoys per vessel.

11.2. CIAT:

Whale shark sets are prohibited.

• Closure:

72 days closure is established since 2018 until 2020, and it applies since 00:00 hours on July 29 to 24:00 hours on October 8, or, since from 00:00 hours on November 9 until 24:00 hours on January 19 of the following year.

In addition, purse seiners are not allowed to fish from 00:00 hours on October 9 to 24:00 hours on November 8 within the area of 96º and 110º W and between 4ºN and 3ºS, "corralito".

During this period, only innocent passage will be authorized with the appropriate request.

• Limitation of the number of buoys:

No more than 450 FAD per vessel can be deployed. For the follow-up of this measure, each vessel operating in the WCPFC area shall send a certificate from the buoy supplier company that collects the number of active buoys per vessel. The information must be sent quarterly to the CIAT Secretariat.

11.3.- ICCAT:

Sets using oceanographic buoys as FADs are forbidden.

• Temporary and space closure:

Fishing for, or supported activities to fish for bigeye, yellowfin and skipjack tunas in association with objects that could affect fish aggregation, including FADs, are prohibited during the period 1 January to 28 February in the following area:

− Southern limit: parallel 4º / South latitude

− Northern limit: parallel 5º / North latitude

− Western limit: meridian 20º / West longitude

− Eastern limit: the African coast

The prohibition referred to in paragraph includes:

− launching any floating objects, with or without buoys;

− fishing around, under, or in association with artificial objects, including vessels;

− fishing around, under, or in association with natural objects;

− towing floating objects from inside to outside the area.

All purse-seine vessels and auxiliary vessels that intend to operate in the closed area shall ship an observer assigned by the ICCAT Regional Program during the closure.

In order to comply with the Recommendation, each vessels must submit the available information on satellite tracking of all FADs and beacons on a weekly basis during the closure period.

• Limitation of the number of buoys:

500 FAD cannot per vessel at any time can be exceeded, with or without active instrumental buoys. For the follow-up of this measure, each vessel operating in the WCPFC area shall send a certificate from the buoy supplier company that collects the number of active buoys per vessel.

11.4. CTOI:

• Limitation of the number of buoys:

350 active instrumental buoys cannot be exceed per vessel at any time. In addition, the number of instrumental buoys acquired by each vessel is fixed at a maximum of 700.

In order to comply with the FAD limit, each vessels must submit a certificate issued by the company that supplies the beacons or by a scientific institute that certifies the following data:

- Number of instrumental buoys per vessel at any time by quarter.
- Number of instrumental bouys contracted by year.

Non instrumental bouys shall be gradually eliminated by January 1, 2017.

12.- Control of the regulatory measures of the RFMOs.

12.1. Control of the limitation of the number of buoys:

The industry control the number of FADs since 2014 and, thanks to AZTI that carries out the control tasks.

The General Secretariat for Fisheries establishes the obligation of the control of FADs in the annexes of the Temporary Fishing License. The guarantee of compliance are the certificates of a Scientific Institute which includes the information of the number of instrumented buoys active and acquired by vessels. Last January 2018, the General Secretariat for Fisheries requested the industry those certificates.

Each FAD is associated with a buoy, so the control is done through the number of active instrumented buoys per day and per vessel.

The main information is provided aggregate by the suppliers of instrumented buoys to the Scientific Institute who receives this information per month in .csv files containing the daily information.

The main tasks includes control mechanisms as analysis of buoys deactivated in port, data crossing of the first moment of activation of a buoy and VMS location of the vessel, as well as with FAD notebooks and observer information.

In Annex III. AZTI Methodology, the methodology carried out to control the FAD number is explained in detail.

12.2. Control of FAD's spatial and temporal closures:

The General Secretary of Fisheries carries out the control of the FAD closures in the Fisheries Monitoring Center thanks to VMS systems.

13. Measures to monitor and follow up the present plan

The relevant authorities may perform documentary monitoring of the provisions envisaged in the present plan, and they may require, if necessary, the data described in section 6.

The Spanish Institute of Oceanography (IEO), as the Spanish scientific authority in this regard, shall be responsible for processing and monitoring the information provided by the operators, and shall be authorized to draft the follow-up reports for this plan and to propose the measures it deems appropriate in order to improve the functioning thereof.

Moreover, the General Secretariat for Fisheries may determine, in coordination with the IEO, the participation of other scientific bodies in order to fulfill the objectives set forth in the present plan.

13. Confidentiality measures for the information provided by operators

The information provided by the operators shall be treated as confidential at all times, and its use shall be restricted solely to scientific or monitoring purposes, if necessary. The General Secretariat for the Sea undertakes not to disclose this sensitive information, other than for the aforementioned purposes, without the express consent of the shipowners.

14. Amendments to the present plan

This plan shall be amended in line with future measures adopted within the different RFMOS and with the conclusions of the reports envisaged in section 12.

15. Implementation

All provisions in this Plan will be in force until further modifications are adopted or new international provisions are set.

ANNEX I

Vessel: XXXXXXXX **Code vessel:** XXXXXXXX

					Buoy			Position			FAD structure					End						Depth (m)	Schoal estimate (tons)	Capture (tons)			Bycatch				Comments	FAD identification
Trip	Date	Time	Place of origin	¿Baliza?	Model	Code number	Activity	Lat	Lon	FAD type	Materials	waterline	External covering	Net with more than 3 cm in the ext. covering	Measurements	Materials	Additions	Ballast	Net with more than 3 cm (not 'anchor')				SKJ	YFT	BET	Group	n° sp. or weight (t)	N/P	n° sp. or weight: released alive		
AAAA-nnn	DDMMAAAA			(S/N)				ggmm	gggmm					(S/N)	aaxbbxcc				(S/N)												

ANNEX II

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

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ABSTRACT

This document presents a renewed Fish Aggregating Devices (FADs) logbook designed for collecting data within the Fish Aggregating Device National Management Plan undertaken by the Spanish General Secretariat of Maritime Fisheries (Ministry of Agriculture and Fisheries, Food and Environment), in collaboration with the Spanish Institute of Oceanography (IEO - Ministry of Economy, Industry and Competitiveness), which is compulsory for the Spanish freezer purse-seine fleet targeting tropical tuna (yellowfin-YFT, skipjack-SKJ and bigeye-BET) in the Atlantic, Indian and Pacific oceans.

The IEO, the AZTI Foundation, the International Seafood Sustainability Foundation (ISSF), the Organization of Associated Producers of Large Tuna Freezers (OPAGAC-AGAC) and the National Association of Tuna Freezer Vessels Shipowners (ANABAC) have held continuous conversations since June 2016 in order to implement this new format for the Spanish FAD logbook, with the following aims: i) solving the issues identified with the previous format, ii) developing easy to follow guidelines for the Spanish fleet and iii) responding to all tuna Regional Fisheries Management Organizations (t-RFMOs) requirements on FAD data collection.

A field-by-field analysis has been conducted, pointing out the major problems that have been identified in past versions of the logbook and describing the solutions and improvements adopted.

KEYWORDS: Spanish, logbook, fish aggregating device, FAD, management plan, tropical tuna, purse-seine

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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.).

[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).

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).

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)

[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).
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).

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 object*') (*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			
	SKJ	YFT	BET	Group	In number or weight (t)	N/W	Nº/Weight specimens released alive
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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Tables

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%**

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.

Figures

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

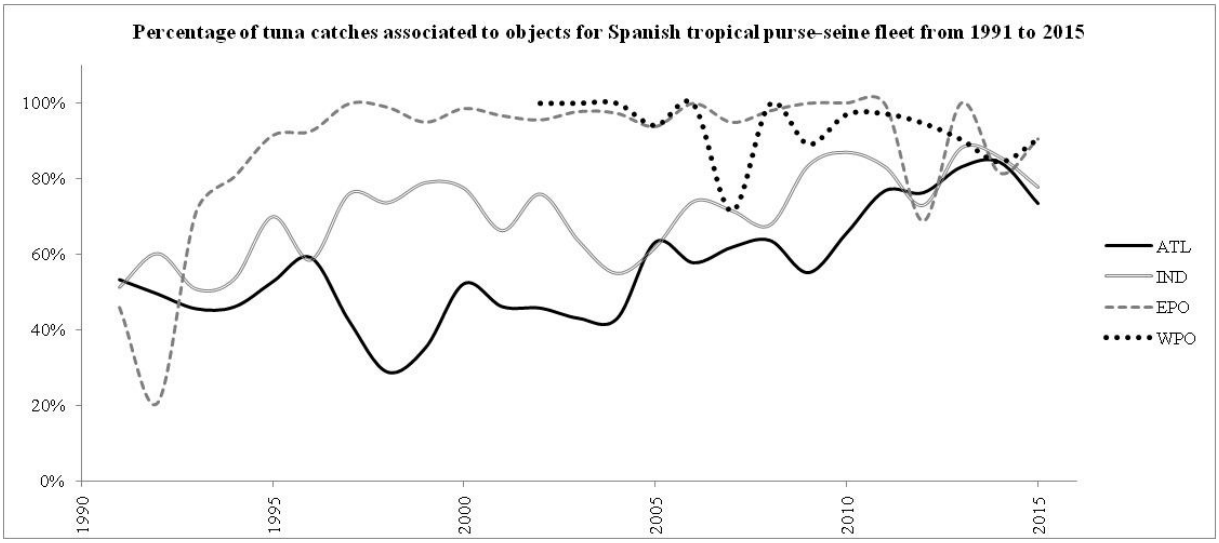

Figure 2. Percentages of tuna catches associated to objects by t-RFMO area for Spanish purse-seine fleet from 1991 to 2015. For WPO area data represented correspond to the 2002-2015 period.

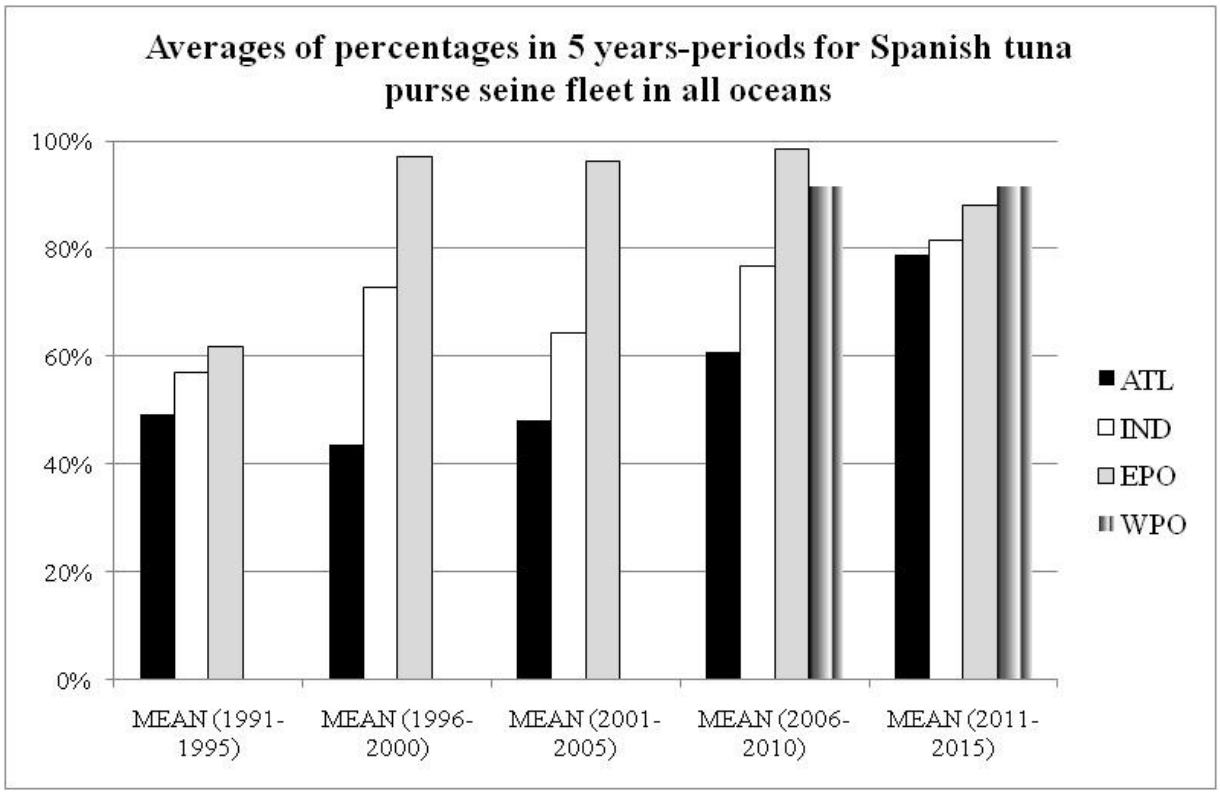

Figure 3. Means of percentages of tuna catches associated to objects by t-RFMO from 1991 to 2015, grouped in five-year periods. For WPO area data represented correspond to the 2006-2015 period.

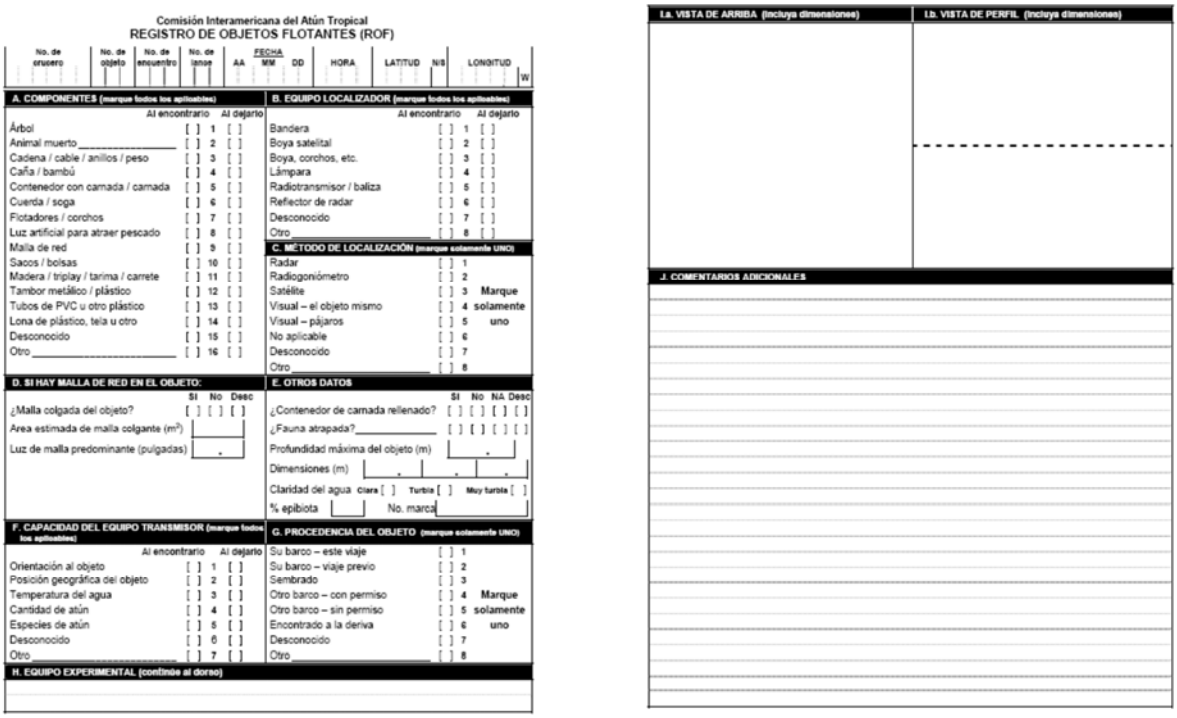

Figure 4. IATTC Floating Objects Form for observers on board purse seiners in the IATTC area.

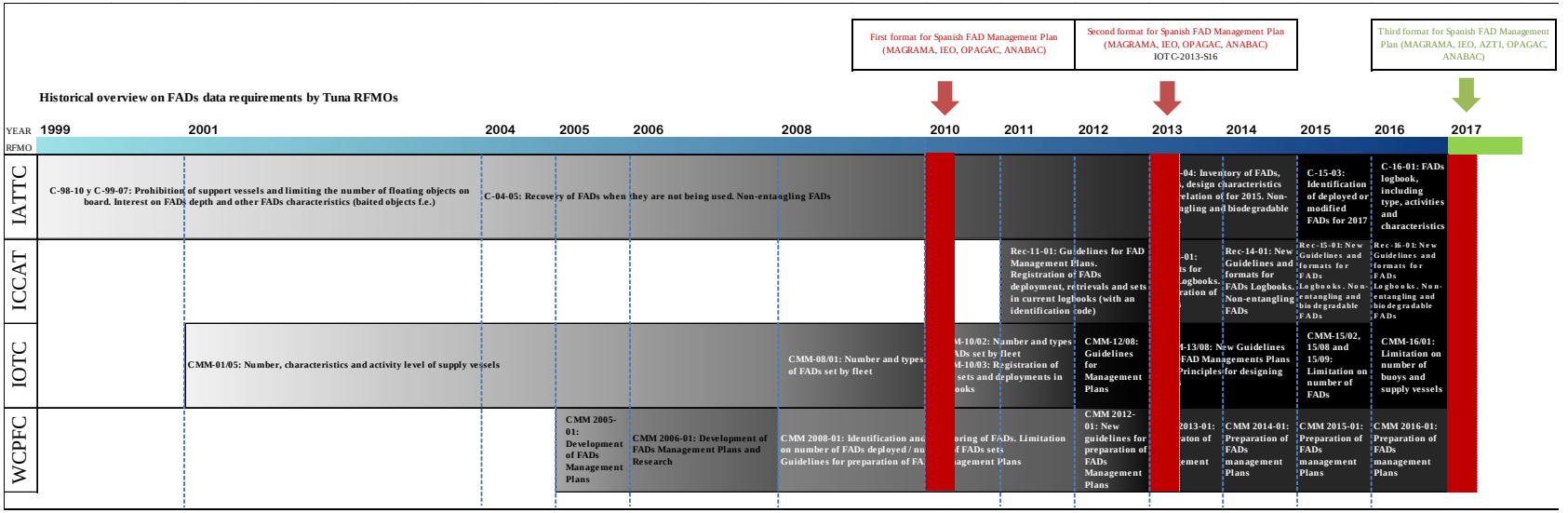

Figure 5. Historical overview on FAD data requirements and report requests by Tuna RFMOs. Remark of Spanish response.

	Vessel name	Number of trip	Registration	Position	Date	Hour	FAD identification	FAD type	General FAD design characteristics	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, nº 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 (nº/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, nº 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.

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

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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CAPTURA INCIDENTAL LIBERADA VIVA:																				

FAD FORM 3.1.3 SPN.DOCX 21-sep-16

Figure 7. IATTC FAD logbook

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

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

Annexes

Annex1. New Spanish FADs logbook form (*see excel attached file*)

Excel description:

Sheet 1 - Registration

Sheet 2 - Instructions

Sheet 3 - Tables

Sheet 4 - Examples

ANNEX III

MINISTERIO
DE AGRICULTURA Y PESCA,
ALIMENTACIÓN Y MEDIO
AMBIENTE

SECRETARIA GENERAL DE
PESCA

DIRECCION GENERAL DE
RECURSOS PESQUEROS
SUBDIRECCION GENERAL
DE ACUERDOS Y ORPS

Annex III. Methodology to count the number of FADs

The Industry agreed to count the number of FADs since 2014, so AZTI started to carry out this task on September 2015 through a contract with the Industry.

The General Fisheries Secretariat (GFS) established in the annexes of the Spanish Temporary fisheries Licences, as a guarantee of compliance with the maximum number of FADs, the necessity of a certificate by a Scientific Institute with the information concerning the number of active instrumented buoys and acquired instrumented buoys per vessel. Last January 2018, the GFS requested the sector these certificates.

The accounting of the number of FADs implies that each FAD is associated with a buoy, so there is a complete control of the number of active instrumented buoys per day and vessel.

The main information is provided by buoys suppliers through provides buoys with a location system and daily speed data. A Scientific Institute receives this information per month and with a delay of two months in csv files.

The processing of information implies a filtering of data to discard records that do not correspond to data of active buoys, deployed at sea or in the scope of application corresponding to each RFMOs.

In addition, there are other control mechanisms that include analysis of disabled buoys in port, data crossing of the first moment of activation of a buoy and VMS location of the vessel, as well as with FADs notebooks and observer information.

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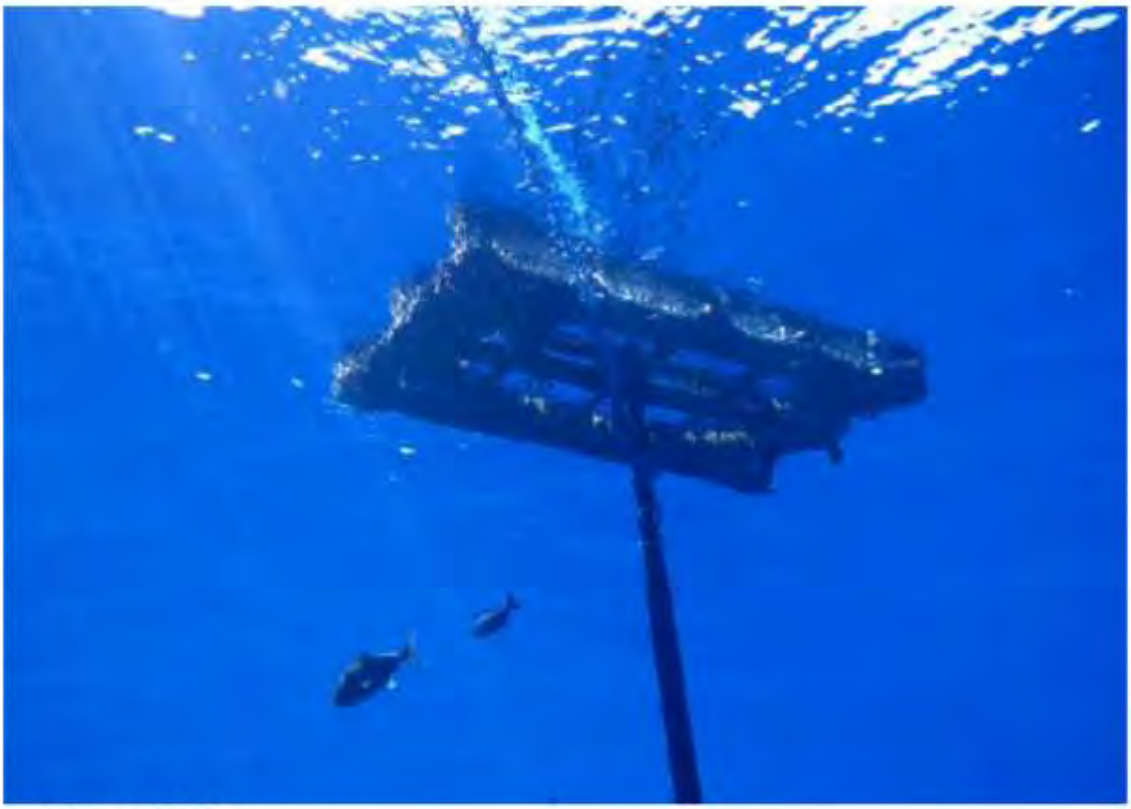
Indonesia DFADs Management Plan (drifting)

Received 12.01.2015

INDONESIA DRIFTING FISH AGGREGATING DEVICES MANAGEMENT PLAN IN INDIAN OCEAN (DFADs MANAGEMENT PLAN FOR 2015 – 2017)



Source: ISSF

DIRECTORATE GENERAL OF CAPTURE FISHERIES
MINISTRY OF MARINE AFFAIRS AND FISHERIES
2014

INDONESIA DRIFTING FISH AGGREGATING DEVICES MANAGEMENT PLAN IN INDIAN OCEAN
(DFADs MANAGEMENT PLAN FOR 2015 – 2017)

1. Objective

The objective of this FADs managment plan are but not limited to:

a. Strengthen a collection of scientific data.
b. Minimize the catch of bycatch of small tuna on FADs
c. Strengthen catch composition data collection to purse-seine fisheries on FADs.
d. Limit a number of deployed FAD.

2. Scope

Description of its application with respect to:

a. Vessel Type:
   i. Small pelagic purse-seiner with one boat;
   ii. Large pelagic purse-seiner with one boat;
   iii. Large pelagic purse-seiner-group
   iv. Handline
   v. Pole and line

b. DFAD numbers and/or DFADs beacon numbers to be deployed:

   Each eligible vessel only granted to deploy maximum 3 (three) sets of FADs.

c. Reporting procedures.

   Reporting procedure is clasified into two (2) categories, namely:

   c.1 Reporting Procedure for DFAD deployment

   Any company or operator or person who has deployed FADs is required to submit a FAD deployment report to Directorate General of Capture Fisheries, shall include:

   i. Date and time of FADs deployment.
   ii. Number of deployed FADs
   iii. Marking of FADs
   iv. FADs position (Latitude and Longitude)
   v. Name of fishing vessel and it's gear type.
   vi. Conclusion and recommendation

c.2 Reporting Procedure for DFADs Harvesting

Any fishing company or operator or person who has harvested fish on FADs is required to submit a harvesting report to Directorate General of Capture Fisheries, shall include:

i. FADs location (latitude and longitude)
ii. Marking of FADs
iii. Name of fishing vessel and it's gear type
iv. Frequency of harvesting.
v. Number and catch species
vi. Catch composition

d. incidental bycatch reduction and utilization policy:

i. Catch Retention

Each eligible vessel to have FADs shall retain all catch on board, both target species and bycatch such tuna juvenile.

ii. Releasing Turtle

Each eligible vessel to have FADs shall require to release all marine turtles which are entangled in fishing gear.

e. Consideration of interaction with other gear types:

There is a potential conflict between eligble vessel to have FADs and Tuna Longline fleet.

f. Plans for monitoring and retrieval of lost DFADs

Monitoring may be undertaken at the time of deployment as well as harvesting. During this monitoring, losted DFADs will be retrieved. In this incident, investigation will be made to find out the owner of DFADs.

3. Institutional arrangements for management of the DFAD Management Plans:

a. Institutional responsibilities:

Directorate General of Capture Fisheries, Ministry of Marine Affairs and Fisheries is responsible to manage FADs to be deployed by Indonesia flagged vessels.

b. Application processes for DFAD and /or DFAD beacons deployment approval:

b.1 Each person who is intending to deploy FADs within Indonesia Fisheries Management Area and High Seas shall require to have FAD License to be issued by Director General of Capture Fisheries.

b.2 Application to have FAD shall be submitted to Director General of Capture Fisheries by Providing the following information:

- Date of FADs Deployment;
- Proposed of Number of FADs;
- Location of FADs Deployment (latitude and longitude);
- Estimation of harvesting frequency (monthly or yearly basis);
- Estimation of fish species and catch in each setting.

b.3 In addition to the requirement as stipulated in point b.2, the application shall be accompanied with the following document:

- Copy of Fishing Permit;
- Copy of ID of vessel owner or responsible person;
- FADs layout and general specification such as material, dimension, and number of each FADs main component;

c. Obligations of vessel owners and masters in respect of DFAD and /or DFAD beacons deployment and use

c.1 Vessel owner and master shall submit a report to Director General of Capture Fisheries in respect of DFADs deployment shall include minimum information as following:

- Date of FADs Deployment;
- Number of Deployed FADs;
- Location of each FADs (latitude and longitude);
- FADs Marking;
- Name of vessel and type of fishing gear;
- Conclusion and recommendation.

C.2 Vessel owner and master shall submit a report to Director General of Capture Fisheries in respect of DFADs use shall include minimum information as following:

- Location (latitude and longitude) of used FADs;
- FADs Marking;
- Name of vessel and type of fishing gear;
- Frequency of harvesting of FADs;
- Catch by species.

d. DFAD and/or DFADs beacons replacement policy

d.1 In case FADs license is expired and not be renewed, the holder of FADs License shall discharge of the deployed of FADs.

d.2 In case the holder of FADs license does not discharge the deployed FADs as stipulated in para d.1, he or she will be classified as non-eligible person to have new FADs license.

e. Reporting obligations

e.1 Report of FADs deployment shall be submitted to Director General of Capture Fisheries within 14 days after the deployment.

e.2 Report of FADs use shall be submitted to Director General of Capture Fisheries every six (6) month.

4. DFAD construction specifications and requirements

a. DFAD design characteristics (a description)

DFAD component consist of:

i. buoy;
ii. attractor;
iii. rope; and
iv. weight.

b. DFAD markings and identifiers, including DFADs beacons:

DFAD marking composed of:

i. Name of owner;
ii. Number of fishing permit and fishing vessel authorized to use DFADs.
iii. Location (latitude and longitude) of DFADs deployment.

c. Lighting requirements

4000 watt – 16000 watt.

d. Radar reflectors

Radar reflector is a piece of flat galvanized steel that could be detected by radar.

e. Visible distance

DFADs can be deployed with a minimum distance ten (10) nautical miles each other.

f. Radio buoys (requirement for serial numbers)

No radio buoys requirement regulated.

g. Satellite transceivers (requirement for serial numbers)

No satellite transceivers requirement regulated

h. Technical requirement in DFADs use.

It is prohibited to shift of DFADs by vessel or other auxiliary tool which is intending to gather aggregated fish in more than one DFADs.

5. Applicable areas

This plan is applied to Indonesia flagged vessel that are fishing in the following watres:

a. Indonesia archipelagic waters
b. Indonesia territorial waters
c. Indonesia Exclusive Economy Zone
d. High Seas of Indian Ocean

6. Applicable period for the DFAD–MP

DFAD Management Plan will be implemented during 2015-2017.

7. Means for monitoring and reviewing implementation of the DFAD–MP

7.1 Regular monitoring will be undertaken by fisheries observer by fishing vessel or fisheries patrol boat.

7.2 DFAD Management Plan will be reviewed every 3 (three) year and will be amended at any time if deemed necessary. The first review will be done in 2017.

8. DFAD logbook

No specific DFAD logbook regulated.

Iran DFADs Management Plan

Received 26.01.2014

Plan of Iran for Fish Aggregating Devices (FADs) in Purse Seiner Vessels

1 – Current situation of Purse Seine Vessels in Iran

Industrial fishing vessels which are used for tuna fishing are eight purse seine vessels. One of fishing gears used in these vessels like any other purse seiners in high seas and international waters of the Indian Ocean are Fish Aggregating Devices (FADs). Each vessel, averagely install 20-30 FADs at sea and control them via radio buoys. Installation of FADs is according experiments of captain of vessel by climate changes, time and place of installation, sea currents and based on policies of IOTC for member countries.

Installation of FADs and collecting them are according national plans, policies and regulation of Iran besides local and regional regulations (like Tuna Fishing Regulations). It must be noted that industrial fishing vessels which are using purse seine methods in the Oman Sea (EEZ of Islamic republic of Iran) do not use FADs and they only use FADs for international waters fishing activities. They usually fetch missed or lost FADs by correspondence with coastal countries but, vessels owners are not so eager to inform others on how they use FADs.

2 – Program of Iran Fisheries Organization for Management of FADs

Iran Fisheries Organization believes that some of non-target fish species might be caught during fishing activity. Main part of catch in purse seine vessels are from high seas and international waters of the Indian Ocean with the help of FADs and fishing by FADs are much better than other methods used (like free herd, supply vessels and whale … methods) and on the other hand, due to some technical and non-technical reasons, despite using FADs by purse seiners catch level is lower comparing to other similar countries. Hence, there is no plan to substitute FADs with similar devices. Therefore, Iran is preparing regulations for controlling FADs and extension services to publicize the devices. However, vessel mangers and captains are committed (obliged) to report their activities in their improved logbook. In coastal waters and shallow waters of the Oman Sea using FADs are banned, thus there is no conflict with other fishing gears.

3 – FADs Characteristics

FADs used by fishing vessels are from D-FAD. This device is mostly made of bamboo wood or renewable materials in their natural forms. Some buoys are installed on these FADs which have special serial numbers and beside that number, name of vessel has been marked on FADs. These Buoys are traceable via satellite. Dimensions of these FADs are approximately 2*3 and or 3*3 meters. These devices have no reflection on radar instruments and can be seen from 4 mile distance.

4 – Operation Zones

Operation zone for purse seiners is the Oman Sea and international waters of Indian Ocean. Fishing around islands, coastal waters and EEZ of coastal countries should be through paying Royalty to these coastal countries.

5 – Inspection and Control program for Management of FADs

Vessel Monitoring Plan to monitor vessels using FADs can use three methods including VMS, logbook control and onboard inspector visits for these vessels according to a regular timetable. This plan can be tailored for two-year period.

6 –FADs Logbook

Supplying separated data on different log sheets seems to be a hard job for fishing community. Noting the common items between Logbook of Catch and Logbook of FAD, they can be merged in one sheet as attached.

(In last row of the Table, you can see name of person in charge, date of filling the Table besides his signature)

جدول گزارش روزانه عملیات صید کشتي هاي پرساینر (Purse Seiner vessels logbook)

خروج از/Departure From: بندر/Port □ لنگرگاه/Loch □	ورود به/Arrival TO: بندر/Port □ لنگرگاه/Loch □	نام و شماره ثبت شناور/ Name&No Vessel	ناخدا/ Master	شماره صفحه / Sheet No
نام بندر / Name Port :	نام بندر / Name Port :			
تاریخ / Date : ساعت / Hour :	تاریخ / Date : ساعت / Hour :			

جریان آبCurrent		درجه حرارت	صید از طریق این تجهیزات Association					صید تخمینی Estimated catch																تور ریزی Set			موفق Successful	موقعیت تور ریزی (طول و عرض جغرافیایی)-Position ۱	تاریخ Date
								گونه های غالب در صید دور زن Discards			سایر گونه ها Other (غالب) Species			زرده kawkaw			هورر دم دراز longtail			چشم درشت bigeye			هورر مسقطی sk ipjack			گیدر yellowfin								
سرعت (ثانت) speed	جهت -5 degree/ direction		نهنگ/کوسه نهنگ shark wale/whale	بویه beacon	کشتي پشتیبان supply vessel	log *	گله آزاد Free school	میزان صید kg	ملوسط سایز صید kg	averge catch size	نام گونه name of species	میزان صید kg	ملوسط سایز صید kg	averge catch size	نام گونه name of species	میزان صید kg	ملوسط سایز صید kg	averge catch size	میزان صید kg	ملوسط سایز صید kg	averge catch size	میزان صید kg	ملوسط سایز صید kg	averge catch size	میزان صید kg	ملوسط سایز صید kg	averge catch size	شماره مخزن ماهی Well	نا موفق Nill	specify time زمان تور ریزی - 2			

اطلاعات فد *	تاریخ استقرار:.....موقعیت جغرافیایی:(طول.....عرض.....)شماره سریال:(رادیو بویه.....گیرنده ماهواره ای.....)ایزار فد:(طبیعی | مصنوعی |)سایزلاگ:(۲*۲ | ۳*۳ |) مواد یکار رفته:(.....)نوع بازدید: (استقرار | کنترل | برداشت | تعمیر |)

نام و نام خانوادگی تکمیل کننده : عنوان شغلی درشناور: تاریخ تکمیل : امضاء :

توضیحات :

Japan DFADs Management Plan

Received 10.04.2017

DFAD Management Plan for Japanese tuna purse seine fishing vessels

Fisheries Agency of Japan (FAJ)

1. Objective

This document describes Drifting Fish Aggregating Devices (DFAD) Management Plan to be applied to Japanese tuna purse seine fishing vessels, in order to fulfill paragraphs 2 and 6 of IOTC Resolution 15/08. The objective of the plan is to ensure that the use of DFAD by Japanese tuna purse seine fishing vessels is managed in a manner consistent with the conservation and management measures and data collection requirements of the IOTC.

2. Scope

(1) Vessel-types and support and tender vessels:

This Management Plan applies to DFAD used by Japanese tuna purse seine fishing vessels during their fishing operation in the Indian Ocean.

(2) DFAD numbers and/or DFAD's beacon numbers to be deployed:

Each vessel may deploy at maximum 150 sets of DFAD.

(3) reporting procedures for DFAD deployment:

A vessel operator shall record information about deployment of DFADs in the FAD logbook (See attached) and submit it to the Japan Far Seas Purse Seine Fishing Association after each cruise. The Japan Far Seas Purse Seine Fishing Association shall submit it to FAJ after reviewing it.

(4) incidental bycatch reduction and utilization policy:

The primary objective of this DFAD Management Plan is to reduce captures of non-target species associated with fishing on DFADs.

FAJ and Fisheries Research and Education Agency (FRA) have been carrying out a series of research activities in order to develop effective and practical methods for reduction of both juvenile bigeye and yellowfin tuna and non-target species catch in DFAD operation.

The more specific purposes of the research activities have been:

- To investigate effectiveness of larger mesh size nets;
- To develop simulation models visualizing under-water shapes of purse seine nets; and
- To evaluate new DFAD designs (sheet type) that potentially can avoid entanglements of non-target species such as sharks and sea turtles.

FAJ periodically holds consultation with scientists, industries and other experts to review the development of effective mitigation measures for juvenile bigeye and yellowfin tuna catch for further improvements of the measures.

(5) consideration of interaction with other gear types

When a fishing operator finds other gear type vessels, the operator does not deploy DFADs near the vessels.

(6) plans for monitoring and retrieval of lost DFADs:

The location of DFAD which is marked with the identified number is monitored by GPS. If the signal is lost, every effort is made to retrieve it. If it cannot be collected, the incident is recorded on FAD logbooks.

(7) statement or policy on "DFADs ownership":

Vessel operators monitor the location of DFAD through GPS. Each DFAD is marked with relevant information in order to identify the owner.

3. Institutional arrangement of the DFAD Management Plans:

(1) Institutional responsibilities:

Vessel operators are responsible for implementation of this DFAD Management Plans including the FAD logbook control. The Japan Far Seas Purse Seine Association will guide and assist the implementation of this plan. The FAJ provides guidance for proper application of this plan, if necessary, through the Japan Far Seas Purse Seine Fishing Association.

(2) application processes for DFAD and /or DFAD beacons deployment approval:

Vessel owners shall notify FAJ of the number of DFAD and beacons planned to deploy in advance. All actual deployment is recorded on the FADs logbook.

(3) Obligations of vessel owners and masters in respect of DFAD and /or DFAD beacons deployment and use:

Vessel operators and owners shall comply with requirements stipulated in this Management Plan and IOTC management measures regarding DFAD operation

(4) DFAD and/or DFADs beacons replacement policy:

All replacement will be recorded on the FADs logbook. Old DFAD should be retrieved as practically as possible.

(5) Reporting obligation

Fishing operators and/or owners will report use of DFAD through the FADs logbook after each cruise to the Japan Far Seas Purse Seine Fishing Association. The Japan Far Seas Purse Seine Fishing Association will submit the logbook to the FAJ.

4. DFADs construction specifications and requirements

(1) DFAD design characteristics

DFAD design characteristics are sheet type and net type.

(2) DFAD marking and identifiers, including DFADs beacons

Vessel operators monitor the location of DFAD through GPS. Each DFAD is marked with relevant information in order to identify the owner.

(3) Lighting requirements

The GPS buoy has a function to light up when the vessel approaches.

(4) radar reflectors

Radar reflectors are not installed in a DFAD.

(5) visible distance

It depends on the ocean condition.

(6) radio buoys (requirement for serial numbers)

No radio buoy is used on DFAD.

(7) satellite transceivers (requirement for serial numbers)

A GPS buoy is installed in each DFAD.

5. Applicable areas

This Management Plan will be applied to fishing operation in the IOTC convention area. All Japanese fishing vessels follow area/time closures adopted as the IOTC conservation and management measures.

6. Applicable periods for the DFAD-MP

This Management Plan will be applied for the entire period while Japanese purse seiners operate in the IOTC convention area. This plan may be modified if the IOTC conservation and management measures are amended.

7. Means for monitoring and reviewing implementation of the DFAD-MP

The Japan Far Seas Purse Seine Fishing Association will review the submitted logbook and will submit it to the FAJ. The FAJ provides guidance to the Japan Far Seas Purse Seine Fishing Association based on the information on the logbook, if necessary.

8. DFAD logbook

The format of FADs logbook is attached.

DFAD logbook

Address

Name

Nameof vessel		Gross tonnage		Tonnage
Call sign		Licence number		Number

year	month	day	Latitude	Longitude	ID	DFAD type(drifting natural FAD, drifting artificial FAD) DFAD design characteristics	(1)deployment (2)hauling (3)retrieving (4)loss (5)operation	Remarks
			N S	E W				
			N S	E W				
			N S	E W				
			N S	E W				
			N S	E W				
			N S	E W				
			N S	E W				
			N S	E W				
			N S	E W				
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			N S	E W				
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			N S	E W				
			N S	E W				
			N S	E W				
			N S	E W				

Korea DFADs Management Plan

Received 16.03.2018

Management Plan for the use of Drifting FADs (DFADs)

Ministry of Oceans and Fisheries

Republic of Korea

1. Objective

The objective of this management plan isto reduce the mortalities of juvenile bigeye tuna and yellowfin tuna and bycatch associated with fishing on DFADs, and to collect data concering the fishing activites. It presentsManagement Plan for the use of DFADs by Korean flagged Purse seiners for the year of 2018 in accordance with paragraph 11 of the IOTC Resolution 17/08. The Ministry of Oceans & Fisheries (MOF) is responsible for the implementation of this Management Plan.

2. Scope

This management plan applies with respect to:

- Vessel-types
  : Korean flagged Purse seine fishing vessels and supply vessels

- DFADs numbers and DFADs beacon numbers to be deployed
  : No more than 350 active instrumented buoys at any one time and 700 acquired annually per purse seine vessel
- Reporting procedures for DFADs deployment
  : A master of fishing vessels records each deployment of DFAD on the DFAD logbook(Attachment 1) and reports to the National Institute of Fisheries Science(NIFS) on a monthly basis or within a shorter period of time, if necessary.
- Incidental bycatch reduction and utilization policy
  : The government of Korea encourages purse seine vessels to retain all catches onboard and land them except fishes considered unfit for human consumption. Since 2016 the NIFS conducts a research plan to develop non-entangling FADs to reduce the incidental bycatch of non-target species including sharks and marine turtles.
- Consideration of interaction with other gear type
  : Collecting the data and information
- Plans for monitoring and retrieval of lost DFADs
  : The government of Korea encouragesfishing vessels concerned to prevent the loss of DFAD at sea. In the event of a loss or of the impossibility of hauling in a DFAD, a fishing mater shall recordits lastknown date and position on the DFAD logbook. If a fisherman finds any FADs lost by other vessels at sea, they are encouraged to retrieve and bring it back to a port.

- Statement or policy on “DFAD ownership”
  : Instrumented buoy on which vessel name or callsign is marked is attached to every DFAD.

3. Institutional arrangements for management of the DFAD Management Plan

- Institutional responsibilities
  : The MOF in collaboration with the NIFS monitors the implementation of IOTC resolutions related to FADs management including Res.17/08 in accordance with domestic laws and regulations.

- Application processes for DFAD and /or DFADs beacons deployment approval
  : In order to comply with national DFAD management plan, each fishing vesselshall record required information of the DFADs deployment on the DFAD logbook and fishing logbook, and report them to the NIFS.
- Obligations of vessel owners and masters in respect of DFAD and/or DFADs beacons deployment and use
  : The fishing companies shall supervise their fishing vessels under the DFADs management plan, and the masters shall be in comply with DFADs management plan and the conservation and management measures related to the use of FADs.
- DFAD and/or DFADs beacons replacement policy
  : If deployed DFADs are worn out or needed to be replaced, the captains/fishingmasters will replace it and record it on the DFAD logbook.
- Reporting obligation
  : Each captain/master shall record the information in relation to DFADs activities on the DFAD logbook and report them to the NIFS.

4. DFAD construction specifications and requirements

It is required for the Korean purse seine vessels to submit their DFAD construction specifications to the government. And each captain/master shall record the information about FAD characteristics on the DFAD logbook.

5. Applicable areas

The IOTC area of competence

6. Applicable periods for the DFAD-MP

The DFAD-MP is applied during the purse seine vessels are in operation in the IOTC area of competence.

7. Means for monitoring and reviewing implementation of the DFAD-MP

Each activity on DFAD is recorded on the DFAD logbook to be reported to the NIFS and is collected by scientific observer programs as well.

8. DFAD loglook

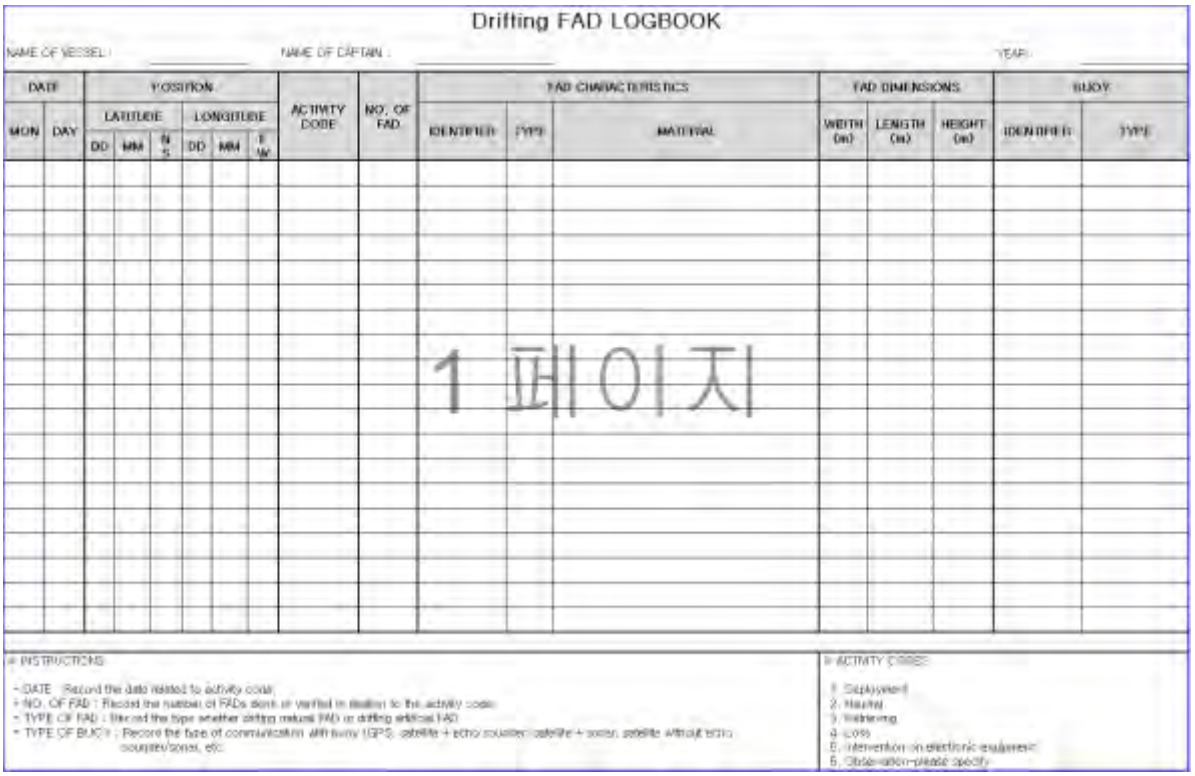
See Attachment 1.

9. Review of Korea's FAD Management Plan for the Previous Year

Korea fully implemented the FAD Management Plan for Korean-flagged vessels submitted for the previous year. The vessels used DFAD strictly following the plan, and all DFADs used were recorded in the DFAD logbook. All relevant reporting requirements were also fully met.

Since the adoption of Resolution 17/08, two purse seiners have operated in the IOTC area of competence, and the total number of instrumented buoys allowed for those vessels were 1,400 (700 per vessel) in accordance with the Resolution. The two vessels used 1,387 instrumented buoys in total, and each vessel used 350 or less active instrumented buoys at any one time, fully complying with the requirements of the Resolution.

Attachment 1. DFAD logbook



Drifting FAD LOGBOOK

NAME OF VESSEL : _____ NAME OF CAPTAIN : _____ YEAR : _____

DATE		POSITION						ACTIVITY CODE	NO. OF FAD	FAD CHARACTERISTICS			FAD DIMENSIONS			BUOY	
MON	DAY	LATITUDE			LONGITUDE					IDENTIFIER	TYPE	MATERIAL	WIDTH (m)	LENGTH (m)	HEIGHT (m)	IDENTIFIER	TYPE
		DD	MM	N/S	DD	MM	E/W										

1 페이지

* INSTRUCTIONS

- DATE : Record the date related to activity code
- NO. OF FAD : Record the number of FADs dumb or verified in relation to the activity code
- TYPE OF FAD : Record the type whether drifting natural FAD or drifting artificial FAD
- TYPE OF BUOY : Record the type of communication with buoy (GPS, satellite + echo sounder, satellite + sonar, satellite without echo sounder/sonar, etc.

* ACTIVITY CODES

1. Deployment
2. Hauling
3. Tracking
4. Loss
5. Intervention on electronic equipment
6. Observation-please specify

Mauritius DFADs Management Plan

Received 14.03.2014

Submitted by: Mauritius

Operator: SAPMER/IOSMS (Indian Ocean Ship Management Services)

Purse Seiners: Belle Isle and Belle Rive

1. **Objective:** *To aggregate tuna target species, in the IOTC area of competence*.
2. **Scope:**
    a. Vessel type: *purse seiner*
    b. DFAD numbers or number of beacons to be deployed: *200 buoys/vessel/year*
    c. Reporting procedures: *Through Logbooks (refer to Appendix 1)*
    d. Incidental by catch reduction and utilization policy: *Non-entangling FADs (refer to Appendix 2)*
    e. Consideration of interaction with other gears type: *None*
    f. Monitoring and retrieval of lost DFADs: *Refer to Logbooks (Appendix 1)*
    g. Statement or policy on DFAD: *use of a limited number of non-entangling FADs*
3. **Institutional arrangement for management of the DFAD Management Plan:**
    a. Institutional responsibilities: *SAPMER and IOSMS*
    b. Application processes for DFAD and/or DFAD beacons deployment approval:
        Supplier – IOSMS/SAPMER
        Rules - IOSMS/SAPMER
        Deployment - Master
    c. DFAD and/or DFADs beacons replacement policy: *maintain 200 buoys per vessel per year*
    d. Reporting obligations - *Through Logbooks (refer to Appendix 1)*
4. **DFAD construction specifications and requirements**
    a. DFAD design characteristics (a description): *As per annexed plan (refer to Appendix 2)*
    b. DFAD markings and identifiers, including DFAD beacons: *DCP identified by serial number*
    c. Lighting requirements: *flash command*
    d. Radar reflectors: *visible without radar reflectors*
    e. Visible distance: *1 NM*
    f. Radio buoys (requirement for serial numbers): *marine instruments*
        MSI XXXXX
        M3I XXXXX
        M4I XXXXX
    g. Satellite transceivers (requirement for serial numbers): *IRIDIUM*
5. Applicable areas: *on high seas and EEZ Indian Ocean Coastal State through licenses, excluding closed area as stipulated by IOTC, shipping lanes, away from fishing grounds of the artisanal fishery.*
6. Applicable period for the DFAD-MP: *yearly*
7. Means for monitoring and reviewing implementation of the DFAD-MP: SAPMER/IOSMS
8. DFAD Logbook: *refer to logbook (Appendix 1)*

Appendix 1

DEPART / SALIDA / DEPARTURE :		ARRIVEE / LLEGADA / ARRIVAL		PATRON / PATRON / MASTER		NAVIRE / BARCO / VESSEL		FEUILLE HOJA SHEET
PORT / PUERTO / PORT	MAURICE	PORT / PUERTO / PORT	Maurice	TEST		Navire	: TEST	
DATE / FECHA / DATE	01/01/2013	DATE / FECHA / DATE	20/01/2013			Pavillon	:	
HEURE / HORA / HOUR	7:00	HEURE / HORA / HOUR	8:00	MAREE	EXEMPLE	Numéro d'immatriculation	:	1
LOCH / CORREDERA / LOCH	0	LOCH / CORREDERA / LOCH	1400			Port d'immatriculation	:	
						Signal d'appel international	:	
						Numéro OMI	:	
						Numéro CFR	:	

CAPTURE ESTIMEE (en tonnes) / ESTIMATION DE LA CAPTURA (en toneladas) / ESTIMATED CATCH (metric tons)

DATE / FECHA / DATE	POSITION (chaque calée ou levée) / POSICION (cada lance u modiado) / POSITION (each set or ...)	CALEE / LANCE / SET: Positive / Positivo / Successful	CALEE / LANCE / SET: Nul / Nulo / Nil	CALEE / LANCE / SET: Heure / Hora / Time TU	1 ALBACORE / RABIL / YELLOWFIN — YFT+10: Taille / Talla / Size	YFT+10: Capture / Captura / Catch	YFT-10: Capture / Captura / Catch	2 LISTAO / LISTADO / SKIPJACK — SKJ: Taille / Talla / Size	SKJ: Capture / Captura / Catch	3 PATUDO / PATUDO / BIGEYE — BET: Taille / Talla / Size	BET: Capture / Captura / Catch	4 GERMON / ALBACORA / ALBACORE — ALB: Taille / Talla / Size	ALB: Capture / Captura / Catch	AUTRE ESPECE (Préciser Nom) / OTHER SPECIES (give name(s)): Nom / Nombre / Name	Taille / Talla / Size	Capture / Captura / Catch	REJETS (Préciser le / les nom(s)) / DESCARTES (dar el / los nombre(s)) / DISCARDS (give name(s)): Nom / Nombre / Name	Taille / Talla / Size	Capture / Captura / Catch
Une calée par ligne / Une ligne par DCP rencontré (visite / pêche / mise à l'eau, etc)																			
10/01/2013	2°01N 12°54W	X		8:00				3,4 kg	60 t								[illegible]	1 kg	3 t
10/01/2013	2°21N 11°20W			10:00															
10/01/2013	2°25N 9°W			12:00															
10/01/2013	2°20N 10°5W			13:00															
10/01/2013	2°15N 9°5W			14:00															
10/01/2013				15:00															

DATE / FECHA / DATE	ASSOCIATION / ASSOCIACION / ASSOCIATION: Banc libre / Banco libre / Free school	Epave / Objeto / Log (Naturel/natural A artificiel/artificial)	Bateau d'assistance / Barco de apoyo / Supply	Balise / Baliza / Beacon	Requin Baleine / Tiburon Ballena / Shark Whale	Baleine / Ballena / Whale	Balise / Boyas / Buoy (Type : MSI, M3I, M4I / Numéro)	DCP / DCP / FAD (CRÉER UNE LIGNE PAR EVENNEMENT SUR DCP NATUREL OU ARTIFICIEL: MISE A L'EAU DCP ECO; CHANGEMENT DE BALISE; VISITE AVEC PECHE; VISITE SANS PECHE; RETRAIT; PERTE / FIN TRANSMISSION BALISE)	ZEE / ZEE / EEZ (NOM DE LA ZEE (hors zee indiquer eaux internationales))	COMMENTAIRES / COMMENTARIOS / COMMENTS (Problèmes divers, Prise accessoire, Taille du banc, Autres associations, Autres remarques)	T° Mer / Mar / Sea	VENT / VIENTO / WIND: Direction / Dirección / Direction — Degrés / Grados / Degree	Vitesse / Velocidad / Speed — Noeuds / Nudos / Knots
10/01/2013		A		X			MSI 17024	VISITE AVEC PECHE	Eaux internationales		27,8 °	135 °	5 nds
10/01/2013		A		X			M3I 17035	MISE A L'EAU DCP ECO	Eaux internationales		28 °	135 °	5 nds
10/01/2013		N		X			M3I 17046	VISITE SANS PECHE	Eaux internationales	Bille de bois	27 °	135 °	4 nds
10/01/2013		A		X			M4I 80170	CHANGEMENT DE BALISE	Eaux internationales	Transfert sur radeau bordon	28 °	157 °	5 nds
10/01/2013				X			D-22330	RETRAIT	Eaux internationales	balise décrochée du DCP	28 °	135 °	4,5 nds
10/01/2013							M3I [illegible]	PERTE / FIN TRANSMISSION BALISE	Eaux internationales	Balise volée 4°28S - 2°27W			

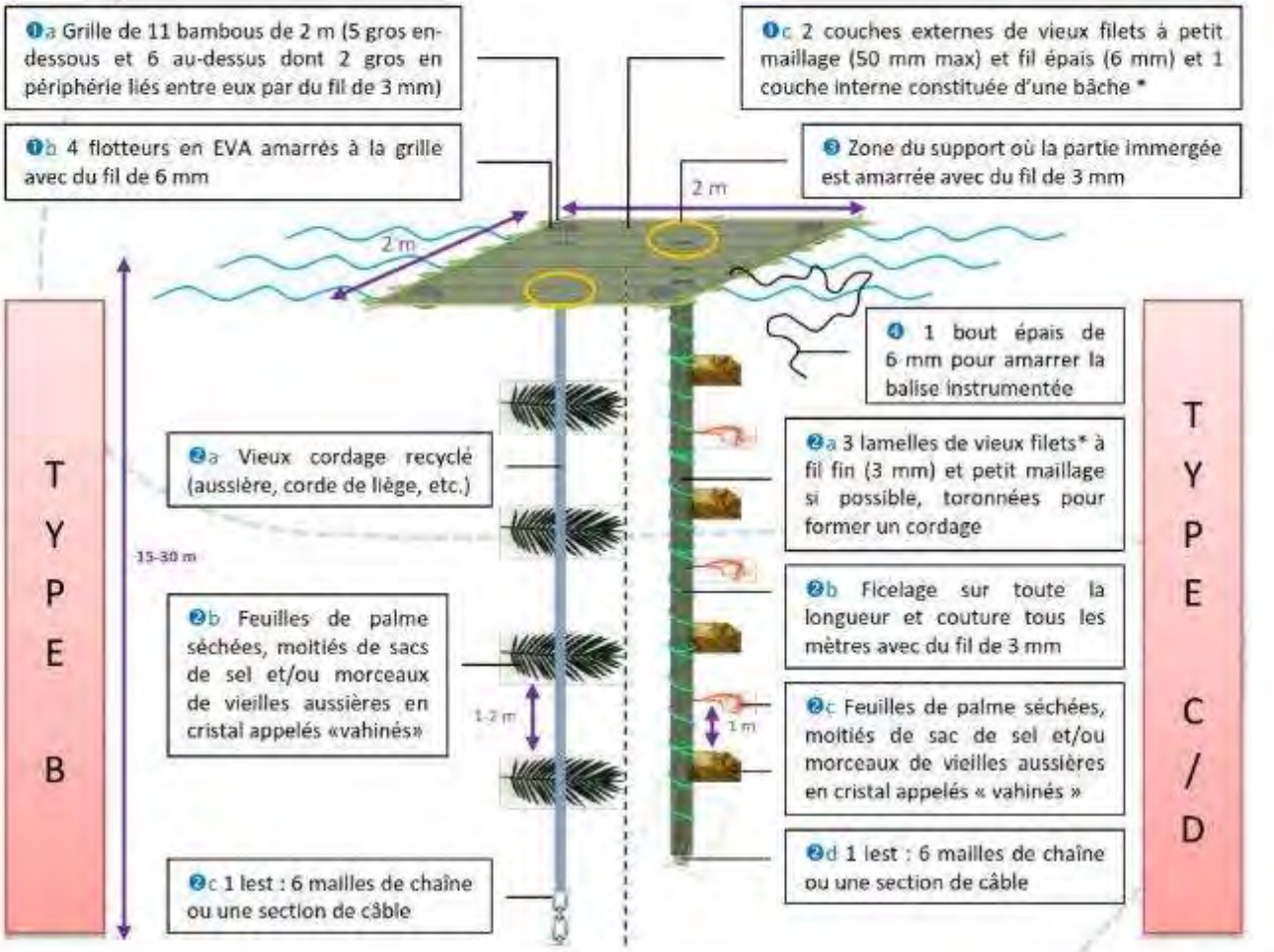
Appendix 2a

CONTRAT D'AVENIR TECHNIQUE
ORTHONGEL

DCP NON-MAILLANT OCÉAN INDIEN

COMMENT ÉVITER LE MAILLAGE DES ANIMAUX ?

- ✓ Supprimer les battants de filet sur les côtés
- ✓ Tendre au maximum les couches de filet pour supprimer leur « souplesse »
- ✓ Coudre les couches de filet ensemble pour interdire l'accès entre elles.
- ✓ Coudre les couches de filet aux bambous.



COMMENT RENFORCER LA PRISE AUX COURANTS ?

✓ Par des « vahinés », des sacs de sel et/ou des feuilles de palme séchées qui permettent d'agrandir la surface de la structure immergée pour jouer le rôle d'ancre flottante (renforcement de la prise aux courants) et le rôle de refuge (augmentation des niches et interstices).

*Vieux filets et bâches remplacés plus tard par des géofilets (ex. fil coco avec mailles 10-20 mm) et/ou des géotextiles (= DCP éco)

Appendix 2b

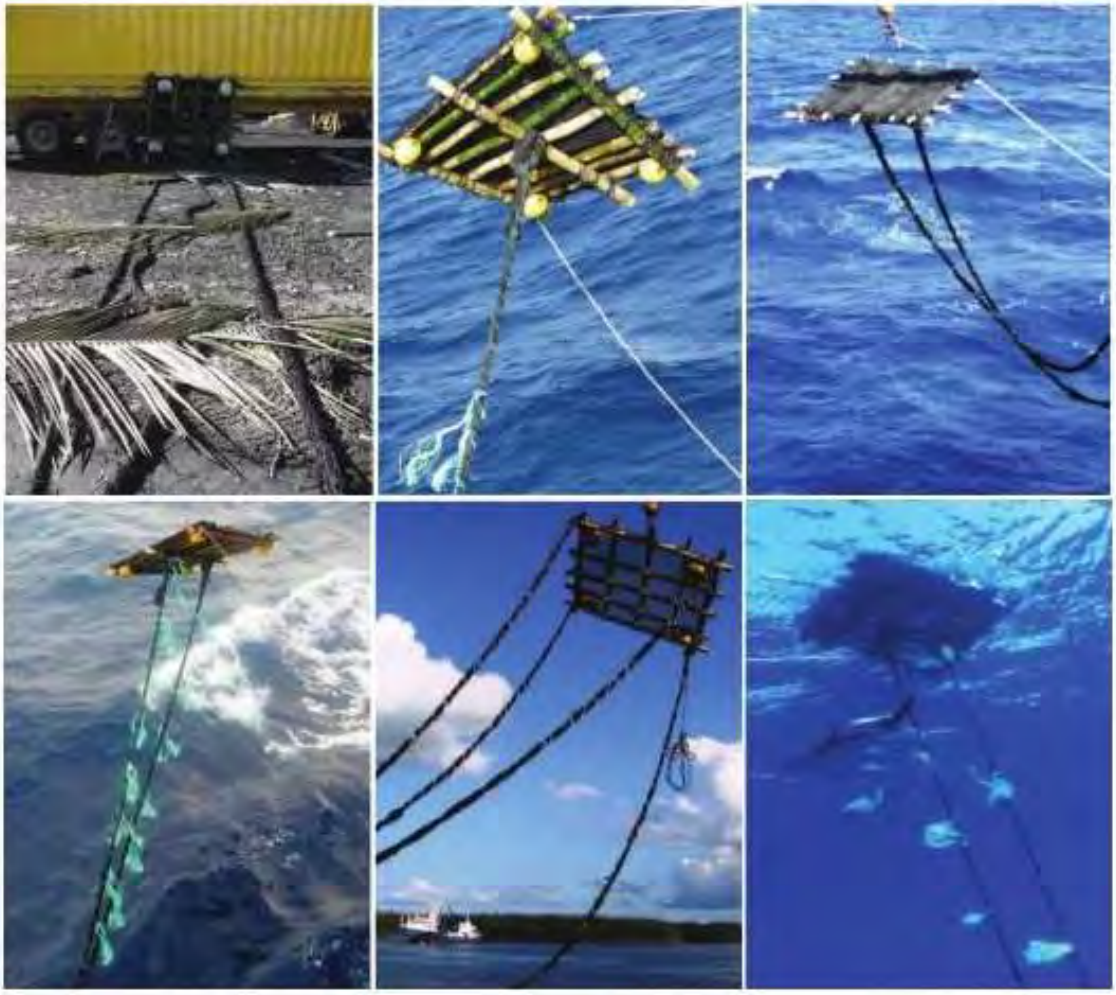
ANNEXE 3 : PHOTOS DE DCP NON-MAILLANTS

a) **DCP non-maillants en mer**

b) <u>DCP non-maillants déployés dans l'océan Indien</u>

Design B

Design C/D



Seychelles DFADs Management Plan

Received 27.04.2015

Drifting Fish Aggregation Devices (DFADs) Management Plan for Seychelles fleet fishing for tuna and tuna-like species in the IOTC area of competence

1. Objective

This Management Plan For Drifting Fish Aggregation Devices (DFADs) for Seychelles have as principal aim to provide guidelines for the use of drifting FADS by Seychelles'fleet targeting tuna and tuna-like species in the IOTC area of competence. This Management Plan fulfils Seychelles' obligations as a member of the Indian Ocean Tuna Commission (IOTC) in regards to IOTC's Resolution 13/08 (*Procedures on a Fish Aggregating Devices (FADs) Management Plan*) that requires all IOTCCPCs that use FADs to submit FAD Management Plansfor their fleets targeting tuna and tuna-like species in the IOTC area of competence.

2. Scope

The current plan applies to:

a) Seychelles flagged purse-seiners and
b) Support (or supply) vessels,
    i. under the flag of Seychelles, which operate in conjunction with purse-seiners of any flag;
    ii. of any flag, acting in support of Seychelles flagged purse seiners, provided that they are not covered by a FAD-MPs from their flag states or are not reporting DFAD logbooks to the Seychelles Authority.

Seychelles considers that support (or supply) vessels are an integral part of the purse seine fishing effort and that it is necessary to understand their operations, and the extent to which they contribute to increase the fishing efficiency of the purse seine fleet.

Seychelles vessels currently do not operate anchored FADs, so these are not covered by the current Plan.

3. Definitions

For the purpose of the DFAD- Management Plan, the term beacons is used to define radio buoys, satellite transceiver or any other electronic device used to track and retrieve DFADs.

4. Background

The term FAD stands for "Fish Aggregating Device". There are two main types of FADs: natural and man-made. Natural FADs are naturally occurring floating objects such as logs, branches, debris and large dead floating marine organisms (whales, whale sharks,

manta rays, etc). Man-made FADs are usually bamboo rafts with old nets hanging underneath and can be found either drifting or anchored.

In the open ocean many fish species including tuna, associate with objects floating on the surface, such as logs. This is highly advantageous to purse seine fishing as free swimming tuna tend to aggregate in the proximity of floating objects and remain highly aggregated making those schools more susceptible to capture by tuna purse seiners.

In the mid 1980's, skippers experimented with ways to maximize the potential of floating objects as tools to enhance fishing. Initially, reflectors and radio beacons were attached to logs to improve their detection over distances and fishers eventually started to construct purpose built Drifting Fish Aggregation Devices (DFADs) fitted with electronic buoys to simultaneously boost the number of floating objects in the ocean and further aid their detection.The most recent generation of DFADs are equipped with echo-sounders that transmit daily or hourly estimates of fish biomass beneath the buoy significantly reducing the searching time.

The increasing use of DFADs has improved catch rates thus greatly enhancing the ability of purse seiners to catch tropical tunas, and allowing boat owners to expand the capacity of their fleets in an attempt to exploit more of the resources. Thus, at present about half of the global tuna catches comes from the use of DFADs.

While DFADs are evidently useful fishing tools, their use has been associated with several potential negative ecosystem impacts such as;

- Catch of juvenile tuna (mainly yellowfin and bigeye)
- Higher levels of bycatch of non-targeted, associated and dependent species (NTAD) -such as sharks and marine turtles-, as compared to those obtained when fishing on free-swimming schools.
- Unsustainable exploitation of stocks through increased fishing effort.
- Ecological impact on marine habitat including coral reefs.
- Marine pollution (persistent marine debris)

In 2010 the IOTC adopted Resolution 10/02, which includes provisions for IOTC CPCs having industrial tuna purse seiners that use supply vessels and/or FADs to report information on the total numbers of FADs deployed by quarter and daily activities of supply vessels. However, in recent years the IOTC,recognizing the need to enhancing monitoring of activities on FADs, adopted Resolution 13/08. Resolution 13/08 calls for all IOTC CPCs that use FADs, drifting and/or anchored, to prepare and present FAD Management Plans for their fisheries, using the Guidelines provided in such resolution. Provisions in this resolution also include collection and reporting through FAD logbook.

5. Historical use of DFAD's by the Seychelles Purse seine fleet fishing for tuna and tuna-like species in the Indian Ocean.

There are very limited data on the actual number of DFAD's deployed by the Seychelles purse seine fleet and their supporting supply vessels. The logbook for purse seine vessels only make provisions for the reporting of sets made on DFAD's associated schools including the corresponding catches by species, irrespective of the type of DFAD involved (natural or man-made). Over the period 2004 to 2013 an annual average of 49,185 MT of tuna were reported as being taken on DFAD's associated schools which corresponds to an average of 73% of the total annual reported catch of this fleet. The catch composition of target species consisted on average of 63% skipjack tuna, 29% yellowfin tuna and 8% bigeye tuna.

6. Use of drifting FADS by Seychelles' purse seine fleet targeting tuna and tuna-like species in the IOTC area of competence.

This Management plan (DFAD – MP) will provide guidelines in the following nine areas:

i. Institutional arrangements for implementation of the DFAD Management Plans
ii. Deployment of DFAD (including numbers, markings and identifiers, recording of serial numbers of beacons),
iii. Fishing on DFADs,
iv. DFAD design and construction specifications,
v. Obligations of vessel owners and masters in respect of DFAD and DFAD beaconsdeployment and use,
vi. Data collection and reporting obligations (including DFAD logbook/ Observer programme),
vii. Applicable area for the DFAD–MP,
viii. Applicable period for the DFAD–MP,
ix. Means for monitoring and reviewing implementation of the DFAD–MP.

6.1 Institutional arrangements for management of the DFAD Management Plan:

The Seychelles Fishing Authority will be the entity responsible for monitoring the implementation of the DFAD – MP, and for taking action in case of infractions.

The responsibility for implementing the DFAD – MP is entrusted with the vessel owners and masters of the Seychelles flagged purse-seiners and supply vessels as defined under clauses 2(a) and 2(b).

6.2 Deployment of DFAD / DFAD beacons (including numbers and procedures)

a. Number of DFAD or DFAD beaconsto bedeployed

Noting the lack of fine-scale data on DFAD's related fishing activities and the need to regulate FAD fisheries, Seychelles *recognizes* the need for additional measures on FADs, in line with FAO Precautionary Approach to Capture Fisheries.
Seychelles will set an interim limit on the number of DFADs set and drifting at sea at any given time (i.e. equipped with beacon), at 550 FADs per tuna purse seine vessel. Therefore, the total number of DFADs that a fishing company can use will be estimated as the number of tuna purse seiners in operation at any time multiplied by 550, irrespective of whether they receive the support of supply vessels or not.

This measure will be applicable as from 1 January 2016. Following the analysis of data collected under the DFAD – MP, this interim limit could be revised basedon advice provided by the IOTC Scientific Committee.

All DFADs set by purse seine and support vessels shall be equipped with electronic devices such as radio buoys, satellite transceiver or any other device , (defined as beacons under section 3), which automatically and continuously indicate their position and allow tracking by the vessel that set the DFAD or its support vessel. Each beacon shall be activated onboard the vessels prior to deployment.

b. Application processes and approval for deployment of DFAD and DFAD beacons

No specific approval will be required prior to the deployment of a DFAD andDFAD beacons.

c. DFAD ownership

DFADs beacons or any other electronic devices used for locating DFAD should be clearly and visibly marked with the name of the fishing company owning the beacon and the name of the fishing vessel that set the device..

d. Recording of serial numbers

The serial numbers of all beacons shall be unique and recorded in the appropriate logbook at the time of deployment of the corresponding DFADs.

e. Reporting procedures for DFAD deployment and encounter

DFAD deployment, as well as all other activities related to the DFAD once it is deployed,

is to be reported in the DFAD logbooks *(see Annex I and II)*. Furthermore, whenever a scientific observer is present onboard the vessels the appropriate observer form *(Annex III)* shall also be filled in by the observer. Information to be collected include, type of DFAD deployed or visited, DFAD identification/markings, beacons type and serial number, type of operation undertaken on DFAD.

f. Monitoring and retrieval of lost DFADs

Every single DFAD must be equipped with radio buoys, satellite transceiver or any othertrackingdevice. Vessel masters are encouraged to prevent, as much as possible, loss of DFAD at sea. In the event of a loss or of the impossibility of hauling in a DFADs the master of the vessel must record in the appropriate logbook, the date it was lost and its last known position. Likewise, masters of fishing vessels shall report in the DFAD logbook of any encounter and interaction with DFADs belonging to a third party as per the same requirements applicable to the DFADs they set.

6.3 Fishing on DFADs

a. Mitigation for non-marketable specimens of tropical tunas and other by-catch

Vessels owners and masters shall do their utmost to improve purse seiners' selectivity when fishing on DFADs so as to limit bycatch and discards in particular, harvesting of non-marketable individuals of targeted species (e.g. tunas of very small size), and non-targeted species (with particular attention to sensitive species such as sharks and turtles).
Fishing around any DFAD shall be conducted in accordance with the following IOTCResolutions:

- Resolution 12/04 – On the conservation of marine turtles,
- Resolution 13/04 – On the conservation of cetaceans,
- Resolution 13/05 –On the conservation of whale shark (*Rhincodon typus*),
- Resolution 05/05 Concerning the conservation of sharks caught in association with fisheries managed by IOTC,
- Resolution 13/06 – On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries,
- Resolution 12/09 On the conservation of thresher sharks (Family Alopiidae) caught in association with fisheries in the IOTC area of competence, and
- Resolution 13/11 On a ban on discards of bigeye tuna, skipjack tuna, yellowfin tuna, and a recommendation for non-targeted species caught by purse seine vessels in the IOTC area of competence.

All reasonable measures must be undertaken under optimal security conditions for the crew, to ensure that any of these species that are incidentally caught are handled in an

appropriate manner and released alive as quickly as possible to maximize post release survival.

6.4 DFAD design and construction specifications,

a. DFAD design characteristics

The design, construction, operation and maintenance of DFADs will be the responsibility of the vessel owners and masters. As of January 1st 2016, all DFADs deployed should conform to the following design principles to mitigate the entanglement of non-target species:

- The surface structure of the DFAD should not be covered, or should only be covered with non-meshed material.
- If netting is used as a sub-surface component', it should be tied in a strand like manner so as to reduce its surface area.
- Each DFAD deployed shall be equipped with a beacon
- The use of non-meshed materials such as ropes or canvas sheets should be promoted as sub-surface component.
- To reduce the amount of synthetic marine debris, the use of natural or biodegradable materials (such as hessian canvas, hemp ropes, etc.) should be promoted.

More details on DFADs construction specifications and requirements are provided in Annex IV**.** As of 1st January 2017 all DFADs must be non-entangling DFAD's and as much as possible constructed from natural and or biodegradable materials.

6.5 Obligations of vessel owners and masters in respect of DFAD and DFAD beacons

Vessel owners and masters are responsible for the fulfillment of the obligations under the DFAD – MP, including observance of the limit on DFADs deployed, appropriate markings of DFADs, and completion of the relevant logbooks and submission of the required data.

6.6 Data collection and reporting obligations

The Commission does not currently have detailed catch and effort data on DFADs, such as how long DFADs are left in the water, composition and structure, hence unable to determine how any of those components may affect catch rates of DFADs. This information is essential to developing conservation and management measures in respect to DFADs.

Purse seine logbook (Annex I) shall be completed by the master of the vessel and

submitted to the Seychelles Fishing Authority at the end of each fishing trip.

Supply vessel logbook (Annex II) shall be completed by the master of the supply vessel and submitted to the Seychelles Fishing Authority at each port call of the supply vessel.

Observer form (Annex III) describing characteristic of DFAD's and operations undertaken on them shall be completed by an observer when present onboard the purse seiner or supply vessel.

Relevant information collected in logbooks will be compiled by the Seychelles fishing Authority and reported to the IOTC as per the requirements of IOTC Resolution 10/02.
In addition, the Seychelles will share DFAD logbooks data with any flagstate whose purse seiners receive the support of supply vessels flagged in Seychelles.

6.7 Applicable areas

The provisions of this Plan are applicable in all the areas of operation of the vessels, as described in section 2, for as long as they are flagged in Seychelles or support Seychelles flagged purse seiners.

6.8 Applicable period for the DFAD–MP

The provisions of this Management Plan will enter into effect on 1st January 2016. Provisions in this plan will be revised to accommodate any future recommendations from the IOTC, as required.

6.9 Means for monitoring and reviewing implementation of the DFAD–MP

The Seychelles Fishing Authority will be the authority responsible to compile the data needed for a proper monitoring and verification of the implementation of the DFAD – MP, including, but not necessarily limited to, logbook data, VMS data, the Seychelles National Observer Programme, and port inspections of the fishing fleet involved.

REFERENCES

Indian Ocean Tuna Commission (2013)- Resolution 13/08 *Procedures on a Fish Aggregating Devices (FADs) Management Plan*.

Indian Ocean Tuna Commission (2013)- Compendium of Active Conservation andManagement Measures for the Indian OceanTuna Commission

Annexe I: Purse seine Fishing Logbook Por favor, rellene una linea por lance (o por día cuando no hayan pescas) HOJA Nº 1

NOMBRE DEL BARCO **PATRON**

DIARIO DE PESCA (I.E.O)

Corredera Comienzo Marea (millas) **Corredera Final Marea (millas)**

PUERTO DE PARTIDA PORT VICTORIA **FECHA DE PARTIDA** **HORA (GMT)**

PUERTO DE DESCARGA **FECHA DE LLEGADA** **HORA (GMT)**

FECHA	HORA (GMT)	Nº LANCE	LANCE +	LANCE -	POSICION	CAPTURAS ESTIMADAS RABIL Captura (Tm)	RABIL Peso medio	LISTADO Captura (Tm)	LISTADO Peso medio	PATUDO Captura (Tm)	PATUDO Peso medio	OTROS Especie	OTROS Captura (Tm)	OTROS Peso medio	Nº de CUBA	OBSERVACIONES	BANCO RABIL	BANCO LISTA	OBJETO	BALIZA	PINTO	BALLENA	TIBURON	TEMP. AGUA (ºC)

ANNEXE II : SUPPLY VESSEL LOGBOOK

SALIDA / DEPARTURE		LLEGADA / ARRIVAL		PATRON / PATRON / MASTER		BARCO / VESSEL	HOJA SHEET
PUERTO / PORT		PUERTO / PORT					
DATE / FECHA		FECHA / DATE					
HORA / HOUR		HORA / HOUR		VIAJE / TRIP			
CORREDERA / LOCH		CORREDERA / LOCH					

		POSICION		LANCE		CAPTURAS ESTIMADAS (toneladas)/ Estimated catch (Tonnes)													ASOCIACION				ACTIVIDAD SOBRE LOS DCP					CORRIENTE			VIENTO		OBSERVACIONES
						YELLOWFIN		SKIPJACK		BIGEYE		ALBACORE		OTHERS																
FECHA DATE	HORA TIME	LAT.	LONG.	POSITIVO / SUCCESSFUL	NULO / NIL	CAT.	TONS	CAT.	TONS	CAT.	TONS	CAT.	TONS	ESP.	CAT.	TONS	OBJETO / RAFT	AVES / BIRDS	BALLENA / WHALE	LIBRE / FREE	MARCAS DEL DCP	ID BALIZA/ BUOY ID	TIPO BALIZA/ BUOY TYPE	TIPO DCP/ FAD TYPE	TIPO DE VISITA/ VISIT TYPE	TEMPERATURA (°C)	DIRECCION (grados)	VELOCIDAD (m/s)	DIRECCION (grados)	VELOCIDAD (nudos)	

Annex III: Scientific Observer Data Collection Programme (Seychelles)

Form D

Version 4.3 Feb. 3013

Monitoring of Drifting FADs

Form D (Drifting FADs) N°:		Date :
Form Route N°:	Route Line Nº:	Vessel IOTC N°:

FAD Activities	Tick only one box
1 - Deployed at sea	
2 - Visited without fishing	
3 - Fished	
4 - Recovered without fishing	

FAD Operation		
FAD type (T.12)		
Future status (T.13)		
Number of days deployed		
Ownership of the FAD	Unknown	
	To the vesels or same company	
	To another vessel or different company	
Name of supply vessel (if associated)		

Beacon Operation	Oper. 1	Oper. 2
Type of activity(T.14)		
Type of Beacon (T.15)		
Code of beacon		
Brand (Make) of Beacon		

Est. Size of shoal (if	
Tuna species	Est. Weight (tons)

Presence of sea turtles, sharks,		
Associated species	Status (T.16)	Number

Remarks :

Data verified (tick):	

Annexe IV: DFAD DESIGN GUIDELINES
(Guidelines developed by Orthongel, CONTRAT D'AVENIR THONIER PROGRAMME)

CONTRAT D'AVENIR THONIER
ORTHONGEL

DCP NON-MAILLANT OCÉAN INDIEN

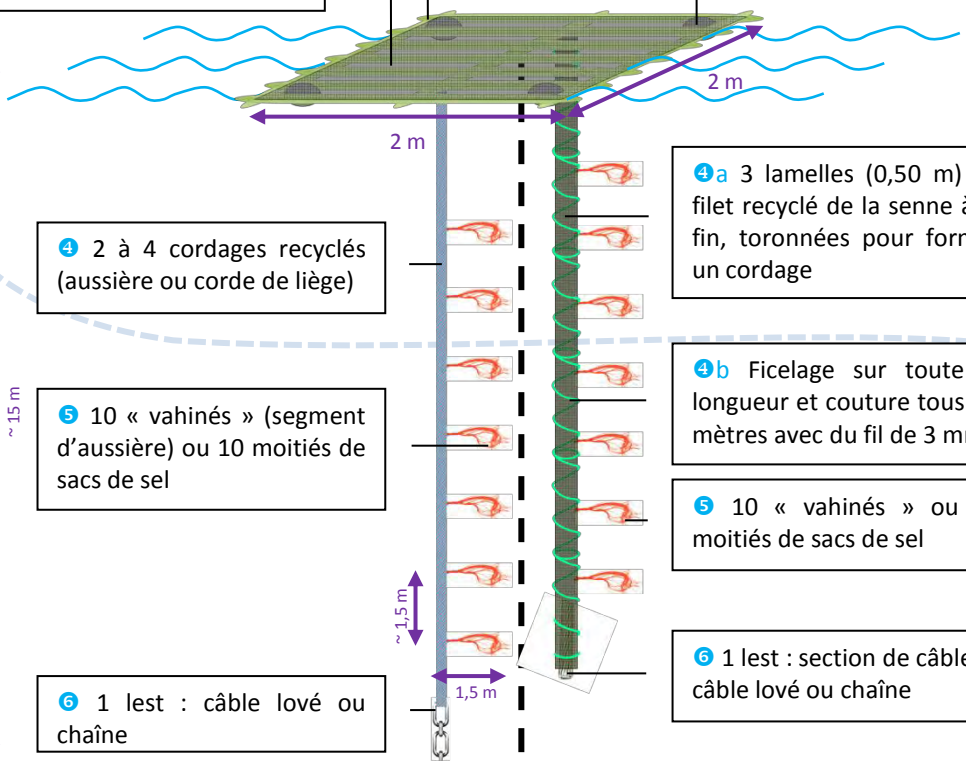
COMMENT ÉVITER LE MAILLAGE DES ANIMAUX ?

✓ Supprimer les battants de filet sur les côtés
✓ Tendre au maximum les couches de filet pour supprimer le flou.
✓ Coudre les couches de filet ensemble pour interdire l'accès entre elles.
✓ Coudre les couches de filet aux bambous.

❶ 1 grille de 10 à 12 bambous liés entre eux par du fil de 3 mm

❷ 4 flotteurs en EVA peints en gris militaire et amarrés à la grille avec du fil de 6 mm

❸ 4 couches de filet recyclé à petit maillage (50 mm) et fil épais (6 mm)



TYPE B

❹ 2 à 4 cordages recyclés (aussière ou corde de liège)

❺ 10 « vahinés » (segment d'aussière) ou 10 moitiés de sacs de sel

❻ 1 lest : câble lové ou chaîne

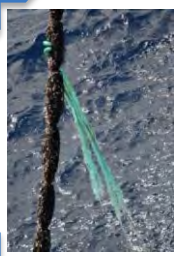
TYPE C/D

❹a 3 lamelles (0,50 m) de filet recyclé de la senne à fil fin, toronnées pour former un cordage

❹b Ficelage sur toute la longueur et couture tous les mètres avec du fil de 3 mm

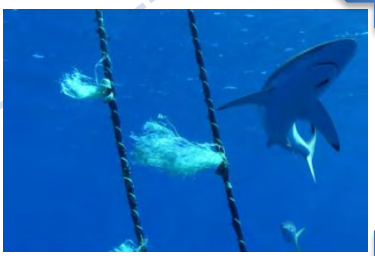
❺ 10 « vahinés » ou 10 moitiés de sacs de sel

❻ 1 lest : section de câble, câble lové ou chaîne



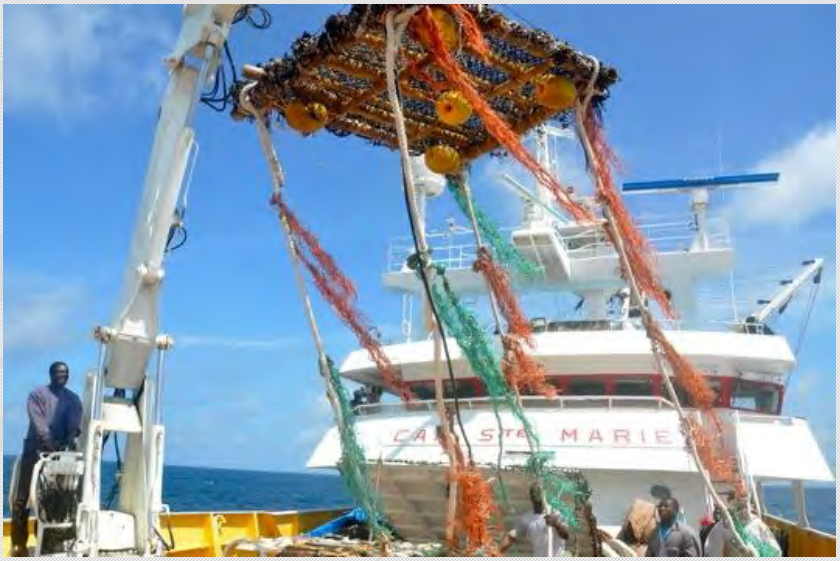
COMMENT RENFORCER LA PRISE AUX COURANTS ?

✓ Par des « vahinés » ou des sacs de sel qui permettent d'agrandir la surface de la structure immergée pour jouer le rôle d'ancre flottante (renforcement de la prise aux courants) et le rôle de refuge (augmentation des niches et interstices).

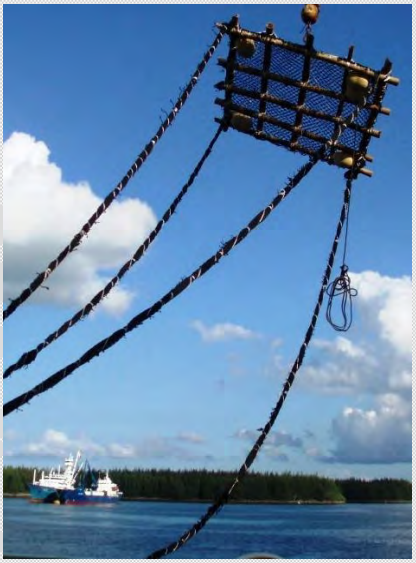


EXEMPLES DE DCP NON-MAILLANT OI

TYPE B



TYPE C/D



CONTRAT D'AVENIR THONIER
ORTHONGEL

DCP NON-MAILLANT OCÉAN ATLANTIQUE

COMMENT ÉVITER LE MAILLAGE DES ANIMAUX ?

✓ Supprimer les battants de filet sur les côtés
✓ Tendre au maximum les couches de filet pour supprimer le flou.
✓ Coudre les couches de filet ensemble pour interdire l'accès entre elles.
✓ Coudre les couches de filet aux bambous.

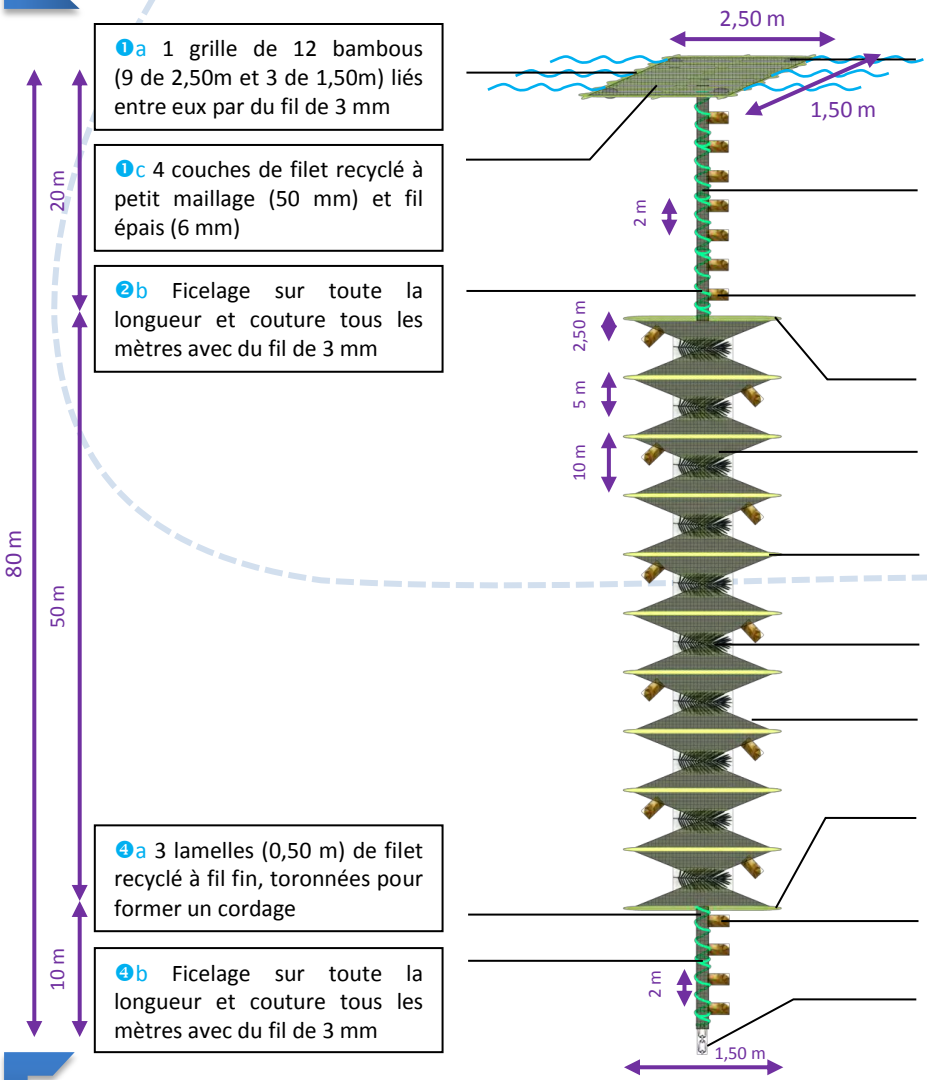
❶a 1 grille de 12 bambous (9 de 2,50m et 3 de 1,50m) liés entre eux par du fil de 3 mm

❶c 4 couches de filet recyclé à petit maillage (50 mm) et fil épais (6 mm)

❷b Ficelage sur toute la longueur et couture tous les mètres avec du fil de 3 mm

❹a 3 lamelles (0,50 m) de filet recyclé à fil fin, toronnées pour former un cordage

❹b Ficelage sur toute la longueur et couture tous les mètres avec du fil de 3 mm



❶b 4 flotteurs en EVA peints en gris militaire et amarrés à la grille avec du fil de 6 mm

❷a 3 lamelles (0,50 m) de filet recyclé à fil fin, toronnées pour former un cordage

❷c 10 « vahinés » ou 10 moitiés de sacs de sel

❸a 2 cannes de bambou (1ère)

❸b 1 nappe de filet recyclé à petit maillage et fil fin

❸c 9 lamelles de bambou (¼ d'une canne de bambou)

❸d 10 feuilles de palme séchées

❸e 10 moitiés de sacs de sel

❸a 2 cannes de bambou (dernière)

❹c 10 « vahinés » ou 10 moitiés de sacs de sel

❹d 1 lest de 6 kg : câble lové ou sac en filet avec des chaînes

COMMENT RENFORCER LA PRISE AUX COURANTS ?

✓ Par un panneau jouant le rôle d'ancre flottante (courant de sub surface)
✓ Par des « vahinés » ou des sacs de sel qui permettent d'agrandir la surface de la structure immergée pour jouer le rôle d'ancre flottante (renforcement de la prise aux courants) et le rôle de refuge (augmentation des niches et interstices).